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## EVIDENCIAS CIENTÍFICAS DEL TRATAMIENTO OSTEOPÁTICO

Las evidencias sobre el abordaje osteopático son numerosas. Por ejemplo, basta con indicar que existe una revista específica de osteopatía que cuenta con índice de impacto JCR, como es la International Journal Of Osteopathic Medicine. , y que nutriéndose exclusivamente de investigación sobre materia osteopática está incluida en las más importantes bases de datos al tratarse de una revista con índice de impacto. Por supuesto, la investigación sobre osteopatía puede encontrarse en muchísimas otras fuentes más allá de la revista anteriormente indicada ya que, al abordar la osteopatía la totalidad del sujeto, hay estudios sobre tratamiento osteopático en revistas tanto del área de la rehabilitación, como del dolor, las neurociencias, la pediatría, gastroenterología, medicina general, medicina interna... En cualquier área de la medicina y las ciencias de la salud podemos encontrar estudios publicados sobre abordaje osteopático. No pretendemos aquí describirlos todos, sino simplemente mostrar algunos ejemplos.

### OSTEOPATÍA ESTRUCTURAL

Las evidencias científicas existentes sobre la osteopatía estructural son tan numerosísimas que es imposible abordarlas todas ellas en un único texto. Por este motivo, el objetivo de este apartado será tan sólo el de hacer una muy breve composición de lugar.

Probablemente a nivel general el fisioterapeuta-osteópata suele ser relacionado sobre todo con la manipulación espinal, si bien obviamente no es la única intervención estructural que utiliza. Por supuesto, también los fisioterapeutas osteópatas investigan sobre la manipulación espinal y demuestran sus efectos positivos (Gonzalez-Iglesias et al 2009; Mendez-Sánchez et al, 2014; Vieira-Pellenz et al, 2014; Molins-Cubero et al, 2014; Casanova-Mendez et al, 2014; Espí-López et al, 2014; Espí-López et al, 2016; Bautista-Aguirre et al, 2017; Bussiéres et al, 2018). Distintas revisiones sistemáticas han demostrado que tanto las manipulaciones espinales como las técnicas articulatorias tienen efectos positivos en diversos ámbitos como la percepción de dolor, el funcionamiento del sistema nervioso autónomo, la integración somatosensorial, el control motor o la función visceral (Kingston et al, 2014; Coronado et al, 2012; Haavik et al, 2012; Bolton et al, 2012; Pickar et al, 2012). Centrados en situaciones clínicas, habitualmente la primera indicación que se suele relacionar con el tratamiento osteopático es el de los trastornos musculoesqueléticos, y especialmente el dolor lumbar. Es interesante destacar que en 2005 una revisión sistemática de ensayos clínicos (Licciardone et al,

2005) ya se demostró la efectividad del tratamiento osteopático para esta patología, y 10 años después, una nueva revisión sistemática que incorporaba los estudios existentes en ese lapso de tiempo corroboraba nuevamente la utilidad de la osteopatía en el dolor lumbar (Franke et al, 2014). De hecho, en un ensayo clínico realizado en 455 sujetos con dolor lumbar crónico el tratamiento osteopático estructural se mostró como un tratamiento seguro, eficiente y bien tolerado por los pacientes (Licciardone, 2013). En la misma línea, también revisiones sistemáticas han demostrado que la manipulación espinal es un tratamiento coste-efectivo ya sea de forma aislada o combinada con otros abordajes (Michaleff et al, 2012). Estudios recientes confirman que el tratamiento combinado es la mejor opción, alcanzándose mejores resultados mediante ejercicio más tratamiento manipulativo osteopático en dolor lumbar que haciendo sólo ejercicio (De Oliveira F, 2019). Debe añadirse que los fisioterapeutas osteópatas investigan sobre más aspectos musculoesqueléticos, no limitándose a las manipulaciones espinales (Fernandez-de-las-Peñas et al, 2008; Heredia-Rizo et al, 2013; Heredia-Rizo, Oliva-Pascual-Vaca et al, 2014, Antolinos-Campillo, Oliva-Pascual-Vaca et al, 2014). A este respecto se puede apreciar cómo el dolor lumbar presenta una disminución significativa de la sintomatología álgica tras el tratamiento del diafragma (Martí-Salvador et al, 2018).

Es interesante destacar que el tratamiento osteopático estructural ha demostrado su utilidad también en situaciones más específicas como dolor lumbar crónico en mujeres obesas (Vismara et al, 2012), así como en estudios realizados en 144 mujeres embarazadas con dolor de espalda (Licciardone et al, 2010). La capacidad del tratamiento estructural osteopático para el abordaje del dolor se ha demostrado incluso en sujetos con lesión medular (Arienti et al, 2011). Igualmente debe añadirse que las evidencias del interés del tratamiento osteopático estructural no se limitan al raquis, puesto que también hay múltiples estudios sobre la idoneidad del tratamiento de los miembros (Hsu et al, 2016; Alburquerque-Sendin et al, 2009; Lopez-Rodriguez et al, 2007).

Asimismo, hay evidencias sobre aspectos básicos del concepto osteopático estructural como por ejemplo el concepto de la hipomovilidad, la hipermovilidad reaccional y el efecto del tratamiento osteopático en la hipomovilidad. Se ha demostrado que de 202 pacientes con hernia de disco e irritación de las raíces lumbosacras, el 72% presentaron disfunción osteopática de la articulación sacroiliaca (Pezhman et al, 2013). Adicionalmente, la necesidad de un buen diagnóstico osteopático se ha demostrado pues se conoce que el efecto mecánico de la manipulación se produce exclusivamente sobre el nivel manipulado (Campbell et al, 2010). En relación a esta cuestión de los test

osteopáticos estructurales, pese a la dificultad de la puesta en marcha de estudios de validación, hay múltiples tests cuya validez ha sido demostrada, como por ejemplo distintos test osteopáticos para el raquis cervical, la primera costilla... (Rey-Eiriz et al, 2010; Hall et al, 2008; Downey et al, 2005; Lindgren et al, 1992).

Otro campo importante abarcado por la osteopatía estructural es el tratamiento del dolor irradiado. Se ha estudiado esta relación (Zhu et al, 2015) obteniéndose como resultado los beneficios de la manipulación osteopática en la radiculopatía cervical degenerativa. Esto se tradujo en un descenso significativo del dolor que presentaban los sujetos. Otro ejemplo de este tipo de efecto de las manipulaciones de alta velocidad y escasa amplitud se describe en una revisión sistemática (Galíndez et al, 2017). En este estudio se aprecia como el uso de este tipo de técnicas puede mejorar la fuerza y la sintomatología álgica en sujetos con epicondilalgia. En este mismo artículo también se observó que las manipulaciones realizadas a nivel cervical pueden disminuir la presión sanguínea en sujetos con hipertensión. Además se observó que el tratamiento osteopático fue más efectivo que el ejercicio terapéutico en estos sujetos con cervicalgia crónica.

Estos cambios producidos en la sintomatología tras las manipulaciones tienen sentido si observamos algunos estudios (Ponzo et al, 2018) que apreciaron que las técnicas osteopáticas pueden generar efectos directamente a nivel cerebral, a través de un aumento de la plasticidad cortical. Los cambios a nivel cortical también se han estudiado valorando el efecto positivo de las técnicas manipulativas en la organización de las áreas sensoriomotoras (Pelletier et al, 2018). Incluso en revisiones sistemáticas con meta-análisis se ha observado la utilidad del tratamiento manipulativo para la migraña, por su capacidad para disminuir los días de afectación y su intensidad (Rist et al, 2019).

Otro tipo de patología frecuente en la sociedad es el vértigo posicional paroxístico benigno. El tratamiento osteopático de esta patología (Papa et al, 2017) mejora los mareos y reduce la pérdida de equilibrio o inestabilidad.

En la base de la osteopatía estructural está la determinación de la rigidez y pérdida de movilidad analítica, que será objeto de tratamiento manual. Estudios recientes continúan confirmando la existencia de estas limitaciones de la movilidad segmentaria local, y la capacidad de ser determinada por palpación manual mediante el desarrollo de las habilidades palpatorias a través del entrenamiento (Tuttle & Hazle, 2018). Asi-

mismo, recientemente se continúa demostrando que las manipulaciones vertebrales normalizan el movimiento intervertebral tras su aplicación (Anderst et al, 2018).

## OSTEOPATÍA CRANEAL

El tratamiento osteopático craneal ha demostrado ser capaz de mejorar la oxigenación de los tejidos cerebrales (Xiangrong et al, 2011). Este puede ser uno de los motivos por los cuales dicho tratamiento osteopático craneal sea capaz de mejorar aspectos de la marcha en sujetos con Parkinson que el propio entrenamiento de la marcha no mejora, como es el caso de la velocidad de ejecución de la marcha (Muller et al, 2013). Asimismo, la inclusión de terapia craneosacra dentro de un protocolo de tratamiento manipulativo osteopático consiguió mejorar la función endotelial, la funcionalidad y la calidad de vida en pacientes con enfermedad arterial periférica y claudicación intermitente (Lombardini, 2009). Igualmente, el tratamiento craneosacro consiguió mejorar la sintomatología urinaria y la calidad de vida en pacientes con esclerosis múltiple (Raviv et al, 2009). Por otro lado, la aplicación de diversas técnicas manuales incluyendo técnicas de osteopatía craneal como el ear-pull, el parietal lift y otras, durante 5 meses consiguió disminuir el dolor y mejorar la calidad de vida en pacientes con fibromialgia con un periodo de seguimiento de 6 meses (Castro et al, 2011). Protocolos de tratamiento similares pero en una única aplicación consiguieron una más rápida recuperación de la inmunosupresión transitoria y de los parámetros cardiovasculares tras el ejercicio físico intenso (Arroyo et al, 2008; Arroyo et al, 2009). Igualmente, además de la mejora en los parámetros cardiovasculares, este tipo de tratamientos han demostrado conseguir mejoras en cuanto a los niveles de ansiedad del paciente (Fernández et al, 2008). En la misma línea, e incluyendo otras técnicas de osteopatía craneal como la compresión del 4º ventrículo, una única sesión de tratamiento es capaz de producir una disminución de la tensión y del dolor percibido, así como una mejora del estado de ánimo y de los parámetros cardiovasculares en pacientes con cefalea tensional crónica (Toro et al, 2009). Esta misma técnica (compresión del 4º ventrículo) fue desarrollada en otro artículo (Martins et al, 2015) en la que se estudiaba sus efectos, por medio de exámenes electroencefalográficos, en pacientes con lumbalgia. La técnica produjo una reorganización funcional de la corteza humana, traducido en un aumento de la relajación de los sujetos. Siguiendo con el dolor lumbar crónico, la terapia craneosacra también se ha mostrado efectiva para reducir la intensidad del dolor, la saturación de oxígeno, la presión arterial sistólica y los niveles de magnesio tras 10 sesiones de tratamiento (Castro-Sanchez et al, 2016). De la misma manera, la terapia craneosacra resultó efectiva y segura para reducir el dolor, la discapacidad funcional y la calidad de vida tras

8 sesiones (una por semana) y con un seguimiento de 3 meses en sujetos con dolor cervical (Haller et al, 2016). En esta línea, tras la aplicación de 6 sesiones repartidas en 4 semanas el tratamiento craneosacro obtuvo buenos resultados en sujetos con migraña (Arnadottir et al, 2013). También resultó un abordaje adecuado para los desórdenes de estrés post-traumático en soldados americanos (Davis et al, 2016) así como para las secuelas de un meningioma y lesión traumática cerebral (Haller et al, 2015) o el tinnitus con hasta un año de seguimiento (Arab et al, 2014). En mujeres embarazadas también fue útil para disminuir la intensidad del dolor matutino (Elden et al, 2013).

Una patología común a nivel craneal es la presencia de cefaleas y migrañas. En la literatura se pueden ver estudios (Cerritelli et al, 2015) que aseveran que el tratamiento osteopático, en el cual se incluyen técnicas de tipo cráneo-sacro, es efectivo para el tratamiento de migrañas en comparación con el uso de fármacos. La terapia cráneo-sacra no sólo es útil para el tratamiento de patología craneal, sino que su uso se puede conducir para generar cambios, incluso, a nivel visceral gracias al sistema nervioso vegetativo. El tratamiento osteopático acelera la recuperación de la frecuencia cardíaca y ayuda a restablecer precozmente el equilibrio simpático tras un estrés mental agudo (Fornari et al, 2017). De forma general, una revisión sistemática (Cerritelli et al, 2017) llega a la conclusión de que la terapia craneal evidencia en todos los artículos incluidos en este estudio una reducción de la sintomatología algica en las cefaleas. Otra revisión sistemática con metaanálisis más reciente confirma que la terapia cráneo-sacra tiene un efecto significativo y robusto en el dolor y la función en sujetos con dolor crónico, pudiendo mantenerse el efecto durante 6 meses (Haller et al, 2019).

La osteopatía es útil en pacientes con conmoción cerebral (Wetzler et al, 2017), ya que un tratamiento de diez sesiones osteopáticas entre las que se incluyen terapia craneosacra, manipulaciones viscerales y neurales produjeron resultados significativos en el rango de movilidad cervical, intensidad de dolor, memoria, cognición y sueño en este tipo de sujetos. Otro campo en el cual es positiva la osteopatía craneal es el de la oftalmología (Sandhouse et al, 2016), en el que se concluyó que las técnicas craneales influyen en la función visual en pacientes con asimetría craneal.

En el ámbito de la pediatría, un estudio epidemiológico desarrollado en 605 niños encontró que los trastornos posturales y de la marcha se asocian frecuentemente a la presencia de disfunciones osteopáticas craneales en niños de Educación Primaria (Silvestrini et al, 2013). En otro estudio realizado en 106 niños, se demostró la correla-

ción existente entre la disfunción mecánica del hueso en cuestión diagnosticada por el osteópata con las características dismorfológicas dentofaciales diagnosticadas por el odontólogo (Fournier-Bourgier et al, 2016). En cuanto al tratamiento de las disfunciones osteopáticas craneales, el tratamiento osteopático craneal aplicado en los primeros meses de vida consigue una mejora significativa del grado de asimetría cefálica en bebés con asimetría postural (Philippi et al, 2006), así como una mejora de las asimetrías craneales en bebés con plagiocefalia no sinostótica (Amiel-Tison C et al, 2008; Lessard et al, 2011). En el caso de la plagiocefalia no sinostótica, añadir tratamiento manual al tratamiento estándar reduce la duración del tratamiento (Cabrera-Martos et al, 2016). Adicionalmente, el tratamiento osteopático craneal aplicado a niños con otitis media aguda recurrente consiguió mejorar los timpanogramas, disminuir el número de recidivas y la necesidad de procedimientos quirúrgicos (Mills et al, 2003).

Siguiendo este ámbito de actuación, la osteopatía puede ser un tratamiento adecuado para recién nacidos prematuros, ya que puede reducir la estancia hospitalaria de los bebés hasta casi 4 días, traducándose este hecho en una disminución del costo hospitalario (Cerritelli et al, 2015). Los datos de esta investigación son similares a los de un estudio tipo metanálisis realizado en 1306 bebés prematuros (Lanaro et al, 2017). Concluyó aportando que el tratamiento osteopático realizado en los bebés prematuros generó una reducción de los días de hospitalización de 2,71 y una reducción de los costes económicos. Además, y es importante señalarlo, no hubo reacciones adversas al tratamiento de osteopatía pediátrica.

Por último, una revisión sistemática Cochrane (Dobson et al, 2012) encontró que las terapias manipulativas para el cólico infantil son muy útiles para la reducción del tiempo de llanto. Asimismo las mejoras reportadas fueron clínicamente significativas. Ensayos clínicos posteriores confirman la utilidad de la terapia craneosacra en estos casos, disminuyendo las horas de llanto, la severidad del cólico e incrementando las horas totales de sueño (Castejón-Castejón et al, 2019).

## OSTEOPATÍA VISCERAL

Para un buen tratamiento osteopático es fundamental partir de un diagnóstico preciso, y conocer las estructuras que están causando el problema que presenta el paciente. Estudios recientes muestran que existe una infraconsideración del origen visceral de los síntomas musculoesqueléticos, y que esto puede contribuir a explicar que los tratamientos habituales que sólo tratan a nivel musculoesquelético obtengan como mucho

un efecto limitado y sólo a corto plazo (Oliva-Pascual-Vaca, 2019). La osteopatía siempre ha tenido en cuenta al sistema visceral dentro de las posibles causas o estructuras participantes en el cuadro sintomatológico del paciente. Estudios realizados en 38.050 mujeres han demostrado una estrecha asociación entre el dolor de espalda y los trastornos viscerales, proponiendo los autores que la causa principal de esta estrecha relación es el desarrollo de reflejos viscerosomáticos (Smith et al, 2008), en los cuales el dolor de espalda no es más que la consecuencia del sufrimiento visceral primario. Teniendo en cuenta que el dolor originado en los órganos internos constituye una de las más frecuentes formas de dolor experimentado por los sujetos en el curso de sus vidas (Giamberardino et al, 2010), y que se sabe que el dolor referido a nivel somático puede ser la única manifestación de un sufrimiento visceral (Jalali, 2014), todo clínico que se relacione con cuadros de dolor debe considerar el posible origen visceral del mismo. En todo momento debe tenerse presente que la percepción de dolor en regiones distintas (incluso muy alejadas) del órgano afectado es la regla en la nocicepción visceral, siendo probablemente este hecho consecuencia de la convergencia de aferentes somáticos y viscerales en las mismas neuronas sensoriales (Giamberardino, 2010). Además, debe tenerse presente que el dolor miofascial y los puntos gatillo miofasciales pueden ser originados por una disfunción visceral primaria (Travell & Simons, 2005; Gerwin, 2002). Se ha demostrado que la colocación experimental de una piedra artificial en el uréter de ratas produjo como consecuencia un aumento del tono de la musculatura relacionada metaméricamente con esa víscera (Giamberardino et al, 2003), lo que mantenido en el tiempo obviamente puede dar lugar a la aparición de puntos gatillo secundarios y dolor miofascial. También en relación al riñón, en un estudio realizado sobre 140 sujetos con dolor lumbar y 101 sujetos asintomáticos, se ha demostrado que los sujetos con dolor lumbar presentan una disminución de la movilidad renal durante la respiración diafragmática, medida mediante ecografía, respecto a los sujetos sanos (Tozzi et al, 2012). En ese mismo estudio observaron que el tratamiento osteopático del riñón afecto producía una disminución del dolor y aumento de la movilidad.

Por todo ello, el osteópata y resto de clínicos que se enfrentan a cuadros de dolor, debe considerar el posible origen visceral de la sintomatología del paciente. De hecho, se conoce que existen numerosas asociaciones entre la disfunción somática y hallazgos anatómicos anormales durante endoscopia (Snider et al, 2016).

La efectividad del abordaje manual visceral cuenta con numerosos estudios que lo apoyan, incluso en modelos animales, que han demostrado que la movilización visce-

ral en ratas puede prevenir y eliminar adherencias peritoneales post-quirúrgicas (Bove et al, 2012), cuyos efectos nocivos para la salud son de sobra conocidos. También en modelos animales con ileo se ha observado el efecto positivo de la intervención manual visceral (Chapelle et al, 2013). En cuanto a la eficacia del tratamiento osteopático visceral a nivel gastrointestinal en humanos, en un estudio desarrollado por fisioterapeutas osteópatas el tratamiento manual de la hernia de hiato en sujetos con reflujo gastroesofágico fue capaz de obtener significativamente mejores resultados que una maniobra control en cuanto a las presiones ejercidas por el esfínter esofágico inferior (Correa-Vieira, Oliva-Pascual-Vaca et al, 2013), lo que puede conducir a eliminar la estimulación frénica y su posterior manifestación somática en forma de dolor. Así, el tratamiento osteopático y el tratamiento miofascial han demostrado disminuir la afectación por reflujo gastroesofágico, disminuyendo incluso la necesidad de consumo de medicación, y mejorando la movilidad y el dolor cervical (Martinez-Hurtado et al, 2019; Eguiaras, Ricard & Oliva-Pascual-Vaca, 2019). También se ha observado una mejora de los síntomas gastrointestinales, junto con una mejora de los patrones comportamentales, en niños autistas tras la aplicación de tratamiento osteopático visceral (Bramati-Castellarin et al, 2016). Por otro lado, el abordaje manual del intestino ha demostrado ser eficaz para el estreñimiento en sujetos con esclerosis múltiple (McClurg et al, 2008), en sujetos con lesión espinal (Ayas et al, 2006) y en sujetos estreñidos sin ninguna otra particularidad (Lamas et al, 2015). También fue efectivo para la mejora de sujetos con neumonía, intubados y con nutrición enteral (Kahraman et al, 2015). Asimismo, se conoce que el tratamiento manual intestinal disminuye el volumen residual gástrico (Uysal et al, 2012), y previene la intolerancia alimentaria en niños pretérmino (Tekgunduz et al, 2012). Adicionalmente, el tratamiento visceral mejora la distensión abdominal, el dolor y la sensibilidad rectal a corto y largo plazo en sujetos con colon irritable (Attali et al, 2013), todo lo cual nos confirma que el abordaje manual de las vísceras mejora la función visceral. Además de esto, los efectos del tratamiento osteopático visceral también tienen manifestaciones somáticas, como se demostró en sujetos con estreñimiento y en sujetos sanos, en los que tras el tratamiento se observó un aumento de la movilidad lumbar y de los umbrales de dolor en las metámeras relacionadas con la inervación ortosimpática intestinal (McSweeney et al, 2012; Martínez-Ochoa, 2018). La disfunción del mesenterio y del colon sigmoides y sus adherencias a tejido peritoneal puede dar lugar a atrapamiento del nervio pudiendo. El tratamiento osteopático visceral, junto con tratamiento estructural y craneosacro da buenos resultados que se mantienen incluso 5 años después del tratamiento (Lafave, 2012).

A nivel del sistema uroginecológico, tal y como se citó anteriormente, el tratamiento osteopático del riñón aumentó la movilidad y disminuyó el dolor en sujetos con dolor lumbar crónico (Tozzi et al, 2012). En el caso de la ptosis renal, el tratamiento osteopático del riñón para reducir la ptosis es capaz de eliminar la sintomatología dolorosa (Lalonde, 2014). Incluso los propios urólogos son conocedores de la posibilidad de corrección manual de la ptosis renal con resolución de los síntomas (Srirangam et al, 2009). Adicionalmente, el tratamiento osteopático visceral en mujeres con infertilidad funcional ha mostrado ser capaz de aumentar la permeabilidad tubárica (Kwurn et al, 2008), además de mejorar el porcentaje de embarazos (Kwurn et al, 2008; Kramp et al, 2012).

El tratamiento osteopático del hígado, bazo y la bomba linfática ha demostrado ser capaz de mejorar la respuesta inmunitaria tras una única sesión de 7 minutos (Walkowski, 2014). También el tratamiento osteopático es útil para el abordaje de la discinesia biliar, que es un desorden funcional gastrointestinal de la vesícula biliar y del esfínter de Oddi, hasta el punto de ser capaz de resolver completamente el cuadro de cólico biliar (Heineman, 2014). Por su parte, el tratamiento osteopático del hígado mediante técnicas de bombeo consiguió aumentar el flujo portal y por consiguiente la función hepática no solo inmediatamente, sino que tras 30 minutos permaneció incrementado (Rodríguez—López & Oliva-Pascual-Vaca, 2017). Además, en dicho estudio se observó un aumento en el umbral de dolor en las metámeras relacionadas con la inervación ortosimpática del hígado. Esta mejora de la función hepática por la aplicación de técnicas osteopáticas de bombeo se observó también a nivel plasmático pues, aplicadas con un cierto seguimiento (6 sesiones durante 3 semanas a razón de 2 sesiones semanales), fueron capaces de disminuir los niveles de las enzimas hepáticas (GPT, GOT, GGT) en sujetos con hígado graso no alcohólico (Reis, 2017). En pacientes en quimioterapia por cáncer de mama, el tratamiento osteopático visceral disminuye el malestar digestivo percibido (Lagrange et al, 2019).

Por último, en cuanto a la influencia del tratamiento osteopático visceral sobre síntomas somáticos, por ejemplo se ha demostrado su eficacia en situaciones clínicas como la migraña (Karen-Voigt et al, 2011). Otro estudio reciente también encontró que el tratamiento osteopático visceral fue eficaz para abordar el dolor, la calidad de vida y la función en sujetos con dolor lumbar crónico (Tamer et al, 2016), en la misma línea de los resultados clínicamente relevantes obtenidos con un seguimiento de un año en sujetos con dolor lumbar a los que también se aplicó manipulación visceral (Panago-

poulos et al, 2015).

Otro campo de actuación importante que abarca la osteopatía es el respiratorio. Esto se puede percibir en cómo la manipulación del ganglio esfenopalatino produce una mejoría en la estabilidad faríngea, evaluada por la presión crítica del cierre, en sujetos que presentan apnea obstructiva del sueño (Jacq et al, 2017); o en la mejoría de la función pulmonar (disminución del volumen residual, aumento de capacidad inspiratoria y aumento de la saturación de oxígeno) tras el tratamiento de tejidos blandos (Cruz-Montesinos et al, 2017). Por otra parte, se ha demostrado que el tratamiento osteopático mejora la movilidad del diafragma (Mancini et al, 2019).

En general, la satisfacción de los pacientes al tratamiento osteopático queda evidenciado en un metanálisis (Slattengren et al, 2017) en el que se observa cómo la osteopatía produce una mejoría de los síntomas y de la funcionalidad de los sujetos ante patologías de tipo cervicalgias, migrañas, postoperatorio gastrointestinal...

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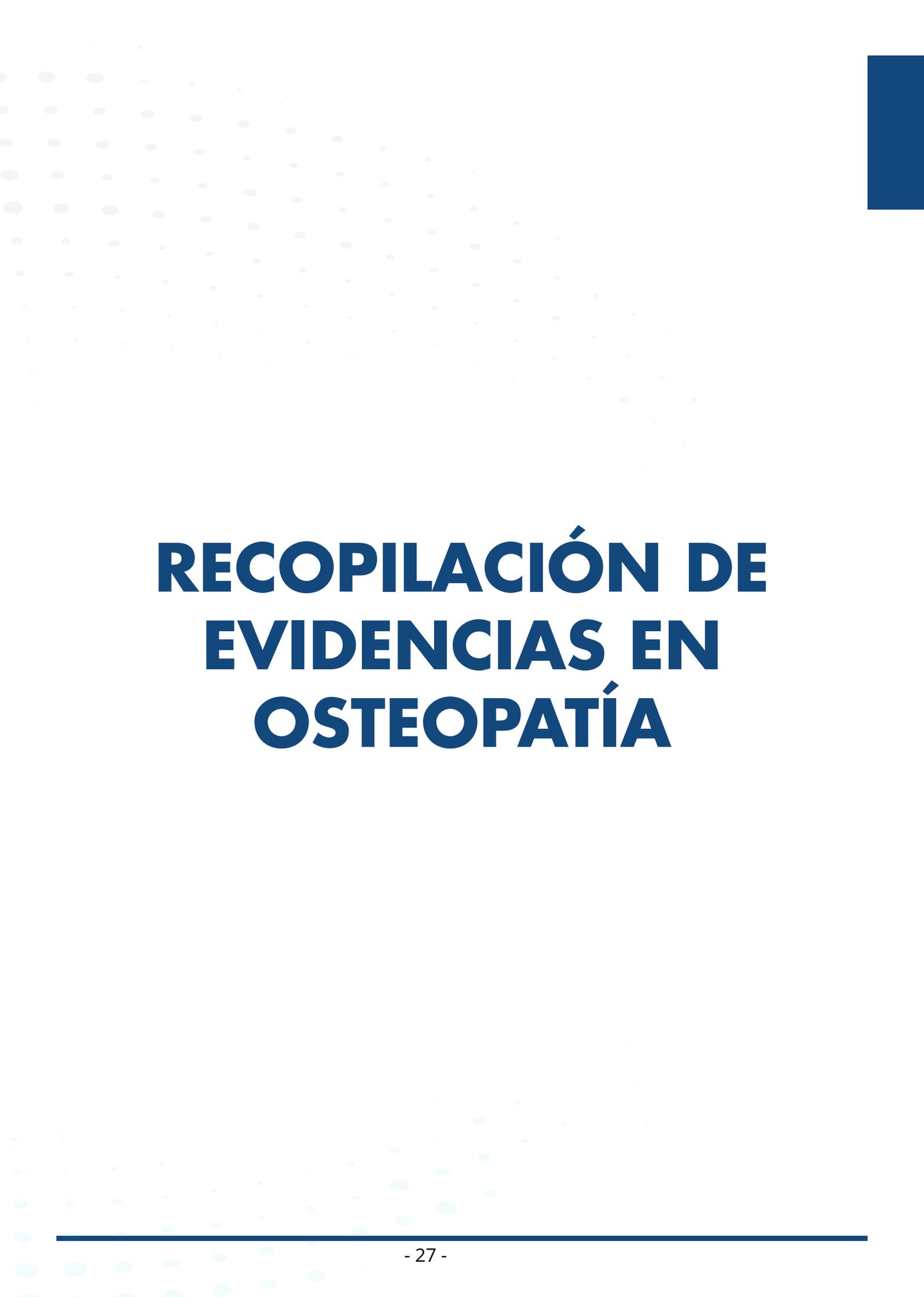
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# **RECOPILOCIÓN DE EVIDENCIAS EN OSTEOPATÍA**



## Osteopathy for primary headache patients: a systematic review.

By Cerritelli F, Lacorte E, Ruffini N, Vanacore N.

J Pain Res. 2017 Mar 14;10:601-611

### OBJECTIVE:

This systematic review aimed to assess the efficacy, effectiveness, safety, and tolerability of osteopathic manipulative treatment (OMT) in patients with headache.

### BACKGROUND:

Migraine is one of the most common and disabling medical conditions. It affects more than 15% of the general population, causing high global socioeconomic costs, and the currently available treatment options are inadequate.

### METHODS:

We systematically reviewed all available studies investigating the use of OMT in patients with migraine and other forms of headache.

### RESULTS:

The search of literature produced six studies, five of which were eligible for review. The reviewed papers collectively support the notion that patients with migraine can benefit from OMT. OMT could most likely reduce the number of episodes per month as well as drug use. None of the included studies, however, was classified as low risk of bias according to the Cochrane Collaboration's tool for assessing risk of bias.

### CONCLUSION:

The results from this systematic review show a preliminary low level of evidence that OMT is effective in the management of headache. However, studies with more rigorous designs and methodology are needed to strengthen this evidence. Moreover, this review suggests that new manual interventions for the treatment of acute migraine are available and developing.



<https://www.ncbi.nlm.nih.gov/pubmed/28352200>

## The role of osteopathy in the Swiss primary health care system: a practice review. B

By Vaucher P, Macdonald RJD, Carnes D.

BMJ Open. 2018 Sep 1;8(8):e023770.

### OBJECTIVES:

The aim of this study was to describe osteopathic activity and scope of practice to understand the current and future role of osteopathy in the Swiss healthcare system.

### DESIGN:

A questionnaire survey that included a patient record-based retrospective clinical audit.

### SETTING/POPULATION:

Osteopaths with a national diploma (n=1086) were invited by mail to participate in an online survey. Osteopathic assistants (n=84) were identified through their national association.

### QUESTIONNAIRE:

The survey was constructed from previous surveys and tested for face validity with experts, osteopaths and patient representatives. The questionnaires were completed online in English, German and French between April and August 2017. Osteopaths anonymously reported information about themselves, their practice, and the treatment and care for four randomly selected patients they managed in 2016.

### RESULTS:

The response rate from the survey was 44.5% (521/1171). Data on osteopathic care were collected for 1144 patients and 3449 consultations. In 2016, osteopaths saw approximately 6.8% of the Swiss population for 1700 000 consultations and an overall estimated cost of 200 million Swiss francs. 76% of patients sought care directly without a referral from another care provider. Few osteopaths (<1%) work in a hospital setting

and 46% work in isolation in private practice. Infants (under 2 years old) made up 10% of all patients and 9% of patients were  $\geq 65$  years. Patients most commonly sought treatment for musculoskeletal conditions (81%) with the spine being the most frequent location (66%). Treatments also included exercise advice (34.2%) and lifestyle management (35.4%). Fewer than 1 patient out of 10 were referred to another health profession or provider.

## CONCLUSIONS:

In Switzerland, osteopathic care represents an important first line management for musculoskeletal conditions that alleviates some of the burden of care in the Swiss primary healthcare system.



<https://www.ncbi.nlm.nih.gov/pubmed/30173163>

## Outpatient Satisfaction With Osteopathic Manipulative Treatment in a Hospital Center: A Survey.

By Tramontano M, Martino Cinnera A, Petracca M, Gaeta A, Tamburella F, Audouard M, Caltagirone C.

Altern Ther Health Med. 2017

### CONTEXT

Although osteopathy is not yet certified as a health profession in Italy, many people choose osteopathic manipulative treatment (OMT) for pain relief. Nevertheless, no study evaluating patients' degree of satisfaction after OMT and the perceived quality of the treatment has occurred in Italy.

### OBJECTIVES

The study intended to assess outpatients' satisfaction with OMT carried out at a hospital. Design • The research team conducted a survey from January 2015 to January 2016 using 3 questionnaires.

### SETTING

The study took place the Fondazione Santa Lucia Hospital (Rome, Italy), an institute for research and health care.

### PARTICIPANTS

Participants were 101 patients with musculoskeletal (MSK) disorders undergoing OMT at the hospital.

### INTERVENTIONS

The OMT was performed by 3 osteopathic practitioners who had completed the 6-y, part-time training program recognized by the Italian Register of Osteopaths.

### OUTCOME MEASURES

To measure the level of their satisfaction, the research team had patients complete the

modified patient satisfaction questionnaire (mPSQ), the patient satisfaction with outpatient physical therapy (PSOPT) instrument, and the visual analog scale for satisfaction (VASS). Parametric and nonparametric analyses were performed to correlate the questionnaires and the demographic variables using the Pearson and Spearman tests.

## RESULTS

Data were obtained from 97 patients, with mean age of  $42.48 \pm 16.1$  y, 50 of whom were female. The data showed high, average general satisfaction after OMT: VASS- $9.36 \pm 1.00$  and (2) PSOPT- $43.27 \pm 3.65$ . A significant negative correlation was found between access to care (D1-TOT) on the mPSQ and at ages older than 65 y- $r = -0.24$  and  $P < .05$ . A significant positive correlation was found between the VASS and female gender- $r = 0.23$  and  $P < .05$ . A significant positive correlation was also found between continuity of care (D3-TOT) and continuity of care-family (D3-1) on the mPSQ and education level- $r = .20$  and  $P < .05$  and  $r = 0.24$ ,  $P < .05$ , respectively, and with other dimensions explored by the questionnaires.

## CONCLUSIONS

The data show a high level of general satisfaction in patients with MSK disorders who underwent OMT in an Italian hospital setting. The overall satisfaction rate was mainly influenced by the patient's perception of the practitioner's technical quality, the continuity of the treatment, and the cost of the service. Some differences emerged for age, gender, and educational level. The information from the current study may be useful for improving the therapeutic assistance provided with OMT and to promote alternative therapies in health and medicine.



<https://www.ncbi.nlm.nih.gov/pubmed/29101775>

## Association of Spinal Manipulative Therapy With Clinical Benefit and Harm for Acute Low Back Pain: Systematic Review and Meta-analysis.

Paige NM, Miake-Lye IM, Booth MS, Beroes JM, Mardian AS, Dougherty P et al.

JAMA. 2017; 317 (14): 1451-1460.

### IMPORTANCE

Acute low back pain is common and spinal manipulative therapy (SMT) is a treatment option. Randomized clinical trials (RCTs) and meta-analyses have reported different conclusions about the effectiveness of SMT.

### OBJECTIVE

To systematically review studies of the effectiveness and harms of SMT for acute ( $\leq 6$  weeks) low back pain. DATA SOURCES: Search of MEDLINE, Cochrane Database of Systematic Reviews, EMBASE, and Current Nursing and Allied Health Literature from January 1, 2011, through February 6, 2017, as well as identified systematic reviews and RCTs, for RCTs of adults with low back pain treated in ambulatory settings with SMT compared with sham or alternative treatments, and that measured pain or function outcomes for up to 6 weeks. Observational studies were included to assess harms.

### DATA EXTRACTION AND SYNTHESIS

Data extraction was done in duplicate. Study quality was assessed using the Cochrane Back and Neck (CBN) Risk of Bias tool. This tool has 11 items in the following domains: randomization, concealment, baseline differences, blinding (patient), blinding (care provider [care provider is a specific quality metric used by the CBN Risk of Bias tool]), blinding (outcome), co-interventions, compliance, dropouts, timing, and intention to treat. Prior research has shown the CBN Risk of Bias tool identifies studies at an increased risk of bias using a threshold of 5 or 6 as a summary score. The evidence was assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria.

### MAIN OUTCOMES AND MEASURES

Pain (measured by either the 100-mm visual analog scale, 11-point numeric rating sca-

le, or other numeric pain scale), function (measured by the 24-point Roland Morris Disability Questionnaire or Oswestry Disability Index [range, 0-100]), or any harms measured within 6 weeks.

## FINDINGS

Of 26 eligible RCTs identified, 15 RCTs (1711 patients) provided moderate-quality evidence that SMT has a statistically significant association with improvements in pain (pooled mean improvement in the 100-mm visual analog pain scale, -9.95 [95% CI, -15.6 to -4.3]). Twelve RCTs (1381 patients) produced moderate-quality evidence that SMT has a statistically significant association with improvements in function (pooled mean effect size, -0.39 [95% CI, -0.71 to -0.07]). Heterogeneity was not explained by type of clinician performing SMT, type of manipulation, study quality, or whether SMT was given alone or as part of a package of therapies. No RCT reported any serious adverse event. Minor transient adverse events such as increased pain, muscle stiffness, and headache were reported 50% to 67% of the time in large case series of patients treated with SMT.

## CONCLUSIONS AND RELEVANCE

Among patients with acute low back pain, spinal manipulative therapy was associated with modest improvements in pain and function at up to 6 weeks, with transient minor musculoskeletal harms. However, heterogeneity in study results was large.



<https://www.ncbi.nlm.nih.gov/pubmed/28399251>

## Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians.

Qaseem A, Wilt TJ, McLean RM, Forciea MA; Clinical Guidelines Committee of the American College of Physicians.

Ann Intern Med. 2017 Apr 4;166(7):514-530.

### DESCRIPTION:

The American College of Physicians (ACP) developed this guideline to present the evidence and provide clinical recommendations on noninvasive treatment of low back pain.

### METHODS:

Using the ACP grading system, the committee based these recommendations on a systematic review of randomized, controlled trials and systematic reviews published through April 2015 on noninvasive pharmacologic and nonpharmacologic treatments for low back pain. Updated searches were performed through November 2016. Clinical outcomes evaluated included reduction or elimination of low back pain, improvement in back-specific and overall function, improvement in health-related quality of life, reduction in work disability and return to work, global improvement, number of back pain episodes or time between episodes, patient satisfaction, and adverse effects.

### TARGET AUDIENCE AND PATIENT POPULATION:

The target audience for this guideline includes all clinicians, and the target patient population includes adults with acute, subacute, or chronic low back pain.

### RECOMMENDATION 1:

Given that most patients with acute or subacute low back pain improve over time regardless of treatment, clinicians and patients should select nonpharmacologic treatment with superficial heat (moderate-quality evidence), massage, acupuncture, or spinal manipulation (low-quality evidence). If pharmacologic treatment is desired, clinicians and patients should select nonsteroidal anti-inflammatory drugs or skeletal muscle relaxants (moderate-quality evidence). (Grade: strong recommendation).

## RECOMMENDATION 2:

For patients with chronic low back pain, clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction (moderate-quality evidence), tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation (low-quality evidence). (Grade: strong recommendation).

## RECOMMENDATION 3:

In patients with chronic low back pain who have had an inadequate response to nonpharmacologic therapy, clinicians and patients should consider pharmacologic treatment with nonsteroidal anti-inflammatory drugs as first-line therapy, or tramadol or duloxetine as second-line therapy. Clinicians should only consider opioids as an option in patients who have failed the aforementioned treatments and only if the potential benefits outweigh the risks for individual patients and after a discussion of known risks and realistic benefits with patients. (Grade: weak recommendation, moderate-quality evidence).

DOI: 10.7326/M16-2367.



<https://www.ncbi.nlm.nih.gov/pubmed/28192789>

## Effect of osteopathic visceral manipulation on pain, cervical range of motion, and upper trapezius muscle activity in patients with chronic nonspecific neck pain and functional dyspepsia: a randomized, double blind, placebo-controlled pilot study.

Silva ACD, Biasotto-Gonzalez DA, Oliveira FH, Andrade AO, Gomes CAFD, Lanza FD, Amorim CF, Politti F.

Evid Based Compl Alternative Med. 2018: 4929271.

### ABSTRACT

Previous studies have reported that visceral disturbances can lead to increased musculoskeletal tension and pain in structures innervated from the corresponding spinal level through viscerosomatic reflexes. We designed a pilot randomised placebocontrolled study using placebo visceral manipulation as the control to evaluate the effect of osteopathic visceral manipulation (OVM) of the stomach and liver on pain, cervical mobility, and electromyographic activity of the upper trapezius (UT) muscle in individuals with nonspecific neck pain (NS-NP) and functional dyspepsia. Twenty-eight NS-NP patients were randomly assigned into two groups: treated with OVM (OVMG; n = 14) and treated with placebo visceral manipulation (PVMG; n = 14). The effects were evaluated immediately and 7 days after treatment through pain, cervical range, and electromyographic activity of the UT muscle. Significant effects were confirmed immediately after treatment (OVMG and PVMG) for numeric rating scale scores ( $p < 0.001$ ) and pain area ( $p < 0.001$ ). Significant increases in EMG amplitude were identified immediately and 7 days after treatment for the OVMG ( $p < 0.001$ ). No differences were identified between the OVMG and the PVMG for cervical range of motion ( $p > 0.05$ ). This study demonstrated that a single visceral mobilisation session for the stomach and liver reduces cervical pain and increases the amplitude of the EMG signal of the UT muscle immediately and 7 days after treatment in patients with nonspecific neck pain and functional dyspepsia.



<https://www.hindawi.com/journals/ecam/2018/4929271/>

## Spinal manipulation or mobilization for radiculopathy: a systematic review.

Leininger B, Bronfort G, Evans R, Reiter T.

Phys Med Rehabil Clin N Am. 2011 Feb;22(1):105-25.

### ABSTRACT

In this systematic review, we present a comprehensive and up-to-date systematic review of the literature as it relates to the efficacy and effectiveness of spinal manipulation or mobilization in the management of cervical, thoracic, and lumbar-related extremity pain. There is moderate quality evidence that spinal manipulation is effective for the treatment of acute lumbar radiculopathy. The quality of evidence for chronic lumbar spine-related extremity symptoms and cervical spine-related extremity symptoms of any duration is low or very low. At present, no evidence exists for the treatment of thoracic radiculopathy. Future high-quality studies should address these conditions.



<https://www.ncbi.nlm.nih.gov/pubmed/21292148>

## Does cervical spine manipulation reduce pain in people with degenerative cervical radiculopathy? A systematic review of the evidence, and a meta-analysis.

Zhu L, Wei X, Wang S.

Clin Rehabil. 2016; 30 (2): 145-55.

### OBJECTIVE:

To assess the effectiveness and safety of cervical spine manipulation for cervical radiculopathy.

### DATA SOURCES:

PubMed, the Cochrane Central Registry of Controlled Trials (CENTRAL) in the Cochrane Library, EMBASE, Chinese Biomedical Literature Database (CBM), Chinese National Knowledge Infrastructure (CNKI), Chinese Scientific Journal Database (VIP), Wanfang data, the website of Chinese clinical trial registry and international clinical trial registry by US National Institutes of Health.

### REVIEW METHODS:

Randomized controlled trials that investigated the effects of cervical manipulation compared with no treatment, placebo or conventional therapies on pain measurement in patients with degenerative cervical radiculopathy were searched. Two authors independently evaluated the quality of the trials according to the risk of bias assessment provided by the PEDro (physiotherapy evidence database) scale. RevMan V.5.2.0 software was employed for data analysis. The GRADE approach was used to evaluate the overall quality of the evidence.

### RESULTS:

Three trials with 502 participants were included. Meta-analysis suggested that cervical spine manipulation (mean difference 1.28, 95% confidence interval 0.80 to 1.75;  $P < 0.00001$ ; heterogeneity:  $\text{Chi}(2) = 8.57$ ,  $P = 0.01$ ,  $I(2) = 77\%$ ) improving visual analogue scale for pain showed superior immediate effects compared with cervical computer traction. The overall strength of evidence was judged to be moderate quality. One out of three trials reported the adverse events and none with a small sample size. CON-

CONCLUSION: There was moderate level evidence to support the immediate effectiveness of cervical spine manipulation in treating people with cervical radiculopathy. The safety of cervical manipulation cannot be taken as an exact conclusion so far.



<https://www.ncbi.nlm.nih.gov/pubmed/25681406>

## Are manual therapies, passive physical modalities, or acupuncture effective for the management of patients with whiplash-associated disorders or neck pain and associated disorders? An update of the Bone and Joint Decade Task Force on Neck Pain and Its Associated Disorders by the OPTIMa collaboration.

Wong JJ, Shearer HM, Mior S, Jacobs C, Côté P, Randhawa K et al.

Spine J. 2016 Dec;16(12):1598-1630. doi: 10.1016/j.spinee.2015.08.024. Epub 2015 Dec 17.

### BACKGROUND CONTEXT:

In 2008, the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders (Neck Pain Task Force) found limited evidence on the effectiveness of manual therapies, passive physical modalities, or acupuncture for the management of whiplash-associated disorders (WAD) or neck pain and associated disorders (NAD). PURPOSE: This review aimed to update the findings of the Neck Pain Task Force, which examined the effectiveness of manual therapies, passive physical modalities, and acupuncture for the management of WAD or NAD.

### STUDY DESIGN/SETTING:

This is a systematic review and best evidence synthesis.

### SAMPLE:

The sample includes randomized controlled trials, cohort studies, and case-control studies comparing manual therapies, passive physical modalities, or acupuncture with other interventions, placebo or sham, or no intervention.

### OUTCOME MEASURES:

The outcome measures were self-rated or functional recovery, pain intensity, health-related quality of life, psychological outcomes, or adverse events.

### METHODS:

We systematically searched five databases from 2000 to 2014. Random pairs of independent reviewers critically appraised eligible studies using the Scottish Intercollegiate

Guidelines Network criteria. Studies with a low risk of bias were stratified by the intervention's stage of development (exploratory vs. evaluation) and synthesized following best evidence synthesis principles. Funding was provided by the Ministry of Finance.

## RESULTS:

We screened 8,551 citations, and 38 studies were relevant and 22 had a low risk of bias. Evidence from seven exploratory studies suggests that (1) for recent but not persistent NAD grades I-II, thoracic manipulation offers short-term benefits; (2) for persistent NAD grades I-II, technical parameters of cervical mobilization (eg, direction or site of manual contact) do not impact outcomes, whereas one session of cervical manipulation is similar to Kinesio Taping; and (3) for NAD grades I-II, strain-counterstrain treatment is no better than placebo. Evidence from 15 evaluation studies suggests that (1) for recent NAD grades I-II, cervical and thoracic manipulation provides no additional benefit to high-dose supervised exercises, and Swedish or clinical massage adds benefit to self-care advice; (2) for persistent NAD grades I-II, home-based cupping massage has similar outcomes to home-based muscle relaxation, low-level laser therapy (LLLT) does not offer benefits, Western acupuncture provides similar outcomes to non-penetrating placebo electroacupuncture, and needle acupuncture provides similar outcomes to sham-penetrating acupuncture; (3) for WAD grades I-II, needle electroacupuncture offers similar outcomes as simulated electroacupuncture; and (4) for recent NAD grades III, a semi-rigid cervical collar with rest and graded strengthening exercises lead to similar outcomes, and LLLT does not offer benefits.

## CONCLUSIONS:

Our review adds new evidence to the Neck Pain Task Force and suggests that mobilization, manipulation, and clinical massage are effective interventions for the management of neck pain. It also suggests that electroacupuncture, strain-counterstrain, relaxation massage, and some passive physical modalities (heat, cold, diathermy, hydrotherapy, and ultrasound) are not effective and should not be used to manage neck pain.



<https://www.ncbi.nlm.nih.gov/pubmed/26707074>

## What are the risks of manual treatment of the spine? A scoping review for clinicians.

Swait G, Finch R.

Chiropr Man Therap. 2017; 25: 37.

### BACKGROUND:

Communicating to patients the risks of manual treatment to the spine is an important, but challenging element of informed consent. This scoping review aimed to characterise and summarise the available literature on risks and to describe implications for clinical practice and research.

### METHOD:

A methodological framework for scoping reviews was followed. Systematic searches were conducted during June 2017. The quantity, nature and sources of literature were described. Findings of included studies were narratively summarised, highlighting key clinical points.

### RESULTS:

Two hundred and fifty articles were included. Cases of serious adverse events were reported. Observational studies, randomised studies and systematic reviews were also identified, reporting both benign and serious adverse events. Benign adverse events were reported to occur commonly in adults and children. Predictive factors for risk are unclear, but for neck pain patients might include higher levels of neck disability or cervical manipulation. In neck pain patients benign adverse events may result in poorer short term, but not long term outcomes. Serious adverse event incidence estimates ranged from 1 per 2 million manipulations to 13 per 10,000 patients. Cases are reported in adults and children, including spinal or neurological problems as well as cervical arterial strokes. Case-control studies indicate some association, in the under 45 years age group, between manual interventions and cervical arterial stroke, however it is unclear whether this is causal. Elderly patients have no greater risk of traumatic injury compared with visiting a medical practitioner for neuro-musculoskeletal problems, however some underlying conditions may increase risk.

## CONCLUSION:

Existing literature indicates that benign adverse events following manual treatments to the spine are common, while serious adverse events are rare. The incidence and causal relationships with serious adverse events are challenging to establish, with gaps in the literature and inherent methodological limitations of studies. Clinicians should ensure that patients are informed of risks during the consent process. Since serious adverse events could result from pre-existing pathologies, assessment for signs or symptoms of these is important. Clinicians may also contribute to furthering understanding by utilising patient safety incident reporting and learning systems where adverse events have occurred.

DOI: 10.1186/s12998-017-0168-5 | PMID: 29234493 | PMCID: PMC5719861



<https://www.ncbi.nlm.nih.gov/pubmed/29234493>

## Effects of Cervical High-Velocity Low-Amplitude Techniques on Range of Motion, Strength Performance, and Cardiovascular Outcomes: A Review.

Galindez-Ibarbengoetxea X, Setuain I, Andersen LL, Ramírez-Velez R, González-Izal M, Jauregi A et al.

J Altern Complement Med. 2017; 23 (9): 667-675.

### BACKGROUND:

Cervical high-velocity low-amplitude (HVLA) manipulation technique is among the oldest and most frequently used chiropractic manual therapy, but the physiologic and biomechanics effects were not completely clear.

### OBJECTIVE:

This review aims to describe the effects of cervical HVLA manipulation techniques on range of motion, strength, and cardiovascular performance.

### METHODS/DESIGN:

A systematic search was conducted of the electronic databases from January 2000 to August 2016: PubMed (n = 131), ScienceDirect (n = 101), Scopus (n = 991), PEDro (n = 33), CINAHL (n = 884), and SciELO (n = 5). Two independent reviewers conducted the screening process to determine article eligibility. The intervention that included randomized controlled trials was thrust, or HVLA, manipulative therapy directed to the cervical spine. Methodological quality was assessed using the Cochrane risk-of-bias tool. The initial search rendered 2145 articles. After screening titles and abstracts, 11 articles remained for full-text review.

### RESULTS:

The review shows that cervical HVLA manipulation treatment results in a large effect size ( $d > 0.80$ ) on increasing cervical range of motion and mouth opening. In patients with lateral epicondylalgia, cervical HVLA manipulation resulted in increased pain-free handgrip strength, with large effect sizes (1.44 and 0.78, respectively). Finally, in subjects with hypertension the blood pressure seemed to decrease after cervical HVLA manipulation. Higher quality studies are needed to develop a stronger evidence-based

foundation for HVLA manipulation techniques as a treatment for cervical conditions.

DOI: 10.1089/acm.2017.0002 | PMID: 28731832



<https://www.ncbi.nlm.nih.gov/pubmed/28731832>

## Comparative clinical effectiveness of management strategies for sciatica: systematic review and network meta-analyses.

Lewis RA, Williams NH, Sutton AJ, Burton K, Din NU, Matar HE et al.

Spine J. 2015 Jun 1;15(6):1461-77.

### BACKGROUND:

There are numerous treatment approaches for sciatica. Previous systematic reviews have not compared all these strategies together.

### PURPOSE:

To compare the clinical effectiveness of different treatment strategies for sciatica simultaneously.

### STUDY DESIGN:

Systematic review and network meta-analysis.

### METHODS:

We searched 28 electronic databases and online trial registries, along with bibliographies of previous reviews for comparative studies evaluating any intervention to treat sciatica in adults, with outcome data on global effect or pain intensity. Network meta-analysis methods were used to simultaneously compare all treatment strategies and allow indirect comparisons of treatments between studies. The study was funded by the UK National Institute for Health Research Health Technology Assessment program; there are no potential conflict of interests.

### RESULTS:

We identified 122 relevant studies; 90 were randomized controlled trials (RCTs) or quasi-RCTs. Interventions were grouped into 21 treatment strategies. Internal and external validity of included studies was very low. For overall recovery as the outcome, compared with inactive control or conventional care, there was a statistically significant improvement following disc surgery, epidural injections, nonopioid analgesia, manipulation, and acupuncture. Traction, percutaneous discectomy, and exercise therapy

were significantly inferior to epidural injections or surgery. For pain as the outcome, epidural injections and biological agents were significantly better than inactive control, but similar findings for disc surgery were not statistically significant. Biological agents were significantly better for pain reduction than bed rest, nonopioids, and opioids. Opioids, education/advice alone, bed rest, and percutaneous discectomy were inferior to most other treatment strategies; although these findings represented large effects, they were statistically equivocal.

## CONCLUSIONS:

For the first time, many different treatment strategies for sciatica have been compared in the same systematic review and meta-analysis. This approach has provided new data to assist shared decision-making. The findings support the effectiveness of nonopioid medication, epidural injections, and disc surgery. They also suggest that spinal manipulation, acupuncture, and experimental treatments, such as anti-inflammatory biological agents, may be considered. The findings do not provide support for the effectiveness of opioid analgesia, bed rest, exercise therapy, education/advice (when used alone), percutaneous discectomy, or traction. The issue of how best to estimate the effectiveness of treatment approaches according to their order within a sequential treatment pathway remains an important challenge.

DOI: 10.1016/j.spinee.2013.08.049 | PMID: 24412033



<https://www.ncbi.nlm.nih.gov/pubmed/24412033>

## Changes in biochemical markers following spinal manipulation-a systematic review and meta-analysis.

Kovanur-Sampath K, Mani R, Cotter J, Gisselman AS, Tumilty S.

Musculoskelet Sci Pract. 2017; 29: 120-131.

### ABSTRACT

The aim of this meta-analysis was to determine the effectiveness of spinal manipulation in influencing various biochemical markers in healthy and or symptomatic population. Electronic databases (n = 10) were searched (from inception till September 2016) and eight trials (325 participants) that met the inclusion criteria were included in the meta-analysis. Two authors independently extracted and assessed the risk of bias in included studies. Standardised mean differences for outcome measures were used to calculate effect sizes. The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) tool was used for assessing the quality of the body of evidence for each outcome of interest. There was moderate quality evidence that spinal manipulation influenced biochemical markers. There was moderate quality evidence of significant difference that spinal manipulation is better (SMD -0.46, 95% CI - 0.93 to 0) than control in eliciting changes in cortisol levels immediately after intervention. There was also a low quality evidence that spinal manipulation is better than control at post-intervention in increasing substance-P (SMD -0.48,95%CI-0.87 to -0.1), neurotensin (SMD -1.8,95%CI-2.56 to -1.04) and oxytocin levels (SMD -2.61,95%CI-3.5to-1.72). However, low quality evidence indicated that spinal manipulation did not influence epinephrine (SMD 0.1,95%CI- 0.56to0.75) or nor-epinephrine levels (SMD -0.06,95%CI-0.71to0.6). The current review found that spinal manipulation can increase substance-p, neurotensin, oxytocin and interleukin levels and may influence cortisol levels post-intervention. However, future trials targeting symptomatic populations are required to understand the clinical importance of such changes.

DOI: 10.1016/j.msksp.2017.04.004 | PMID: 28399479



<https://www.ncbi.nlm.nih.gov/pubmed/28399479>

## The Association Between Cervical Spine Manipulation and Carotid Artery Dissection: A Systematic Review of the Literature.

Chung CL, Côté P, Stern P, L'Espérance G.

J Manipulative Physiol Ther. 2015; 38(9): 672-6.

### OBJECTIVE:

Controversy surrounds the safety of cervical spine manipulation. Ischemic stroke secondary to cervical spine manipulation is a hypothesized adverse event. In Canada, the seriousness of these events and their perceived association to cervical spine manipulation has led some members of the public to call for a ban of the procedure. The primary objective of this study was to determine the incidence of internal carotid artery (ICA) dissection after cervical spine manipulation in patients who experience neck pain and its associated disorders. The secondary objective was to determine whether cervical spine manipulation is associated with an increased risk of ICA dissection in patients with neck pain, upper back pain, or headaches.

### METHODS:

We systematically searched MEDLINE, CINAHL, Alternative Health, AMED, Index to Chiropractic Literature, and EMBASE from 1970 to November 2012. Two independent reviewers used standardized criteria to screen the eligibility of articles. We considered cohort studies, case-control studies, and randomized clinical trials that addressed our objectives. We planned to critically appraise eligible articles using the Scottish Intercollegiate Guideline Network methodology.

### RESULTS:

We did not find any epidemiologic studies that measured the incidence of cervical spine manipulation and ICA dissection. Similarly, we did not find any studies that determined whether cervical spine manipulation is associated with ICA dissection.

### CONCLUSIONS:

The incidence of ICA dissection after cervical spine manipulation is unknown. The relative risk of ICA dissection after cervical spine manipulation compared with other health

care interventions for neck pain, back pain, or headache is also unknown. Although several case reports and case series raise the hypothesis of an association, we found no epidemiologic studies that validate this hypothesis.

DOI: 10.1016/j.jmpt.2013.09.005 | PMID: 24387889

 <https://www.ncbi.nlm.nih.gov/pubmed/24387889>

## The effects of spinal mobilizations on the sympathetic nervous system: a systematic review.

Kingston L, Claydon L, Tumilty S.

Man Ther. 2014; 19 (4): 281-7

### ABSTRACT

The activity of the sympathetic nervous system is of importance to manual therapists, since the experience of pain is associated with sympathetic activity. There has been little exploration into the effects of mobilizing vertebral segments below the cervical spine. In addition to this, a synthesis of the evidence for changes in sympathetic outcome measures has not been completed. The primary aim of this review was to investigate the effects of spinal mobilizations compared to a control or placebo on sympathetic outcome measures. The secondary aim was to establish the level of change, either excitatory or inhibitory, in sympathetic outcome measures. Five electronic databases (Ovid Medline, Embase, AMED, PEDro, and the Cochrane library; from database inception to May 2012) were searched for randomized controlled trials. Two independent raters applied inclusion criteria and rated studies for methodological quality. Seven studies met the inclusion criteria. All studies demonstrated a consistent increase in sympathetic outcome measures, indicative of sympathetic excitation, irrespective of the segments mobilized. Synthesis of the results established strong evidence (multiple high-quality randomised controlled trials (RCTs) for a positive change in skin conductance, respiratory rate, blood pressure, and heart rate among the healthy population. As only one study investigated changes in a symptomatic population, there was limited evidence (one RCT) for an increase in skin conductance and decrease in skin temperature. Evidence from this systematic review supports a sympatho-excitatory response to spinal mobilizations irrespective of the segment mobilized.

DOI: 10.1016/j.math.2014.04.004 | PMID: 24814903



<https://www.ncbi.nlm.nih.gov/pubmed/24814903>

## Management of neck pain and associated disorders: A clinical practice guideline from the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration.

Côté P, Wong JJ, Sutton D, Shearer HM, Mior S, Randhawa K et al.

Eur Spine J. 2016; 25 (7): 2000-22.

### PURPOSE:

To develop an evidence-based guideline for the management of grades I-III neck pain and associated disorders (NAD).

### METHODS:

This guideline is based on recent systematic reviews of high-quality studies. A multi-disciplinary expert panel considered the evidence of effectiveness, safety, cost-effectiveness, societal and ethical values, and patient experiences (obtained from qualitative research) when formulating recommendations. Target audience includes clinicians; target population is adults with grades I-III NAD <6 months duration.

### RECOMMENDATION 1:

Clinicians should rule out major structural or other pathologies as the cause of NAD. Once major pathology has been ruled out, clinicians should classify NAD as grade I, II, or III.

### RECOMMENDATION 2:

Clinicians should assess prognostic factors for delayed recovery from NAD.

### RECOMMENDATION 3:

Clinicians should educate and reassure patients about the benign and self-limited nature of the typical course of NAD grades I-III and the importance of maintaining activity and movement. Patients with worsening symptoms and those who develop new physical or psychological symptoms should be referred to a physician for further evaluation at any time during their care.

#### RECOMMENDATION 4:

For NAD grades I-II  $\leq 3$  months duration, clinicians may consider structured patient education in combination with: range of motion exercise, multimodal care (range of motion exercise with manipulation or mobilization), or muscle relaxants. In view of evidence of no effectiveness, clinicians should not offer structured patient education alone, strain-counterstrain therapy, relaxation massage, cervical collar, electroacupuncture, electrotherapy, or clinic-based heat.

#### RECOMMENDATION 5:

For NAD grades I-II  $> 3$  months duration, clinicians may consider structured patient education in combination with: range of motion and strengthening exercises, qigong, yoga, multimodal care (exercise with manipulation or mobilization), clinical massage, low-level laser therapy, or non-steroidal anti-inflammatory drugs. In view of evidence of no effectiveness, clinicians should not offer strengthening exercises alone, strain-counterstrain therapy, relaxation massage, relaxation therapy for pain or disability, electrotherapy, shortwave diathermy, clinic-based heat, electroacupuncture, or botulinum toxin injections.

#### RECOMMENDATION 6:

For NAD grade III  $\leq 3$  months duration, clinicians may consider supervised strengthening exercises in addition to structured patient education. In view of evidence of no effectiveness, clinicians should not offer structured patient education alone, cervical collar, low-level laser therapy, or traction.

#### RECOMMENDATION 7:

For NAD grade III  $> 3$  months duration, clinicians should not offer a cervical collar. Patients who continue to experience neurological signs and disability more than 3 months after injury should be referred to a physician for investigation and management.

#### RECOMMENDATION 8:

Clinicians should reassess the patient at every visit to determine if additional care is necessary, the condition is worsening, or the patient has recovered. Patients reporting significant recovery should be discharged.

DOI: 10.1007/s00586-016-4467-7 | PMID: 26984876



<https://www.ncbi.nlm.nih.gov/pubmed/26984876>

## Spinal manipulation epidemiology: systematic review of cost effectiveness studies.

Michaleff ZA, Lin CW, Maher CG, van Tulder MW.

J Electromyogr Kinesiol. 2012; 22 (5): 655-62.

### BACKGROUND:

Spinal manipulative therapy (SMT) is frequently used by health professionals to manage spinal pain. With many treatments having comparable outcomes to SMT, determining the cost-effectiveness of these treatments has been identified as a high research priority.

### OBJECTIVE:

To investigate the cost-effectiveness of SMT compared to other treatment options for people with spinal pain of any duration.

### METHODS:

We searched eight clinical and economic databases and the reference lists of relevant systematic reviews. Full economic evaluations conducted alongside randomised controlled trials with at least one SMT arm were eligible for inclusion. Two authors independently screened search results, extracted data and assessed risk of bias using the CHEC-list.

### RESULTS:

Six cost-effectiveness and cost-utility analysis were included. All included studies had a low risk of bias scoring  $\geq 16/19$  on the CHEC-List. SMT was found to be a cost-effective treatment to manage neck and back pain when used alone or in combination with other techniques compared to GP care, exercise and physiotherapy.

### CONCLUSIONS:

This review supports the use of SMT in clinical practice as a cost-effective treatment when used alone or in combination with other treatment approaches. However, as this conclusion is primarily based on single studies more high quality research is needed to

identify whether these findings are applicable in other settings.

DOI: 10.1016/j.jelekin.2012.02.011 | PMID: 22429823

 <https://www.ncbi.nlm.nih.gov/pubmed/22429823>

## Clinical practice guidelines for the noninvasive management of low back pain: A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration.

Wong JJ, Côté P, Sutton DA, Randhawa K, Yu H, Varatharajan S et al.

Eur J Pain. 2017; 21 (2): 201-216.

### ABSTRACT

We conducted a systematic review of guidelines on the management of low back pain (LBP) to assess their methodological quality and guide care. We synthesized guidelines on the management of LBP published from 2005 to 2014 following best evidence synthesis principles. We searched MEDLINE, EMBASE, CINAHL, PsycINFO, Cochrane, DARE, National Health Services Economic Evaluation Database, Health Technology Assessment Database, Index to Chiropractic Literature and grey literature. Independent reviewers critically appraised eligible guidelines using AGREE II criteria. We screened 2504 citations; 13 guidelines were eligible for critical appraisal, and 10 had a low risk of bias. According to high-quality guidelines: (1) all patients with acute or chronic LBP should receive education, reassurance and instruction on self-management options; (2) patients with acute LBP should be encouraged to return to activity and may benefit from paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs), or spinal manipulation; (3) the management of chronic LBP may include exercise, paracetamol or NSAIDs, manual therapy, acupuncture, and multimodal rehabilitation (combined physical and psychological treatment); and (4) patients with lumbar disc herniation with radiculopathy may benefit from spinal manipulation. Ten guidelines were of high methodological quality, but updating and some methodological improvements are needed. Overall, most guidelines target nonspecific LBP and recommend education, staying active/exercise, manual therapy, and paracetamol or NSAIDs as first-line treatments. The recommendation to use paracetamol for acute LBP is challenged by recent evidence and needs to be revisited. SIGNIFICANCE: Most high-quality guidelines recommend education, staying active/exercise, manual therapy and paracetamol/NSAIDs as first-line treatments for LBP. Recommendation of paracetamol for acute LBP is challenged by recent evidence and needs updating.

DOI: 10.1002/ejp.931 | PMID: 27712027



<https://www.ncbi.nlm.nih.gov/pubmed/27712027>

## Multimodal Therapy Combining Spinal Manipulation, Transcutaneous Electrical Nerve Stimulation, and Heat for Primary Dysmenorrhea: A Prospective Case Study.

Wong JJ, Laframboise M, Mior S.

J Chiropr Med. 2018 Sep;17(3):190-197.

### OBJECTIVE:

The purpose of this case study was to report the effects of multimodal therapy as an adjunct to oral contraceptives on pain and menstrual symptoms in a patient with primary dysmenorrhea.

### CLINICAL FEATURES:

A 27-year old nulligravid and nulliparous woman presented with low back pain, thigh pain, and menstrual symptoms associated with primary dysmenorrhea. Multimodal therapies (spinal manipulation, clinic-based transcutaneous electrical nerve stimulation, and heat applied at home) were delivered over 3 menstrual cycles. Outcome measures included pain (visual analogue scale) and menstrual symptoms (Menstrual Distress Questionnaire) from baseline to follow-up. She continued to take her oral contraceptives throughout the study period.

### INTERVENTION AND OUTCOME:

For both low back and thigh pain, the patient reported clinically important differences in average pain and worst pain after 2 and 3 months from baseline. There were no clinically important differences in current pain, best pain, or menstrual symptoms at follow-up. No adverse events were reported.

### CONCLUSION:

Some of this patient's dysmenorrhea symptoms responded favorably to multimodal therapy over 5 months. The authors observed important short-term reductions in low back and thigh pain (average and worst pain intensity) during care.

DOI: 10.1016/j.jcm.2018.03.005 | PMID: 30228810 | PMCID: PMC6141360



<https://www.ncbi.nlm.nih.gov/pubmed/30228810>

## The Treatment of Neck Pain-Associated Disorders and Whiplash-Associated Disorders: A Clinical Practice Guideline.

Bussièrès AE, Stewart G, Al-Zoubi F, Decina P, Descarreaux M, Hayden J et al.

J Manipulative Physiol Ther. 2016; 39 (8): 523-564.

### OBJECTIVE:

The objective was to develop a clinical practice guideline on the management of neck pain-associated disorders (NADs) and whiplash-associated disorders (WADs). This guideline replaces 2 prior chiropractic guidelines on NADs and WADs.

### METHODS:

Pertinent systematic reviews on 6 topic areas (education, multimodal care, exercise, work disability, manual therapy, passive modalities) were assessed using A Measurement Tool to Assess Systematic Reviews (AMSTAR) and data extracted from admissible randomized controlled trials. We incorporated risk of bias scores in the Grading of Recommendations Assessment, Development, and Evaluation. Evidence profiles were used to summarize judgments of the evidence quality, detail relative and absolute effects, and link recommendations to the supporting evidence. The guideline panel considered the balance of desirable and undesirable consequences. Consensus was achieved using a modified Delphi. The guideline was peer reviewed by a 10-member multidisciplinary (medical and chiropractic) external committee.

### RESULTS:

For recent-onset (0-3 months) neck pain, we suggest offering multimodal care; manipulation or mobilization; range-of-motion home exercise, or multimodal manual therapy (for grades I-II NAD); supervised graded strengthening exercise (grade III NAD); and multimodal care (grade III WAD). For persistent (>3 months) neck pain, we suggest offering multimodal care or stress self-management; manipulation with soft tissue therapy; high-dose massage; supervised group exercise; supervised yoga; supervised strengthening exercises or home exercises (grades I-II NAD); multimodal care or practitioner's advice (grades I-III NAD); and supervised exercise with advice or advice alone (grades I-II WAD). For workers with persistent neck and shoulder pain, evidence supports mixed

supervised and unsupervised high-intensity strength training or advice alone (grades I-III NAD). CONCLUSIONS: A multimodal approach including manual therapy, self-management advice, and exercise is an effective treatment strategy for both recent-onset and persistent neck pain.

DOI: 10.1016/j.jmpt.2016.08.007 | PMID: 27836071

 <https://www.ncbi.nlm.nih.gov/pubmed/27836071>

## Assessing the risk of stroke from neck manipulation: a systematic review.

Haynes MJ, Vincent K, Fischhoff C, Bremner AP, Lanlo O, Hankey GJ.

Int J Clin Pract. 2012; 66 (10): 940-7.

### BACKGROUND:

Strokes, typically involving vertebral artery dissection, can follow cervical spinal manipulative therapy, and these types of stroke occur rarely. There is disagreement about whether a strong association between neck manipulation and stroke exists. An earlier systematic review found two relevant studies of association that used controls, which also discussed the limitations of the two papers. Our systematic review updates the earlier review, and aims to determine whether conclusive evidence of a strong association exists.

### METHODS:

PRISMA guidelines for systematic reviews were followed, and the literature was searched using a strategy that included the terms 'neck manipulation' and 'stroke' from the PubMed, Embase, CINAHL Plus and AMED databases. Citations were included if they met criteria such as being case-control studies, and dealt with neck manipulation and/or neck movement/positioning. Papers were scored for their quality, using similar criteria to the earlier review. For individual criteria, each study was assigned a full positive score if the criterion was satisfied completely.

### RESULTS:

Four case-control studies and one case-control study, which included a case- crossover design, met the selection criteria, but all of them had at least three items in the quality assessment that failed to be completely positive. Two studies were assessed to be the most robustly designed, one indicating a strong association between stroke and various intensities of neck movement, including manipulation, and the other suggesting a much reduced relative association when using primary care practitioners' visits as controls. However, potential biases and confounders render the results inconclusive.

### CONCLUSION:

Conclusive evidence is lacking for a strong association between neck manipulation and stroke, but is also absent for no association. Future studies of association will need to minimise potential biases and confounders, and ideally have sufficient numbers of cases to allow subgroup analysis for different types of neck manipulation and neck movement.

DOI: 10.1111/j.1742-1241.2012.03004.x | PMID: 22994328 | PMCID: PMC3506737



<https://www.ncbi.nlm.nih.gov/pubmed/22994328>

## Epidemiology: spinal manipulation utilization.

Hurwitz EL.

J Electromyogr Kinesiol. 2012; 22 (5): 648-54.

### ABSTRACT

The objectives of this article are to describe spinal manipulation use by time, place, and person, and (2) identify predictors of the use of spinal manipulation. We conducted a systematic review of the English-language literature published from January 1, 1980 through June 30, 2011. Of 822 citations identified, 213 were deemed potentially relevant; 75 were included after further consideration. Twenty-one additional articles were identified from reference lists. The literature is heavily weighted toward North America, Europe, and Australia and thus largely precludes inferences about spinal manipulation use in other parts of the world. In the regions covered by the literature, chiropractors, osteopaths, and physical therapists are most likely to deliver spinal manipulation, often in conjunction with other conservative therapies. Back and neck pain are the most frequent indications for receiving spinal manipulation; non-musculoskeletal conditions comprise a very small percentage of indications. Although spinal manipulation is more commonly used in adults than children, evidence suggests that spinal manipulation may be more likely used for non-musculoskeletal ailments in children than in adults. Patient satisfaction with spinal manipulation is very high.

DOI: 10.1016/j.jelekin.2012.01.006 | PMID: 22289432



<https://www.ncbi.nlm.nih.gov/pubmed/22289432>

## Clinical research on lumbar oblique-pulling manipulation in combination with sling exercise therapy for patients with chronic nonspecific low back pain.

Wang SQ, Chen M1, Wei X, Gao XX1, Zhao GD.

Rev Assoc Med Bras (1992). 2019 Jul 22;65(6):886-892.

### OBJECTIVE:

To investigate clinical curative effects of lumbar oblique-pulling manipulation in combination with sling-exercise-therapy training on chronic nonspecific lower back pain.

### METHODS:

A total of 60 patients with chronic nonspecific lower back pain in the Outpatient Department were included in this study. These patients were randomly divided into two groups: the observation group and the control group. The control group adopted a single sling-exercise-therapy training three times a week, while the observation group adopted lumbar oblique-pulling manipulation in combination with manipulation treatment once a week. The course of treatment lasted for four weeks.

### RESULTS:

Before and after treatment, the ODI score was compared within the group. A remarkable statistical significance was observed from the third day ( $P < 0.05$ ). At the third month of follow-up, the difference in ODI scores between these two groups was statistically significant ( $P < 0.05$ ). (2) Before and after treatment, it was observed that differences in VAS scores from the third day were statistically significant ( $P < 0.05$ ). (3) The difference in muscle strength between these two groups had remarkable statistical significance in the third month of follow-up ( $P < 0.05$ ).

### CONCLUSION:

The effective rehabilitation function of lumbar oblique-pulling manipulation in combination with sling-exercise-therapy training in patients with CNLBP is superior to that of sling-exercise-therapy training alone.

DOI: [10.1590/1806-9282.65.6.886](https://doi.org/10.1590/1806-9282.65.6.886) | PMID: 31340321



[http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0104-42302019000600886&tIng=en](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-42302019000600886&tIng=en)

## Adding connective tissue manipulation to physiotherapy for chronic low back pain improves pain, mobility, and well-being: a randomized controlled trial.

Celenay ST, Kaya DO, Ucurum SG.

J Exerc Rehabil. 2019 Apr 26;15(2):308-315.

### ABSTRACT

This study aimed to evaluate the effectiveness of connective tissue manipulation (CTM) for improving pain, mobility, and well-being in chronic low back pain (CLBP). Sixty-six patients with CLBP were randomized to three groups: CTM, sham massage (SM) and control groups. The groups got standardized physiotherapy and the related applications 5 days/wk, 3 weeks. Pain intensity, mobility, and well-being (Hospital Anxiety and Depression Scale [HADS], Oswestry Disability Index [ODI], and Short Form-36 [SF-36]) were assessed before and after the applications. Pain, mobility, and disability improved in all groups ( $P < 0.05$ ). There were differences in resting pain, HADS, and SF-36 scores in CTM, resting pain in SM, and SF-36 scores in controls ( $P < 0.05$ ). Activity pain, HADS scores decreased, mobility and physical component of the SF-36 increased in CTM compared to SM ( $P < 0.05$ ). Pain, ODI, and HADS scores decreased, mobility and SF-36 increased in CTM, and ODI scores decreased in SM compared to controls ( $P < 0.05$ ). In conclusion, pain intensity during activity and at night and disability decreased, and spinal mobility increased in all groups. However, CTM showed superiority in improving pain, mobility, and well-being in patients with CLBP.

DOI: 10.12965/jer.1836634.317 | PMID: 31111018 | PMCID: PMC6509448



<https://www.ncbi.nlm.nih.gov/pubmed/31111018>

## Do participants with low back pain who respond to spinal manipulative therapy differ biomechanically from nonresponders, untreated controls or asymptomatic controls?.

Wong AY, Parent EC, Dhillon SS, Prasad N, Kawchuk GN.

Spine (Phila Pa 1976). 2015 Sep 1;40(17):1329-37.

### STUDY DESIGN:

Nonrandomized controlled study.

### OBJECTIVE:

To determine whether patients with low back pain (LBP) who respond to spinal manipulative therapy (SMT) differ biomechanically from nonresponders, untreated controls or asymptomatic controls.

### SUMMARY OF BACKGROUND DATA:

Some but not all patients with LBP report improvement in function after SMT. When compared with nonresponders, studies suggest that SMT responders demonstrate significant changes in spinal stiffness, muscle contraction, and disc diffusion. Unfortunately, the significance of these observations remains uncertain given methodological differences between studies including a lack of controls.

### METHODS:

Participants with LBP and asymptomatic controls attended 3 sessions for 7 days. On sessions 1 and 2, participants with LBP received SMT (+LBP/+SMT, n = 32) whereas asymptomatic controls did not (-LBP/-SMT, n = 57). In these sessions, spinal stiffness and multifidus thickness ratios were obtained before and after SMT and on day 7. Apparent diffusion coefficients from lumbar discs were obtained from +LBP/+SMT participants before and after SMT on session 1 and from an LBP control group that did not receive SMT (+LBP/-SMT, n = 16). +LBP/+SMT participants were dichotomized as responders/nonresponders on the basis of self-reported disability on day 7. A repeated measures analysis of covariance was used to compare apparent diffusion coefficients among responders, nonresponders, and +LBP/-SMT subjects, as well as spinal stiffness or multifidus

dus thickness ratio among responders, nonresponders, and -LBP/-SMT subjects.

## RESULTS:

After the first SMT, SMT responders displayed statistically significant decreases in spinal stiffness and increases in multifidus thickness ratio sustained for more than 7 days; these findings were not observed in other groups. Similarly, only SMT responders displayed significant post-SMT improvement in apparent diffusion coefficients.

## CONCLUSION:

Those reporting post-SMT improvement in disability demonstrated simultaneous changes between self-reported and objective measures of spinal function. This coherence did not exist for asymptomatic controls or no-treatment controls. These data imply that SMT impacts biomechanical characteristics within SMT responders not present in all patients with LBP. This work provides a foundation to investigate the heterogeneous nature of LBP, mechanisms underlying differential therapeutic response, and the biomechanical and imaging characteristics defining responders at baseline.

DOI: 10.1097/BRS.0000000000000981 | PMID: 26020851

 <https://www.ncbi.nlm.nih.gov/pubmed/26020851>

## Effect of spinal manipulative therapy on mechanical pain sensitivity in patients with chronic nonspecific low back pain: a pilot randomized, controlled trial.

Bond BM, Kinslow CD, Yoder AW, Liu W.

J Man Manip Ther. 2019 Mar 5:1-13.

### OBJECTIVES:

The long-term goal of our study is to improve the understanding of the biological mechanisms associated with spinal manipulative therapy (SMT) in low back pain.

### METHODS:

This project involved a pilot randomized, blinded clinical trial (ClinicalTrials.gov registration number NCT03078114) of 3-week SMT in chronic nonspecific low back pain (CNSLBP) patients. We recruited 29 participants and randomly assigned them into either a SMT (n = 14) or sham SMT (n = 15) group. Pre- and postintervention, we quantified the effect of SMT on clinical outcomes (Numeric Pain Rating Scale and Oswestry Disability Index) and pressure pain threshold (PPT) at local (lumbar spine), regional (lower extremity), and remote (upper extremity) anatomical sites.

### RESULTS:

We observed a significant main effect for time signifying reduced hypersensitivity (increased PPT) at local (p = .015) and regional (p = .014) locations at 3 weeks. Furthermore, we found significant main effects of time indicating improvements in pain (p < .001) and disability (p = .02) from baseline among all participants regardless of intervention. However, no between-group differences were observed in PPT, clinical pain, or disability between the SMT and sham SMT groups over 3 weeks.

### CONCLUSIONS:

After 3 weeks of SMT or sham SMT in CNSLBP patients, we found hypoalgesia at local and remote sites along with improved pain and low back-related disability.

DOI: 10.1080/10669817.2019.1572986 | PMID: 30935324



<https://www.ncbi.nlm.nih.gov/pubmed/30935324>

## Effectiveness of Exercise Therapy and Manipulation on Sacroiliac Joint Dysfunction: A Randomized Controlled Trial.

Nejati P, Safarcherati A, Karimi F.

Pain Physician. 2019 Jan;22(1):53-61.

### BACKGROUND:

The sacroiliac joint dysfunction (SIJD) has been found to be the primary culprit for lower back pain (LBP), but it is still overlooked and treated as LBP. There are no guidelines or appropriate therapeutic protocols for SIJD. Thus, there is a need for an effective treatment strategy for SIJD.

### OBJECTIVE:

To compare exercise therapy (ET), manipulation therapy (MT), and a combination of the 2 (EMT) in terms of their effectiveness in treating SIJD.

### STUDY DESIGN:

A comparative, prospective, single-blind randomized controlled trial .

### SETTING:

Sports Medicine Department of Rasoul Akram Hospital.

### METHODS:

A total of 51 patients with lower back or buttock pain resulting from SIJD were randomly assigned to 1 of 3 study groups: ET, MT, or EMT. The ET group received posterior innominate self-mobilization, sacroiliac joint stretching, and spinal stabilization exercises. The MT group underwent posterior innominate mobilization and SIJ manipulation. Lastly, the EMT group received manipulation maneuvers followed by exercise therapy. Pain and disability were assessed at 6, 12, and 24 weeks after the interventions.

### RESULTS:

All 3 groups demonstrated significant improvement in pain and disability scores com-

pared to the baseline ( $P < 0.05$ ). The difference among these therapeutic protocols was found to be a function of time. At week 6, MT showed notable results, but at week 12, the effect of ET was remarkable. Finally, at week 24, no significant difference was observed among the study groups.

### LIMITATIONS:

A major limitation of the present study is lack of a control group receiving a type of intervention other than the experimental protocols. Another limitation is the short duration of follow-ups.

### CONCLUSIONS:

Exercise and manipulation therapy appear to be effective in reducing pain and disability in patients with SIJD. However, the combination of these 2 therapies does not seem to bring about significantly better therapeutic results than either approach implemented separately.

PMID: 30700068



<https://www.ncbi.nlm.nih.gov/pubmed/30700068>

## Outcomes of acute and chronic patients with magnetic resonance imaging-confirmed symptomatic lumbar disc herniations receiving high-velocity, low-amplitude, spinal manipulative therapy: a prospective observational cohort study with one-year follow-up.

Leemann S, Peterson CK, Schmid C, Anklin B, Humphreys BK.

J Manipulative Physiol Ther. 2014 Mar-Apr;37(3):155-63.

### OBJECTIVE:

The purposes of this study were to evaluate patients with low-back pain (LBP) and leg pain due to magnetic resonance imaging-confirmed disc herniation who are treated with high-velocity, low-amplitude spinal manipulation in terms of their short-, medium-, and long-term outcomes of self-reported global impression of change and pain levels at various time points up to 1 year and to determine if outcomes differ between acute and chronic patients using a prospective, cohort design.

### METHODS:

This prospective cohort outcomes study includes 148 patients (between ages of 18 and 65 years) with LBP, leg pain, and physical examination abnormalities with concordant lumbar disc herniations. Baseline numerical rating scale (NRS) data for LBP, leg pain, and the Oswestry questionnaire were obtained. The specific lumbar spinal manipulation was dependent upon whether the disc herniation was intraforaminal or paramedian as seen on the magnetic resonance images and was performed by a doctor of chiropractic. Outcomes included the patient's global impression of change scale for overall improvement, the NRS for LBP, leg pain, and the Oswestry questionnaire at 2 weeks, 1, 3, and 6 months, and 1 year after the first treatment. The proportion of patients reporting "improvement" on the patient's global impression of change scale was calculated for all patients and acute vs chronic patients. Pretreatment and post-treatment NRS scores were compared using the paired t test. Baseline and follow-up Oswestry scores were compared using the Wilcoxon test. Numerical rating scale and Oswestry scores for acute vs chronic patients were compared using the unpaired t test for NRS scores and the Mann-Whitney U test for Oswestry scores. Logistic regression analysis compared baseline variables with "improvement."

## RESULTS:

Significant improvement for all outcomes at all time points was reported ( $P < .0001$ ). At 3 months, 90.5% of patients were “improved” with 88.0% “improved” at 1 year. Although acute patients improved faster by 3 months, 81.8% of chronic patients reported “improvement” with 89.2% “improved” at 1 year. There were no adverse events reported.

## CONCLUSIONS:

A large percentage of acute and importantly chronic lumbar disc herniation patients treated with chiropractic spinal manipulation reported clinically relevant improvement.

DOI: 10.1016/j.jmpt.2013.12.011 | PMID: 24636109



<https://www.ncbi.nlm.nih.gov/pubmed/24636109>

## Effects of spinal manipulation and pain education on pain in patients with chronic low back pain: a protocol of randomized sham-controlled trial. Integr Med Res. 2018 Sep;7(3):271-278.

Vier C, Bracht MA, Neves ML, Junkes-Cunha M, Santos ARS.

Integr Med Res. 2018 Sep;7(3):271-278.

### BACKGROUND:

Low back pain (LBP) has more than doubled in the last 20 years, probably influenced by biopsychosocial factors. Noninvasive treatments have been applied in individuals with chronic nonspecific LBP as spinal manipulation and pain education. However, the neurophysiological effects of these treatments are not clear. The aim of this research is to verify the pain control, functional and neurophysiological effects of spinal manipulation, and pain education in individuals with chronic nonspecific LBP.

### METHODS:

This research is an assessor and subject blinded, 2-arm, randomized sham-controlled trial and will be conducted at Governador Celso Ramos Hospital, Florianópolis, Brazil. One hundred and twenty-eight individuals with chronic nonspecific LBP will be recruited for this study. Individuals will be randomly allocated into one of the two groups: spinal manipulation plus pain education or (2) sham treatment plus pain education. Each group will be received two sessions per week over six weeks of treatment. The measures will be applied at baseline, six weeks, and three months after randomization. The primary outcome will be a pain intensity at six weeks postrandomization. Secondary outcomes will be pressure pain threshold, disability, fear and avoidance beliefs, kinesiophobia, risk of poor prognosis, quality of life, and inflammatory biomarkers.

### DISCUSSION:

Evidence has shown that psychosocial factors are more involved in chronic pain than we thought a few years ago. Then, studies investigating both functional and neurophysiological effects of these interventions to evaluate the effectiveness of treatment and what else is happening at the cellular level in nervous system are needed.



<https://www.ncbi.nlm.nih.gov/pubmed/30271716>

## Spinal manipulation plus laser therapy versus laser therapy alone in the treatment of chronic non-specific low back pain: a randomized controlled study.

Nambi G, Kamal W, Es S, Joshi S, Trivedi P.

Eur J Phys Rehabil Med. 2018 Dec;54(6):880-889.

### BACKGROUND:

Low back pain (LBP) is a common musculoskeletal disorder causing pain and disability in most of the countries. In recent years, new approaches such as Spinal manipulation and laser therapy have been considered as an alternative to conventional exercise and also found contradicting results in terms of its effectiveness.

### AIM:

A study to compare the combined effects of spinal manipulation, Laser and exercise versus Laser and exercise alone in chronic non-specific low back pain (cnLBP).

### DESIGN:

Randomized control study.

### SETTING:

Subjects with cnLBP were treated with spinal manipulation, Laser and exercise in out-patient department for four weeks.

### POPULATION:

Three hundred and thirty subjects who fulfilled the selection criteria were randomized (1:1:1 ratio) into SM-LT-CE (N.=110), LT-CE (N.=110) and control group (N.=110).

### METHODS:

The outcome measurements were Visual Analog Scale (VAS), Modified Modified Schober Test (MMST) Roland and Morris Disability Questionnaire (RMDQ), Physical Health Questionnaire-9 (PHQ-9) and Health Related Quality of Life-4 (HRQOL-4). Baseline and follow-up measurements were measured at 4 weeks, 6 and 12 months by a blinded

investigator.

## RESULTS:

Three hundred and twenty-six subjects completed the intervention and 304 completed the 12-month follow-up. Demographic variables show homogeneity between the groups and ANOVA analyses showed significant improvement ( $P < 0.001$ ) in pain reduction (VAS), flexion range of motion (MMST), functional disability (RMDQ), depression status (PHQ-9), and quality of life (HRQOL-4) in SM-LT-CE group compared to the other two groups at one-year follow-up.

## CONCLUSIONS:

Spinal manipulation combined with laser therapy and conventional exercise is more effective than laser therapy and conventional exercise alone in chronic non-specific low back pain.

## CLINICAL REHABILITATION IMPACT:

Spinal manipulation is an adjuvant intervention and it can be applied in every day clinical practice.

DOI: 10.23736/S1973-9087.18.05005-0 | PMID: 29687966



<https://www.ncbi.nlm.nih.gov/pubmed/29687966>

## Effect of spinal manipulative treatment on cardiovascular autonomic control in patients with acute low back pain.

Younes M, Nowakowski K, Didier-Laurent B, Gombert M, Cottin F.

Chiropr Man Therap. 2017 Dec 4;25:33.

### BACKGROUND:

This study aimed to quantify the effect of spinal manipulative treatment (SMT) from an analysis of baroreflex, systolic blood pressure and heart rate variability (HRV) on patients with acute back pain. It was hypothesized that SMT would increase the parasympathetic cardiovascular autonomic control.

### METHODS:

Twenty-two patients with acute back pain were randomly divided into two groups: one receiving sham treatment (Sham) and the other receiving SMT. Recordings were completed during the first day and the seventh day, immediately before and after treatment on both days. ECG and systolic blood pressure were continuously recorded to compute cardiovascular variability and baroreflex sensitivity components. The perceived level of pain was measured with the numeric pain scale (NPS) 48 h before, just before and just after each treatment. The NPS ranged from 0 to 100% (peak of pain before treatment). ECG and systolic blood pressure recordings were analyzed in time frequency domain using the Smoothed pseudo Wigner-Ville distribution.

### RESULTS:

Root mean square of the successive differences, high frequency power of the heart rate variability, and high frequency baroreflex sensitivity differences between post and pre tests were higher in the SMT group than in the Sham group ( $p < 0.01$ ), whereas no differences were observed with the other heart rate variability components. Also, no differences were observed with the systolic blood pressure components. Although the estimated pain scale values decreased over time, no difference was observed between the SMT and Sham groups.

### CONCLUSIONS:

This seems to be the first study to assess the effect of SMT on both heart rate variability and baroreflex sensitivity in patients with acute back pain. SMT can be seen to provoke an increase in parasympathetic control known to relate to a person's healthy state. Thus, cardiovascular variability analysis may be a useful tool for clinicians to quantify and objectify the beneficial effects of spinal manipulation treatment.

DOI: [10.1186/s12998-017-0167-6](https://doi.org/10.1186/s12998-017-0167-6)



<https://chiromt.biomedcentral.com/articles/10.1186/s12998-017-0167-6>

## Recovery From Chronic Low Back Pain After Osteopathic Manipulative Treatment: A Randomized Controlled Trial.

Licciardone JC, Gatchel RJ, Aryal S.

J Am Osteopath Assoc. 2016 Mar;116(3):144-55.

### CONTEXT:

Little is known about recovery after spinal manipulation in patients with low back pain (LBP).

### OBJECTIVE:

To assess recovery from chronic LBP after a short regimen of osteopathic manipulative treatment (OMT) in a responder analysis of the OSTEOPATHic Health outcomes In Chronic low back pain (OSTEOPATHIC) Trial.

### METHODS:

A randomized double-blind, sham-controlled trial was conducted to determine the efficacy of 6 OMT sessions over 8 weeks. Recovery was assessed at week 12 using a composite measure of pain recovery (10 mm or less on a 100-mm visual analog scale) and functional recovery (2 or less on the Roland-Morris Disability Questionnaire for back-specific functioning). The RRs and numbers-needed-to-treat (NNTs) for recovery with OMT were measured, and corresponding cumulative distribution functions were plotted according to baseline LBP intensity and back-specific functioning. Multiple logistic regression was used to compute the OR for recovery with OMT while simultaneously controlling for potential confounders. Sensitivity analyses were performed to corroborate the primary results.

### RESULTS:

There were 345 patients who met neither of the recovery criteria at baseline in the primary analyses and 433 patients who met neither or only 1 of these criteria in the sensitivity analyses. There was a large treatment effect for recovery with OMT (RR, 2.36; 95% CI, 1.31-4.24; P=.003), which was associated with a clinically relevant NNT (8.9; 95% CI, 5.4-25.5). This significant finding persisted after adjustment for potential con-

founders (OR, 2.92; 95% CI, 1.43-5.97; P=.003). There was also a significant interaction effect between OMT and comorbid depression (P=.02), indicating that patients without depression were more likely to recover from chronic LBP with OMT (RR, 3.21; 95% CI, 1.59-6.50; P<.001) (NNT, 6.5; 95% CI, 4.2-14.5). The cumulative distribution functions demonstrated optimal RR and NNT responses in patients with moderate to severe levels of LBP intensity and back-specific dysfunction at baseline. Similar results were observed in the sensitivity analyses.

## CONCLUSIONS:

The OMT regimen was associated with significant and clinically relevant measures for recovery from chronic LBP. A trial of OMT may be useful before progressing to other more costly or invasive interventions in the medical management of patients with chronic LBP.

DOI: 10.7556/jaoa.2016.031 | PMID: 26927908



<https://www.ncbi.nlm.nih.gov/pubmed/26927908>

## Similar Effects of Thrust and Nonthrust Spinal Manipulation Found in Adults With Subacute and Chronic Low Back Pain: A Controlled Trial With Adaptive Allocation.

Xia T, Long CR, Gudavalli MR, Wilder DG, Vining RD, Rowell RM, Reed WR, DeVocht JW, Goertz CM, Owens EF Jr, Meeker WC.

Spine (Phila Pa 1976). 2016 Jun;41(12):E702-9.

### STUDY DESIGN:

A three-arm controlled trial with adaptive allocation.

### OBJECTIVES:

The aim of this study was to compare short-term effects of a side-lying, thrust spinal manipulation (SM) procedure and a nonthrust, flexion-distraction SM procedure in adults with subacute or chronic low back pain (LBP) over 2 weeks.

### SUMMARY OF BACKGROUND DATA:

SM has been recommended in recently published clinical guidelines for LBP management. Previous studies suggest that thrust and nonthrust SM procedures, though distinctly different in joint loading characteristics, have similar effects on patients with LBP.

### METHODS:

Participants were eligible if they were 21 to 54 years old, had LBP for at least 4 weeks, scored 6 or above on the Roland-Morris disability questionnaire, and met the diagnostic classification of 1, 2, or 3 according to the Quebec Task Force Classification for Spinal Disorders. Participants were allocated in a 3:3:2 ratio to four sessions of thrust or nonthrust SM procedures directed at the lower lumbar and pelvic regions, or to a 2-week wait list control. The primary outcome was LBP-related disability using Roland-Morris Disability Questionnaire and the secondary outcomes were LBP intensity using visual analog scale, Fear-Avoidance Beliefs Questionnaire, and the 36-Item Short Form Health Survey. The study was conducted at the Palmer Center for Chiropractic Research with care provided by experienced doctors of chiropractic. Clinicians and patients were not

blinded to treatment group.

## RESULTS:

Of 192 participants enrolled, the mean age was 40 years and 54% were male. Improvement in disability, LBP intensity, Fear-Avoidance Beliefs Questionnaire-work subscale, and 36-Item Short Form Health Survey-physical health summary measure for the two SM groups were significantly greater than the control group. No difference in any outcomes was observed between the two SM groups.

## CONCLUSION:

Thrust and nonthrust SM procedures with distinctly different joint loading characteristics demonstrated similar effects in short-term LBP improvement and both were superior to a wait list control.

DOI: 10.1097/BRS.0000000000001373 | PMID: 26656041 | PMCID: PMC4902754

 <https://www.ncbi.nlm.nih.gov/pubmed/26656041>

## Short-term effectiveness of spinal manipulative therapy versus functional technique in patients with chronic nonspecific low back pain: a pragmatic randomized controlled trial.

Castro-Sánchez AM, Lara-Palomo IC, Matarán-Peñarrocha GA, Fernández-de-Las-Peñas C, Saavedra-Hernández M, Cleland J, Aguilar-Ferrándiz ME.

Spine J. 2016 Mar;16(3):302-12.

### BACKGROUND CONTEXT:

Chronic low back pain (LBP) is a prevalent condition associated with pain, disability, decreased quality of life, and fear of movement. To date, no studies have compared the effectiveness of spinal manipulation and functional technique for the management of this population.

### PURPOSE:

This study aimed to compare the effectiveness of spinal manipulation and functional technique on pain, disability, kinesiophobia, and quality of life in patients with chronic LBP.

### STUDY DESIGN/SETTING:

A single-blind pragmatic randomized controlled trial conducted in a university research clinic was carried out.

### PATIENT SAMPLE:

Sixty-two patients (62% female, age: 45±7) with chronic LBP comprised the patient sample.

### OUTCOME MEASURES:

Data on disability (Roland-Morris Disability Questionnaire [RMQ], Oswestry Low Back Pain Disability Index [ODI]), pain intensity (Numerical Pain Rate Scale [NPRS]), fear of movement (Tampa Scale of Kinesiophobia [TSK]), quality of life (Short Form-36 [SF-36] quality of life questionnaire), isometric resistance of abdominal muscles (McQuade test), and spinal mobility in flexion (finger-to-floor distance) were collected at baseline

immediately after the intervention phase and at 1 month postintervention by an assessor blinded to group allocation of the patients.

## METHODS:

Patients were randomly assigned to the spinal manipulative therapy group or the functional technique group and received three once-weekly sessions.

## RESULTS:

In comparison to patients receiving functional technique, those receiving spinal manipulation experienced statistically, although not clinically, significant greater reductions in terms of RMQ (standardized mean difference in score changes between groups at post-treatment: 0.1; at 1 month: 0.1) and ODI (post-treatment: 2.9; at 1 month: 1.4). Linear longitudinal analysis showed a significant improvement in both groups over time for RMQ (manipulative:  $F=68.51$ ,  $p<.001$ ; functional:  $F=28.58$ ,  $p<.001$ ) and ODI (manipulative:  $F=104.66$ ,  $p<.001$ ; functional:  $F=32.15$ ,  $p=.001$ ). However, significant treatment-by-time interactions were not detected for pain intensity ( $p=.488$ ), TSK ( $p=.552$ ), any domains of the SF-36 quality of life questionnaire ( $p\leq.164$ ), McQuade test ( $p=.512$ ), and finger-to-floor distance ( $p=.194$ ). Differences between and within groups were not clinically meaningful in any of the reported measures.

## CONCLUSIONS:

In comparison to functional technique, spinal manipulative therapy showed greater reduction in disability in patients with chronic LBP, but not in terms of pain, fear of movement, quality of life, isometric resistance of trunk flexors, or spinal mobility. However, differences in disability were not clinically meaningful; therefore, spinal manipulative therapy did not result in any clinically important short-term benefits over functional technique therapy. In addition, as neither group met the threshold for minimum clinically important difference following treatment, neither treatment resulted in a clinically meaningful benefit.

DOI: 10.1016/J.SPINEE.2015.08.057 | PMID: 26362233



<https://www.ncbi.nlm.nih.gov/pubmed/26362233>

## Comparison of spinal manipulation methods and usual medical care for acute and subacute low back pain: a randomized clinical trial.

Schneider M, Haas M, Glick R, Stevans J, Landsittel D.

Spine (Phila Pa 1976). 2015 Feb 15;40(4):209-17

### STUDY DESIGN:

Randomized controlled trial with follow-up to 6 months.

### OBJECTIVE:

This was a comparative effectiveness trial of manual-thrust manipulation (MTM) versus mechanical-assisted manipulation (MAM); and manipulation versus usual medical care (UMC).

### SUMMARY OF BACKGROUND DATA:

Low back pain (LBP) is one of the most common conditions seen in primary care and physical medicine practice. MTM is a common treatment for LBP. Claims that MAM is an effective alternative to MTM have yet to be substantiated. There is also question about the effectiveness of manipulation in acute and subacute LBP compared with UMC.

### METHODS:

A total of 107 adults with onset of LBP within the past 12 weeks were randomized to 1 of 3 treatment groups: MTM, MAM, or UMC. Outcome measures included the Oswestry LBP Disability Index (0-100 scale) and numeric pain rating (0-10 scale). Participants in the manipulation groups were treated twice weekly during 4 weeks; subjects in UMC were seen for 3 visits during this time. Outcome measures were captured at baseline, 4 weeks, 3 months, and 6 months.

### RESULTS:

Linear regression showed a statistically significant advantage of MTM at 4 weeks compared with MAM (disability = -8.1,  $P = 0.009$ ; pain = -1.4,  $P = 0.002$ ) and UMC (disability = -6.5,  $P = 0.032$ ; pain = -1.7,  $P < 0.001$ ). Responder analysis, defined as 30% and 50% reductions in Oswestry LBP Disability Index scores revealed a significantly greater pro-

portion of responders at 4 weeks in MTM (76%; 50%) compared with MAM (50%; 16%) and UMC (48%; 39%). Similar between-group results were found for pain: MTM (94%; 76%); MAM (69%; 47%); and UMC (56%; 41%). No statistically significant group differences were found between MAM and UMC, and for any comparison at 3 or 6 months.

## CONCLUSION:

MTM provides greater short-term reductions in self-reported disability and pain scores compared with UMC or MAM.

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<https://www.ncbi.nlm.nih.gov/pubmed/25423308>

## Does effectiveness of exercise therapy and mobilisation techniques offer guidance for the treatment of lateral and medial epicondylitis? A systematic review.

Hoogvliet P, Randsdorp MS, Dingemanse R, Koes BW, Huisstede BM.

Br J Sports Med. 2013; 47 (17): 1112-9.

### BACKGROUND:

Owing to the change in paradigm of the histological nature of epicondylitis, therapeutic modalities as exercises such as stretching and eccentric loading and mobilisation are considered for its treatment.

### OBJECTIVE:

To assess the evidence for effectiveness of exercise therapy and mobilisation techniques for both medial and lateral epicondylitis.

### METHODS:

Searches in PubMed, Embase, Cinahl and Pedro were performed to identify relevant randomised clinical trials (RCTs) and systematic reviews. Two reviewers independently extracted data and assessed the methodological quality.

### RESULTS:

One review and 12 RCTs, all studying lateral epicondylitis, were included. Different therapeutic regimes were evaluated: stretching, strengthening, concentric/eccentric exercises and manipulation of the cervical or thoracic spine, elbow or wrist. No statistical pooling of the results could be performed owing to heterogeneity of the included studies. Therefore, a best-evidence synthesis was used to summarise the results. Moderate evidence for the short-term effectiveness was found in favour of stretching plus strengthening exercises versus ultrasound plus friction massage. Moderate evidence for short-term and mid-term effectiveness was found for the manipulation of the cervical and thoracic spine as add-on therapy to concentric and eccentric stretching plus mobilisation of wrist and forearm. For all other interventions only limited, conflicting or no evidence was found.

## CONCLUSIONS:

Although not yet conclusive, these results support the belief that strength training decreases symptoms in tendinosis. The short-term analgesic effect of manipulation techniques may allow more vigorous stretching and strengthening exercises resulting in a better and faster recovery process of the affected tendon in lateral epicondylitis.

DOI: 10.1136/bjsports-2012-091990 | PMID: 23709519



<https://www.ncbi.nlm.nih.gov/pubmed/23709519>

## Changes in pain sensitivity following spinal manipulation: a systematic review and meta-analysis.

Coronado RA, Gay CW, Bialosky JE, Carnaby GD, Bishop MD, George SZ.

J Electromyogr Kinesiol. 2012; 22 (5): 752-67.

### ABSTRACT

Spinal manipulation (SMT) is commonly used for treating individuals experiencing musculoskeletal pain. The mechanisms of SMT remain unclear; however, pain sensitivity testing may provide insight into these mechanisms. The purpose of this systematic review is to examine the literature on the hypoalgesic effects of SMT on pain sensitivity measures and to quantify these effects using meta-analysis. We performed a systematic search of articles using CINAHL, MEDLINE, PsycINFO, and SPORTDiscus from each databases' inception until May 2011. We examined methodological quality of each study and generated pooled effect size estimates using meta-analysis software. Of 997 articles identified, 20 met inclusion criteria for this review. Pain sensitivity testing used in these studies included chemical, electrical, mechanical, and thermal stimuli applied to various anatomical locations. Meta-analysis was appropriate for studies examining the immediate effect of SMT on mechanical pressure pain threshold (PPT). SMT demonstrated a favorable effect over other interventions on increasing PPT. Subgroup analysis showed a significant effect of SMT on increasing PPT at the remote sites of stimulus application supporting a potential central nervous system mechanism. Future studies of SMT related hypoalgesia should include multiple experimental stimuli and test at multiple anatomical sites.

DOI: 10.1016/j.jelekin.2011.12.013 | PMID: 22296867 | PMCID: PMC3349049



<https://www.ncbi.nlm.nih.gov/pubmed/22296867>

## Assessment of skin blood flow following spinal manual therapy: a systematic review.

Zegarra-Parodi R, Park PY, Heath DM, Makin IR, Degenhardt BF, Roustit M.

Man Ther. 2015; 20 (2): 228-49.

### ABSTRACT

Skin blood flow (SBF) indexes have been used to describe physiological mechanisms associated with spinal manual therapy (SMT). The aims of the current review were to assess methods for data collection, assess how investigators interpreted SBF changes, and formulate recommendations to advance manual medicine research. A database search was performed in PubMed, Cochrane Library, the Physiotherapy Evidence Database, and the Cumulative Index to Nursing and Allied Health Literature through April 2014. Articles were included if at least 1 outcome measure was changes in 1 SBF index following SMT. The database search yielded 344 records. Two independent authors applied the inclusion criteria. Twenty studies met the inclusion criteria. Selected studies used heterogeneous methods to assess short-term post-SMT changes in SBF, usually vasoconstriction, which was interpreted as a general sympathoexcitatory effect through central mechanisms. However, this conclusion might be challenged by the current understanding of skin sympathetic nervous activity over local endothelial mechanisms that are specifically controlling SBF. Evaluation of SBF measurements in peripheral tissues following SMT may document physiological responses that are beyond peripheral sympathetic function. Based on the current use of SBF indexes in clinical and physiological research, 14 recommendations for advancing manual medicine research using laser Doppler flowmetry are presented.

DOI: 10.1016/j.math.2014.08.011 | PMID: 25261088

 <https://www.ncbi.nlm.nih.gov/pubmed/25261088>

## Evidence-based guidelines for the chiropractic treatment of adults with headache.

Bryans R, Descarreaux M, Duranleau M, Marcoux H, Potter B, Ruegg R, et al.

J Manipulative Physiol Ther. 2011; 34 (5): 274-89.

### OBJECTIVE:

The purpose of this manuscript is to provide evidence-informed practice recommendations for the chiropractic treatment of headache in adults.

### METHODS:

Systematic literature searches of controlled clinical trials published through August 2009 relevant to chiropractic practice were conducted using the databases MEDLINE; EMBASE; Allied and Complementary Medicine; the Cumulative Index to Nursing and Allied Health Literature; Manual, Alternative, and Natural Therapy Index System; Alt HealthWatch; Index to Chiropractic Literature; and the Cochrane Library. The number, quality, and consistency of findings were considered to assign an overall strength of evidence (strong, moderate, limited, or conflicting) and to formulate practice recommendations.

### RESULTS:

Twenty-one articles met inclusion criteria and were used to develop recommendations. Evidence did not exceed a moderate level. For migraine, spinal manipulation and multimodal multidisciplinary interventions including massage are recommended for management of patients with episodic or chronic migraine. For tension-type headache, spinal manipulation cannot be recommended for the management of episodic tension-type headache. A recommendation cannot be made for or against the use of spinal manipulation for patients with chronic tension-type headache. Low-load craniocervical mobilization may be beneficial for longer term management of patients with episodic or chronic tension-type headaches. For cervicogenic headache, spinal manipulation is recommended. Joint mobilization or deep neck flexor exercises may improve symptoms. There is no consistently additive benefit of combining joint mobilization and deep neck flexor exercises for patients with cervicogenic headache. Adverse events were not ad-

dressed in most clinical trials; and if they were, there were none or they were minor.

## CONCLUSIONS:

Evidence suggests that chiropractic care, including spinal manipulation, improves migraine and cervicogenic headaches. The type, frequency, dosage, and duration of treatment(s) should be based on guideline recommendations, clinical experience, and findings. Evidence for the use of spinal manipulation as an isolated intervention for patients with tension-type headache remains equivocal.

DOI: 10.1016/j.jmpt.2011.04.008 | PMID: 21640251

 <https://www.ncbi.nlm.nih.gov/pubmed/21640251>

## Evidence-based guidelines for the chiropractic treatment of adults with neck pain.

Bryans R, Decina P, Descarreaux M, Duranleau M, Marcoux H, Potter B et al.

J Manipulative Physiol Ther. 2014; 37 (1): 42-63.

### OBJECTIVE:

The purpose of this study was to develop evidence-based treatment recommendations for the treatment of nonspecific (mechanical) neck pain in adults.

### METHODS:

Systematic literature searches of controlled clinical trials published through December 2011 relevant to chiropractic practice were conducted using the databases MEDLINE, EMBASE, EMCARE, Index to Chiropractic Literature, and the Cochrane Library. The number, quality, and consistency of findings were considered to assign an overall strength of evidence (strong, moderate, weak, or conflicting) and to formulate treatment recommendations.

### RESULTS:

Forty-one randomized controlled trials meeting the inclusion criteria and scoring a low risk of bias were used to develop 11 treatment recommendations. Strong recommendations were made for the treatment of chronic neck pain with manipulation, manual therapy, and exercise in combination with other modalities. Strong recommendations were also made for the treatment of chronic neck pain with stretching, strengthening, and endurance exercises alone. Moderate recommendations were made for the treatment of acute neck pain with manipulation and mobilization in combination with other modalities. Moderate recommendations were made for the treatment of chronic neck pain with mobilization as well as massage in combination with other therapies. A weak recommendation was made for the treatment of acute neck pain with exercise alone and the treatment of chronic neck pain with manipulation alone. Thoracic manipulation and trigger point therapy could not be recommended for the treatment of acute neck pain. Transcutaneous nerve stimulation, thoracic manipulation, laser, and traction could not be recommended for the treatment of chronic neck pain.

## CONCLUSIONS:

Interventions commonly used in chiropractic care improve outcomes for the treatment of acute and chronic neck pain. Increased benefit has been shown in several instances where a multimodal approach to neck pain has been used.

DOI: 10.1016/j.jmpt.2013.08.010 | PMID: 24262386



<https://www.ncbi.nlm.nih.gov/pubmed/24262386>

## Spinal manipulative therapy-specific changes in pain sensitivity in individuals with low back pain .

Bialosky JE, George SZ, Horn ME, Price DD, Staud R, Robinson ME.

J Pain. 2014 Feb;15(2):136-48.

### ABSTRACT

Spinal manipulative therapy (SMT) is effective for some individuals experiencing low back pain; however, the mechanisms are not established regarding the role of placebo. SMT is associated with changes in pain sensitivity, suggesting related altered central nervous system response or processing of afferent nociceptive input. Placebo is also associated with changes in pain sensitivity, and the efficacy of SMT for changes in pain sensitivity beyond placebo has not been adequately considered. We randomly assigned 110 participants with low back pain to receive SMT, placebo SMT, placebo SMT with the instructional set “The manual therapy technique you will receive has been shown to significantly reduce low back pain in some people,” or no intervention. Participants receiving the SMT and placebo SMT received their assigned intervention 6 times over 2 weeks. Pain sensitivity was assessed prior to and immediately following the assigned intervention during the first session. Clinical outcomes were assessed at baseline and following 2 weeks of participation in the study. Immediate attenuation of suprathreshold heat response was greatest following SMT ( $P = .05$ , partial  $\eta(2) = .07$ ). Group-dependent differences were not observed for changes in pain intensity and disability at 2 weeks. Participant satisfaction was greatest following the enhanced placebo SMT.

### PERSPECTIVE:

The results of this study indicate attenuation of pain sensitivity is greater in response to SMT than the expectation of receiving an SMT. These findings suggest a potential mechanism of SMT related to lessening of central sensitization and may indicate a pre-clinical effect beyond the expectations of receiving SMT.

DOI: 10.1016/j.jpain.2013.10.005 | PMID: 24361109 | PMCID: PMC3946602



<https://www.ncbi.nlm.nih.gov/pubmed/24361109>

## Osteopathic manipulative treatment for low back and pelvic girdle pain during and after pregnancy: A systematic review and meta-analysis.

Franke H, Franke JD, Belz S, Fryer G.

J Bodyw Mov Ther. 2017; 21 (4): 752-762.

### BACKGROUND:

Low back pain (LBP) is a common complaint during pregnancy. This study examined the effectiveness of osteopathic manipulative treatment (OMT) for LBP in pregnant or postpartum women. METHODS: Randomized controlled trials unrestricted by language were reviewed. Outcomes were pain and functional status. Mean difference (MD) or standard mean difference (SMD) and overall effect size were calculated.

### RESULTS:

Of 102 studies, 5 examined OMT for LBP in pregnancy and 3 for postpartum LBP. Moderate-quality evidence suggested OMT had a significant medium-sized effect on decreasing pain (MD, -16.65) and increasing functional status (SMD, -0.50) in pregnant women with LBP. Low-quality evidence suggested OMT had a significant moderate-sized effect on decreasing pain (MD, -38.00) and increasing functional status (SMD, -2.12) in postpartum women with LBP.

### CONCLUSIONS:

This review suggests OMT produces clinically relevant benefits for pregnant or postpartum women with LBP. Further research may change estimates of effect, and larger, high-quality randomized controlled trials with robust comparison groups are recommended.

DOI: 10.1016/j.jbmt.2017.05.014 | PMID: 29037623



<https://www.ncbi.nlm.nih.gov/pubmed/29037623>

## Physiological effects of physical therapy interventions on lumbar intervertebral discs: A systematic review.

Mitchell UH, Helgeson K, Mintken P. P

Physiother Theory Pract. 2017; 33 (9): 695-705.

### BACKGROUND CONTEXT:

The use of physical therapy has been recommended in the treatment of low back pain based on primarily mechanical and neurophysiological effects. Recent studies have measured the physiological effects of physical therapy interventions, including manual therapy and traction, on the intervertebral discs (IVD), and these findings may have implications for the long-term management or even prevention of low back pain. PURPOSE: The objective of this systematic review is to investigate the literature regarding possible physiological effects of physical therapy interventions on the intervertebral disc (IVD).

### STUDY DESIGN:

Systematic Review.

### METHODS:

A literature search of published articles through December 2014 resulted in the retrieval of 8 clinical studies assessing the influence of physical therapy interventions on the physiology of the IVD.

### RESULTS:

Three studies, including two using animal models, investigated the effects of 30-minute intermittent traction on disc height. One in vivo animal study and two studies using human subjects assessed changes of disc height associated with static traction. Three studies investigated the effects of lumbar spine manipulation and mobilization on changes in water diffusion within the IVD. All studies confirmed, either directly or indirectly, that their respective intervention influenced disc physiology primarily through water flow. CONCLUSION: Physical therapy interventions may have an effect on the physiology of the IVD, primarily through water diffusion and molecular transport,

which are important for the health of the IVD.

DOI: 10.1080/09593985.2017.1345026 | PMID: 28715273



<https://www.ncbi.nlm.nih.gov/pubmed/28715273>

## Osteopathic manipulative treatment for nonspecific low back pain: a systematic review and meta-analysis.

Franke H, Franke JD, Fryer G.

BMC Musculoskelet Disord. 2014 Aug; 15: 286.

### BACKGROUND:

Nonspecific back pain is common, disabling, and costly. Therefore, we assessed effectiveness of osteopathic manipulative treatment (OMT) in the management of nonspecific low back pain (LBP) regarding pain and functional status.

### METHODS:

A systematic literature search unrestricted by language was performed in October 2013 in electronic and ongoing trials databases. Searches of reference lists and personal communications identified additional studies. Only randomized clinical trials were included; specific back pain or single treatment techniques studies were excluded. Outcomes were pain and functional status. Studies were independently reviewed using a standardized form. The mean difference (MD) or standard mean difference (SMD) with 95% confidence intervals (CIs) and overall effect size were calculated at 3 months post-treatment. GRADE was used to assess quality of evidence.

### RESULTS:

We identified 307 studies. Thirty-one were evaluated and 16 excluded. Of the 15 studies reviewed, 10 investigated effectiveness of OMT for nonspecific LBP, 3 effect of OMT for LBP in pregnant women, and 2 effect of OMT for LBP in postpartum women. Twelve had a low risk of bias. Moderate-quality evidence suggested OMT had a significant effect on pain relief (MD, -12.91; 95% CI, -20.00 to -5.82) and functional status (SMD, -0.36; 95% CI, -0.58 to -0.14) in acute and chronic nonspecific LBP. In chronic nonspecific LBP, moderate-quality evidence suggested a significant difference in favour of OMT regarding pain (MD, -14.93; 95% CI, -25.18 to -4.68) and functional status (SMD, -0.32; 95% CI, -0.58 to -0.07). For nonspecific LBP in pregnancy, low-quality evidence suggested a significant difference in favour of OMT for pain (MD, -23.01; 95% CI, -44.13 to -1.88) and functional status (SMD, -0.80; 95% CI, -1.36 to -0.23), whereas modera-

te-quality evidence suggested a significant difference in favour of OMT for pain (MD, -41.85; 95% CI, -49.43 to -34.27) and functional status (SMD, -1.78; 95% CI, -2.21 to -1.35) in nonspecific LBP postpartum.

## CONCLUSION:

Clinically relevant effects of OMT were found for reducing pain and improving functional status in patients with acute and chronic nonspecific LBP and for LBP in pregnant and postpartum women at 3 months posttreatment. However, larger, high-quality randomized controlled trials with robust comparison groups are recommended.

DOI: 10.1186/1471-2474-15-286 | PMID: 25175885 | PMCID: PMC4159549



<https://www.ncbi.nlm.nih.gov/pubmed/25175885>

## The efficacy of manual joint mobilisation/manipulation in treatment of lateral ankle sprains: a systematic review.

Loudon JK, Reiman MP, Sylvain J.

Br J Sports Med. 2014;48 (5): 365-70.

### BACKGROUND:

Lateral ankle sprains are common and can have detrimental consequences to the athlete. Joint mobilisation/manipulation may limit these outcomes.

### OBJECTIVE:

Systematically summarise the effectiveness of manual joint techniques in treatment of lateral ankle sprains.

### METHODS:

This review employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. A computer-assisted literature search of MEDLINE, CINAHL, EMBASE, OVID and Physiotherapy Evidence Database (PEDro) (January 1966 to March 2013) was used with the following keywords alone and in combination 'ankle', 'sprain', 'injuries', 'lateral', 'manual therapy', and 'joint mobilisation'. The methodological quality of individual studies was assessed using the PEDro scale.

### RESULTS:

After screening of titles, abstracts and full articles, eight articles were kept for examination. Three articles achieved a score of 10 of 11 total points; one achieved a score of 9; two articles scored 8; one article scored a 7 and the remaining article scored a 5. Three articles examined joint techniques for acute sprains and the remainder examined subacute/chronic ankle sprains. Outcome measures included were pain level, ankle range of motion, swelling, functional score, stabilometry and gait parameters. The majority of the articles only assessed these outcome measures immediately after treatment. No detrimental effects from the joint techniques were revealed in any of the studies reviewed. CONCLUSIONS: For acute ankle sprains, manual joint mobilisation diminished pain and increased dorsiflexion range of motion. For treatment of subacute/chronic la-

teral ankle sprains, these techniques improved ankle range-of-motion, decreased pain and improved function.

DOI: 10.1136/bjsports-2013-092763 | PMID: 23980032



<https://www.ncbi.nlm.nih.gov/pubmed/23980032>

## Osteopathic manipulative treatment showed reduction of length of stay and costs in preterm infants: A systematic review and meta-analysis.

Lanaro D, Ruffini N, Manzotti A, Lista G.

Medicine (Baltimore). 2017; 96 (12): e6408.

### BACKGROUND:

Osteopathic medicine is an emerging and complementary method used in neonatology.

### METHODS:

Outcomes were the mean difference in length of stay (LOS) and costs between osteopathy and alternative treatment group. A comprehensive literature search of (quasi)- randomized controlled trials (RCTs), was conducted from journal inception to May, 2015. Eligible studies must have treated preterm infants directly in the crib or bed and Osteopathic Manipulative Treatment (OMT) must have been performed by osteopaths. A rigorous Cochrane-like method was used for study screening and selection, risk of bias assessment and data reporting. Fixed effect meta-analysis was performed to synthesize data.

### RESULTS:

5 trials enrolling 1306 infants met our inclusion criteria. Although the heterogeneity was moderate ( $I^2=61\%$ ,  $P=0.03$ ), meta-analysis of all five studies showed that preterm infants treated with OMT had a significant reduction of LOS by 2.71 days (95% CI -3.99, -1.43;  $P<0.001$ ). Considering costs, meta-analysis showed reduction in the OMT group (-1,545.66 $\&OV0556$ ;; -1,888.03 $\&OV0556$ ;; -1,203.29 $\&OV0556$ ;;  $P<0.0001$ ). All studies reported no adverse events associated to OMT. Subgroup analysis showed that the benefit of OMT is inversely associated to gestational age.

### CONCLUSIONS:

The present systematic review showed the clinical effectiveness of OMT on the reduction of LOS and costs in a large population of preterm infants.

DOI: 10.1097/MD.00000000000006408 | PMID: 28328840 | PMCID: PMC5371477



<https://www.ncbi.nlm.nih.gov/pubmed/28328840>

## The effect of thoracic spine manipulation on pain and disability in patients with non-specific neck pain: a systematic review.

Huisman PA, Speksnijder CM, de Wijer A.

Disabil Rehabil. 2013; 35 (20): 1677-85.

### PURPOSE:

The aim of this systematic review was to determine the efficacy of thoracic spine manipulation (TSM) in reducing pain and disability in patients diagnosed with non-specific neck pain.

### METHODS:

An extensive literature search of PubMed, The Cochrane Library, CINAHL and EMBASE was conducted in February 2012. Randomized controlled trials (RCTs) or controlled clinical trials evaluating the effect of TSM in patients aged 18 to 65 years with non-specific neck pain were eligible. Methodological quality of the studies was assessed according to the Physiotherapy Evidence Database scale (PEDro). Qualitative analyses were conducted by means of the best evidence synthesis of van Peppen et al.

### RESULTS:

The methodological quality of the 10 included RCTs (677 patients) varied between four and eight points. Eight studies reported significant reduction in pain and/or disability by TSM. Overall, according to the best evidence synthesis, there is insufficient evidence that TSM is more effective than control interventions in reducing pain and disability in patients with non-specific neck pain.

### CONCLUSIONS:

TSM has a therapeutic benefit to some patients with neck pain, when compared to the effect of interventions such as electrotherapy/thermal programme, infrared radiation therapy, spinal mobilization and exercises. However, in comparison to cervical spine manipulation, no evidence is found that TSM is more effective in reducing pain and disability. Implications for Rehabilitation TSM is often used in the treatment of non-specific neck pain, which is a major health problem in the Western society. There is insu-

fficient evidence that TSM is more effective in reducing pain and disability than control treatments in patients with non-specific neck pain. Despite the insufficient evidence that TSM is more effective than control treatments, TSM has a therapeutic benefit to some patients with neck pain. Therefore, TSM alone or in combination with other interventions is a suitable intervention to use in the treatment of non-specific neck pain.

DOI: 10.3109/09638288.2012.750689 | PMID: 23339721



<https://www.ncbi.nlm.nih.gov/pubmed/23339721>

## Osteopathic Manipulative Treatment in Pediatric and Neonatal Patients and Disorders: Clinical Considerations and Updated Review of the Existing Literature.

Bagagiolo D, Didio A, Sbarbaro M, Priolo CG, Borro T, Farina D.

Am J Perinatol. 2016; 33 (11): 1050-4.

### ABSTRACT

Osteopathic medicine is a form of complementary and alternative medicine. Osteopathic practitioners treat patients of all ages: according to the Osteopathic International Alliance's 2012 survey, about one-third of all treated patients are aged between 31 and 50 years and nearly a quarter (23.4%) are pediatric patients, with 8.7% of them being younger than 2 years. In 2013 a systematic review evaluated the effectiveness of osteopathic manipulative treatment (OMT) in pediatric patients with different underlying disorders, but due to the paucity and low methodological quality of the primary studies the results were inconclusive. The aim of this review is therefore to update the evidence concerning OMT in perinatal and pediatric disorders and to assess its clinical impact. Most published studies favor OMT, but the generally small sample sizes in these studies cannot support ultimate conclusions about the efficacy of osteopathic therapy in pediatric age. In turn, clinical trials of OMT in premature infants might represent an important step in the osteopathic research because they can address both cost-effectiveness issues, and an innovative, multidisciplinary approach to the management of specific pediatric diseases cared for by the same, common health care system. The available studies in neonatal settings provide evidence that OMT is effective in reducing the hospital length of stay of the treated infants, therefore, suggesting that robust cost-effectiveness analyses should be included in the future clinical trials' design to establish new possible OMT-shared strategies within the health care services provided to newborns.

DOI: 10.1055/s-0036-1586113 | PMID: 27603533



<https://www.ncbi.nlm.nih.gov/pubmed/27603533>

## Effectiveness of osteopathic manipulative therapy for managing symptoms of irritable bowel syndrome: a systematic review.

Müller A, Franke H, Resch KL, Fryer G.

J Am Osteopath Assoc. 2014; 114 (6): 470-9.

### CONTEXT:

Irritable bowel syndrome (IBS) is a common and often lifelong functional gastrointestinal disorder. There is a scarcity of effective management options for IBS.

### OBJECTIVE:

To assess the effectiveness of osteopathic manipulative therapy (OMTh) for managing the symptoms of IBS.

### DATA SOURCES:

Articles without language or publication-date restriction were searched in PubMed, Embase, Cochrane Library, PEDro, OSTMED.DR, and Osteopathic Research Web. Search terms included irritable bowel syndrome, IBS, functional colonic disease, colon irritable, osteopath\*, osteopathic manipulation, osteopathic medicine, clinical trial, and randomized clinical trial. Experts in the field of visceral osteopathy were also contacted to identify additional studies.

### STUDY SELECTION:

The authors evaluated randomized controlled trials (RCTs) of OMTh for IBS in adults in whom IBS was diagnosed using Rome (I-III) criteria. If OMTh was not the sole intervention in the intervention group and if the same additional interventions were not applied to the control group, the study was excluded.

### DATA EXTRACTION:

Citation identification, study selection, and data extraction were independently undertaken by 2 reviewers with a data extraction form from the Cochrane Collaboration. A consensus method was used to resolve disagreements concerning the assessment of the methodologic quality of the RCTs that were reviewed.

## RESULTS:

The search identified 10 studies that examined OMTh for patients with IBS; 5 studies (204 patients) met the inclusion criteria. All studies were assessed as having low risk of bias according to the Cochrane Collaboration criteria, although there was heterogeneity in the outcome measures and control interventions. Three studies used visual analog scales for abdominal pain, whereas others used the IBS severity score and the Functional Bowel Disorder Severity Index. A variety of secondary outcomes were used. All studies reported more pronounced short-term improvements with OMTh compared with sham therapy or standard care only. These differences remained statistically significant after variable lengths of follow-up in 3 studies.

## CONCLUSION:

The present systematic review provides preliminary evidence that OMTh may be beneficial in the treatment of patients with IBS. However, caution is required in the interpretation of these findings because of the limited number of studies available and the small sample sizes.

DOI: 10.7556/jaoa.2014.098 | PMID: 24917634



<https://www.ncbi.nlm.nih.gov/pubmed/24917634>

## The role of the descending inhibitory pain mechanism in musculoskeletal pain following high-velocity, low amplitude thrust manipulation: a review of the literature.

Savva C, Giakas G, Efstathiou M.

J Back Musculoskelet Rehabil. 2014; 27 (4): 377-82.

### BACKGROUND:

Although the antinociceptive effect of high-velocity, low amplitude thrust manipulation (HVLAM) has been recognized by numerous systematic reviews, the underlying mechanism for manipulation-related pain relief remains poorly understood. An increasing number of studies have explored its analgesic mechanism suggesting that the excitation of the descending inhibitory pain mechanism (DIPM) might play the most important role for musculoskeletal pain relief.

### OBJECTIVE:

The objective of this review is to investigate the role of the DIPM in musculoskeletal pain following HVLAM as well as to identify the pain-relieving importance of this technique within clinical practice.

### METHODOLOGY:

English literature databases were searched to find studies related to the objective of the present review.

### RESULTS AND CONCLUSIONS:

Findings from current literature support that HVLAM has a profound influence on nociceptive stimulus via the possible activation of the DIPM. It seems that the application of this technique activates the periaqueductal gray region area of the midbrain, stimulates the noradrenergic descending system and at the level of the spinal cord, the nociceptive afferent barrage is reduced and mechanical hypoalgesia is induced. However, the literature on HVLAM induced-analgesia is still problematic regarding the methodological design of the existing research. Despite these limitations, the clinical importance of the activation of the DIPM should not be ignored since the resulted analgesic effect

of this technique can provide a window of opportunity to restore impaired physical performance and disability.

DOI: 10.3233/BMR-140472 | PMID: 24867897



<https://www.ncbi.nlm.nih.gov/pubmed/24867897>

## Dose response and efficacy of spinal manipulation for chronic cervicogenic headache: a pilot randomized controlled trial.

Haas M, Spegman A, Peterson D, Aickin M, Vavrek D.

Spine J. 2010; 10 (2): 117-28.

### BACKGROUND CONTEXT:

Systematic reviews of randomized controlled trials suggest that spinal manipulative therapy (SMT) is efficacious for care of cervicogenic headache (CGH). The effect of SMT dose on outcomes has not been studied.

### PURPOSE:

To compare the efficacy of two doses of SMT and two doses of light massage (LM) for CGH. PATIENT SAMPLE: Eighty patients with chronic CGH.

### MAIN OUTCOME MEASURES:

Modified Von Korff pain and disability scales for CGH and neck pain (minimum clinically important difference=10 on 100-point scale), number of headaches in the last 4 weeks, and medication use. Data were collected every 4 weeks for 24 weeks. The primary outcome was the CGH pain scale.

### METHODS:

Participants were randomized to either 8 or 16 treatment sessions with either SMT or a minimal LM control. Patients were treated once or twice per week for 8 weeks. Adjusted mean differences (AMD) between groups were computed using generalized estimating equations for the longitudinal outcomes over all follow-up time points (profile) and using regression modeling for individual time points with baseline characteristics as covariates and with imputed missing data. RESULTS: For the CGH pain scale, comparisons of 8 and 16 treatment sessions yielded small dose effects:  $|AMD| \leq 5.6$ . There was an advantage for SMT over the control: AMD=-8.1 (95% confidence interval=-13.3 to -2.8) for the profile, -10.3 (-18.5 to -2.1) at 12 weeks, and -9.8 (-18.7 to -1.0) at 24 weeks. For the higher dose patients, the advantage was greater: AMD=-11.9 (-19.3 to -4.6) for the profile, -14.2 (-25.8 to -2.6) at 12 weeks, and -14.4 (-26.9 to -2.0) at 24 weeks. Pa-

tients receiving SMT were also more likely to achieve a 50% improvement in pain scale: adjusted odds ratio=3.6 (1.6 to 8.1) for the profile, 3.1 (0.9 to 9.8) at 12 weeks, and 3.1 (0.9 to 10.3) at 24 weeks. Secondary outcomes showed similar trends favoring SMT. For SMT patients, the mean number of CGH was reduced by half. CONCLUSIONS: Clinically important differences between SMT and a control intervention were observed favoring SMT. Dose effects tended to be small.

DOI: 10.1016/j.spinee.2009.09.002 | PMID: 19837005 | PMCID: PMC2819630



<https://www.ncbi.nlm.nih.gov/pubmed/19837005>

## NASS Contemporary Concepts in Spine Care: spinal manipulation therapy for acute low back pain.

Dagenais S, Gay RE, Tricco AC, Freeman MD, Mayer JM.

Spine J. 2010; 10 (10): 918-40.

### BACKGROUND CONTEXT:

Low back pain (LBP) continues to be a very prevalent, disabling, and costly spinal disorder. Numerous interventions are routinely used for symptoms of acute LBP. One of the most common approaches is spinal manipulation therapy (SMT).

### PURPOSE:

To assess the current scientific literature related to SMT for acute LBP.

### PATIENT SAMPLE:

Not applicable.

### OUTCOME MEASURES:

Not applicable.

### DESIGN:

Systematic review (SR).

### METHODS:

Literature was identified by searching MEDLINE using indexed and free text terms. Studies were included if they were randomized controlled trials (RCTs) published in English, and SMT was administered to a group of patients with LBP of less than 3 months. RCTs included in two previous SRs were also screened, as were reference lists of included studies. Combined search results were screened for relevance by two reviewers. Data related to methods, risk of bias, harms, and results were abstracted independently by two reviewers.

## RESULTS:

The MEDLINE search returned 699 studies, of which six were included; an additional eight studies were identified from two previous SRs. There were 2,027 participants in the 14 included RCTs, which combined SMT with education (n=5), mobilization (MOB) (n=4), exercise (n=3), modalities (n=3), or medication (n=2). The groups that received SMT were most commonly compared with those receiving physical modalities (n=7), education (n=6), medication (n=5), exercise (n=5), MOB (n=3), or sham SMT (n=2). The most common providers of SMT were chiropractors (n=5) and physical therapists (n=5). Most studies (n=6) administered 5 to 10 sessions of SMT over 2 to 4 weeks for acute LBP. Outcomes measured included pain (n=10), function (n=10), health-care utilization (n=6), and global effect (n=5). Studies had a follow-up of less than 1 month (n=7), 3 months (n=1), 6 months (n=3), 1 year (n=2), or 2 years (n=1). When compared with various control groups, results for improvement in pain in the SMT groups were superior in three RCTs and equivalent in three RCTs in the short term, equivalent in four RCTs in the intermediate term, and equivalent in two RCTs in the long term. For improvement in function, results from the SMT groups were superior in one RCT and equivalent in four RCTs in the short term, superior in one RCT and equivalent in one RCT in the intermediate term, and equivalent in one RCT and inferior in one RCT in the long term. No harms related to SMT were reported in these RCTs.

## CONCLUSIONS:

Several RCTs have been conducted to assess the efficacy of SMT for acute LBP using various methods. Results from most studies suggest that 5 to 10 sessions of SMT administered over 2 to 4 weeks achieve equivalent or superior improvement in pain and function when compared with other commonly used interventions, such as physical modalities, medication, education, or exercise, for short, intermediate, and long-term follow-up. Spine care clinicians should discuss the role of SMT as a treatment option for patients with acute LBP who do not find adequate symptomatic relief with self-care and education alone.

DOI: 10.1016/j.spinee.2010.07.389 | PMID: 20869008



<https://www.ncbi.nlm.nih.gov/pubmed/20869008>

## Manipulative therapy for lower extremity conditions: update of a literature review.

Brantingham JW, Bonnefin D, Perle SM, Cassa TK, Globe G, Pribicevic M et al.

J Manipulative Physiol Ther. 2012; 35 (2): 127-66.

### OBJECTIVE:

The purpose of this study is to update a systematic review on manipulative therapy (MT) for lower extremity conditions.

### METHODS:

A review of literature was conducted using MEDLINE, MANTIS, Science Direct, Index to Chiropractic Literature, and PEDro from March 2008 to May 2011. Inclusion criteria required peripheral diagnosis and MT with or without adjunctive care. Clinical trials were assessed for quality using a modified Scottish Intercollegiate Guidelines Network (SIGN) ranking system.

### RESULTS:

In addition to the citations used in a 2009 systematic review, an additional 399 new citations were accessed: 175 citations in Medline, 30 citations in MANTIS, 98 through Science Direct, 54 from Index to Chiropractic Literature, and 42 from the PEDro database. Forty-eight clinical trials were assessed for quality.

### CONCLUSIONS:

Regarding MT for common lower extremity disorders, there is a level of B (fair evidence) for short-term and C (limited evidence) for long-term treatment of hip osteoarthritis. There is a level of B for short-term and C for long-term treatment of knee osteoarthritis, patellofemoral pain syndrome, and ankle inversion sprain. There is a level of B for short-term treatment of plantar fasciitis but C for short-term treatment of metatarsalgia and hallux limitus/rigidus and for loss of foot and/or ankle proprioception and balance. Finally, there is a level of I (insufficient evidence) for treatment of hallux abducto valgus. Further research is needed on MT as a treatment of lower extremity conditions, specifically larger trials with improved methodology.

DOI: 10.1016/j.jmpt.2012.01.001 | PMID: 22325966



<https://www.ncbi.nlm.nih.gov/pubmed/22325966>

## What “CAM” we learn about the level of evidence from 60 years of research into manipulative and body-based therapies in sports and exercise medicine?

Macznik AK, Schneiders AG, Sullivan SJ, Athens J.

Complement Ther Med. 2014 Apr; 22 (2): 349-53.

### OVERVIEW:

Complementary and alternative medicine (CAM) is becoming increasingly accepted in modern western society, including amongst amateur and professional athletes, however, it has not yet been determined how CAM is reflected in scientific publications in sports and exercise medicine (SEM).

### AIM:

The aim of this study was to identify trends in the levels of evidence for manipulative and body-based therapies within the SEM literature.

### METHODS:

The literature was systematically searched with no language restrictions in seven databases and retrieved articles were screened and classified according to their study design using the Oxford Centre for Evidence-Based Medicine system.

### RESULTS:

From 6088 retrieved articles, 395 were retained for evaluation and these included 180 on massage, 96 on acupuncture and 95 on manipulation. The majority of the articles were published in English, with 88 in non-English languages. Level-1 evidence was available for acupuncture, manipulation, massage, and Pilates. From the nineteen-seventies onwards, a decreasing trend was observed for low evidence articles with a corresponding increasing trend for clinical trials. After the year 2000, over 50% of the published articles were clinical trials, RCTs or systematic reviews.

### CONCLUSIONS:

This review revealed an increase in the quantity and quality of published manipulative and body-based therapy articles in SEM over the last 60 years with the evidence level

varying considerably between therapies. The timeframe associated with the development of evidence in CAM may reflect the move to provide scientific support for therapies previously justified primarily by anecdotal evidence, or traditional and cultural use.

DOI: 10.1016/j.ctim.2014.02.004 | PMID: 24731907



<https://www.ncbi.nlm.nih.gov/pubmed/24731907>

## Osteopathic manual treatment and ultrasound therapy for chronic low back pain: a randomized controlled trial.

Licciardone JC, Minotti DE, Gatchel RJ, Kearns CM, Singh KP.

Complement Ther Med. 2014 Apr; 22 (2): 349-53.

### PURPOSE:

We studied the efficacy of osteopathic manual treatment (OMT) and ultrasound therapy (UST) for chronic low back pain.

### METHODS:

A randomized, double-blind, sham-controlled, 2 × 2 factorial design was used to study OMT and UST for short-term relief of nonspecific chronic low back pain. The 455 patients were randomized to OMT (n = 230) or sham OMT (n = 225) main effects groups, and to UST (n = 233) or sham UST (n = 222) main effects groups. Six treatment sessions were provided over 8 weeks. Intention-to-treat analysis was performed to measure moderate and substantial improvements in low back pain at week 12 (30% or greater and 50% or greater pain reductions from baseline, respectively). Five secondary outcomes, safety, and treatment adherence were also assessed.

### RESULTS:

There was no statistical interaction between OMT and UST. Patients receiving OMT were more likely than patients receiving sham OMT to achieve moderate (response ratio [RR] = 1.38; 95% CI, 1.16-1.64; P <.001) and substantial (RR = 1.41, 95% CI, 1.13-1.76; P = .002) improvements in low back pain at week 12. These improvements met the Cochrane Back Review Group criterion for a medium effect size. Back-specific functioning, general health, work disability specific to low back pain, safety outcomes, and treatment adherence did not differ between patients receiving OMT and sham OMT. Nevertheless, patients in the OMT group were more likely to be very satisfied with their back care throughout the study (P <.001). Patients receiving OMT used prescription drugs for low back pain less frequently during the 12 weeks than did patients in the sham OMT group (use ratio = 0.66, 95% CI, 0.43-1.00; P = .048). Ultrasound therapy was not efficacious.

## CONCLUSIONS:

The OMT regimen met or exceeded the Cochrane Back Review Group criterion for a medium effect size in relieving chronic low back pain. It was safe, parsimonious, and well accepted by patients.

## TRIAL REGISTRATION:

ClinicalTrials.gov [NCT00315120](https://clinicaltrials.gov/ct2/show/study/NCT00315120).

DOI: 10.1370/afm.1468 | PMID: 23508598 | PMCID: PMC3601389



<https://www.ncbi.nlm.nih.gov/pubmed/23508598>

## Long-term effects of osteopathic treatment of chronic prostatitis with chronic pelvic pain syndrome: a 5-year follow-up of a randomized controlled trial and considerations on the pathophysiological context.

Marx S, Cimniak U, Rütz M, Resch KL.

Urologe A. 2013 Mar;52(3):384-90

### BACKGROUND:

The etiology of chronic prostatitis chronic pelvic pain syndrome (CP/CPPS) is still unclear. As no pathological findings exist the diagnosis of CP/CPPS is essentially a diagnosis by exclusion and functional disorders, so-called somatoform disorders play a more important role. Osteopathy treats functional disorders of the musculoskeletal system including all associated internal organs but little attention has so far been paid to this treatment method. Therefore, the 5-year follow-up period was intended to show that this is a sustainable form of therapy using exclusively manual and gentle techniques and simple treatment procedures resulting in manageable costs.

### MATERIALS AND METHODS:

The aim of this study was to investigate whether sustainability of osteopathic treatment could be demonstrated even after 5 years. This was a randomized controlled study initially involving 5 treatment sessions, a follow-up without treatment after 6 weeks and further follow-up after 1.5 and 5 years. Of the 20 patients 19 in the test group participated in the 5-year follow-up. The control group were not asked because it would have been unacceptable to expect the patients to refrain from having treatment for as long as 5 years. The men were aged between 29 and 70 years. The patients were asked to complete the international prostate symptom score (IPSS), the National Institutes of Health chronic prostatitis symptom index (NIH-CPSI) and the quality of life (QOL) questionnaires once again and in particular to state whether they had received osteopathic treatment specifically for the prostate problem and how often they had been treated.

### RESULTS:

The follow-up assessment of the symptoms of chronic prostatitis (NIH-CPSI) showed that they had further improved after 1.5 years (intragroup difference -1.8 points, 95

% confidence interval CI=-3.8 to 0.3) and also after 5 years (intragroup difference -1.3 points 95 % CI=-3.4 to 0.8). The urinary tract symptoms (IPSS) showed a statistically significant improvement (intergroup difference 8.9 points, 95 % CI=4.7-13.1,  $p<0.0005$ ). At the second follow-up after 1.5 years there was a further improvement (intragroup difference -2.2 points, 95% CI=-3.9 to -0.4,  $p=0.02$ ) which was found to remain constant after 5 years (intragroup difference 0.2 points). The quality of life (QOL) with respect to the symptoms showed a statistically significant improvement in comparing both groups during the study phase (intergroup difference  $\chi^2$ :  $p<0.005$ ). At follow-up after 5 years out of 19 patients 15 answered the question "how would you feel if the symptoms currently present would not change in the future?" with excellent or satisfactory and 11 patients would not have wanted further osteopathic treatment. Of the patients 8 reported that since the second follow-up (within 3.5 years) they had received osteopathic treatment one to eight times; however, this was partially more prophylactic than due to pain.

## CONCLUSIONS:

Due to the sustainability of osteopathic treatment and the low amount of time involved, osteopathy should be taken seriously as a treatment for patients with CP/CPPS. Furthermore, due to the osteopathic treatment the patients learnt to alleviate or even eliminate their own symptoms in treating themselves. In order to help many other affected persons out of their dilemma it would be desirable if more urologists and internists would become acquainted with osteopathy in order to be able to offer this to patients at an early stage. Further studies with larger numbers of patients should be carried out to confirm these results.

DOI: 10.1007/s00120-012-3075-3 | PMID: 23354911



<https://www.ncbi.nlm.nih.gov/pubmed/23354911>

## Management of falls and balance disorders in the elderly.

Noll DR.

J Am Osteopath Assoc. 2013 Jan;113(1):17-22.

### ABSTRACT

Falls, gait disturbances, and balance disorders are common clinical problems for the elderly, and these problems are associated with considerable morbidity. However, the literature reports relatively few effective treatment options, such as vitamin D replacement, exercise and physical therapy, and tai chi. Because of the limited number of available effective interventions, there is a need to explore other approaches, such as osteopathic manipulative treatment. The author reviews the limited body of literature relating to the use of manipulation for reducing fall events and improving gait and balance in the elderly. At this time, there are new opportunities for clinical and basic science research to investigate emerging uses of osteopathic manipulative treatment for managing falls, gait disturbances, and balance disorders.

PMID: 23329802



<https://www.ncbi.nlm.nih.gov/pubmed/23329802>

## A comparative study of cervical hysteresis characteristics after various osteopathic manipulative treatment (OMT) modalities.

Barnes PL, Laboy F, Noto-Bell L, Ferencz V, Nelson J, Kuchera ML.

J Bodyw Mov Ther. 2013 Jan;17(1):89-94.

### BACKGROUND:

Few objective measures have been used to document change in myofascial tissues after OMT.

### HYPOTHESIS:

Paraspinal tissues associated with cervical somatic dysfunction (SD) will demonstrate quantifiable change in myofascial hysteresis characteristics after a given OMT technique but not after a Sham intervention.

### MATERIALS & METHODS:

240 subjects were palpated for cervical articular SD. A randomly selected intervention (5 OMT techniques or a Sham) was applied to the cervical SD clinically considered to be most severe. A durometer (SA201®; Sigma Instruments, Cranberry, PA, USA) objectively measured myofascial structures overlying each cervical spinal segment pre and post-intervention. Using a single consistent piezoelectric impulse, this durometer quantified four hysteresis (tissue texture) characteristics--fixation, mobility, frequency, and motoricity.

### RESULTS:

Baseline changes in median hysteresis values were noted for each OMT technique but not for Sham interventions. Notably, segmental counterstrain OMT resulted in significant motoricity change compared to adjacent segmental myofascial measures (p-value 0.04) along with a suggestive trend in the mobility component (p-value 0.12).

### CONCLUSION:

When comparing treated to untreated cervical segments, the most significant change occurred post-counterstrain OMT with no overall change following Sham. Overall,

quantifiable objective change occurs in myofascial tissues post-OMT, in addition to the noted clinical palpable change.

DOI: 10.1016/j.jbmt.2012.10.004 | PMID: 23294689



<https://www.ncbi.nlm.nih.gov/pubmed/23294689>

## Osteopathic manipulative treatment (OMT) for lower urinary tract symptoms (LUTS) in women.

Franke H, Hoesele K.

J Bodyw Mov Ther. 2013 Jan;17(1):11-8.

### BACKGROUND:

Because of its prevalence and impact on women's well-being, and its high financial costs, female LUTS is an important health problem that requires serious attention from health professionals.

### OBJECTIVE:

The objective of this review was to determine the clinical effects of osteopathic treatment on female lower urinary tract disorders.

### DATA SOURCES:

A systematic literature search was performed in May 2011 in the electronic databases Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, PEDro, OSTMED-DR, OSTEOPATHIC WEBRESEARCH and databases of ongoing trials. A manual search in reference lists and a personal communication with experts in the field of osteopathy was also conducted to identify additional studies.

### STUDY SELECTION:

Only randomized clinical studies (RCT) or controlled clinical studies (CCT) were included. Inclusion criteria of the participants were female, at least 18 years old and a diagnosed female urinary tract disorder. Exclusion criteria were neurologic disorders, tumors, urinary tract infections or antibiotic treatment, and pregnancy.

### DATA EXTRACTION:

Two review authors independently extracted the data of the studies using a standardized data extraction form. The updated Cochrane Risk of bias tool from 2011 was used to assess the methodological quality.

## RESULTS:

The quantitative analysis shows a statistically significant and clinically relevant improvement when the osteopathic intervention was compared to an untreated group. Two studies which compare OMT with the pelvic floor muscle training as a reference treatment document almost the same therapeutic effect.

## CONCLUSION:

The findings of this systematic review and meta-analysis are promising and encouraging to conduct larger, rigorous osteopathic intervention studies for female urination disorders. Future studies should compare the osteopathic treatment with established standard procedures in the control group.

DOI: [10.1016/j.jbmt.2012.05.001](https://doi.org/10.1016/j.jbmt.2012.05.001) | PMID: 23294678



<https://www.ncbi.nlm.nih.gov/pubmed/23294678>

## Osteopathic treatment of patients with long-term sequelae of whiplash injury: effect on neck pain disability and quality of life.

Schwerla F, Kaiser AK, Gietz R, Kastner R.

J Altern Complement Med. 2013 Jun;19(6):543-9.

### OBJECTIVES:

The clinical sequelae and manifestation resulting from whiplash injury are defined as late whiplash syndrome (LWS). The objective of this study was to investigate whether a series of osteopathic treatments of patients with LWS may improve their symptoms.

### DESIGN:

The study was designed as a two-phase (pre-post) clinical intervention study. In phase one, the patients received no treatment for 6 weeks; in phase two, they received five test-dependent osteopathic treatments.

### SETTING:

Forty-two (42) patients (mean age 39 years) suffering from LWS due to car rear-end collisions were included.

### INTERVENTION:

Five (5) individualized and custom-tailored osteopathic treatments at 1-week intervals were performed.

### MAIN OUTCOME MEASURES:

Main outcome parameters were the neck-related pain and disability (determined by the Neck Pain and Disability Scale [NPAD]) and the quality of life (assessed on the SF-36). The presence of a post-traumatic stress disorder (PTSD) was diagnosed.

### RESULTS:

A direct comparison between the untreated period and the treatment period revealed clinically relevant and statistically significant improvements in the osteopathic treat-

ment period for the NPAD. In the intervention phase, the NPAD dropped from 41.5 to 26.0 points, which corresponds to an improvement of 37% (95% confidence interval=11.1-19.8;  $p<0.0005$ ). For the SF-36, both the physical and the mental component summary showed a significant and substantial improvement during treatment phase ( $p=0.009$  versus  $p=0.02$ ). Prior to treatment, 17 patients (43.6%) were diagnosed with a positive PTSD; this number fell to only 6 (15.4%) during observation.

## CONCLUSIONS:

Five (5) osteopathic treatments had a beneficial effect on the physical as well as the mental aspects of LWS and lives up to its claim of being a complementary modality in the treatment regimen of this condition. Based on these preliminary findings, rigorous randomized controlled studies are warranted.

DOI: [10.1089/acm.2012.0354](https://doi.org/10.1089/acm.2012.0354) | PMID: 23273259



<https://www.ncbi.nlm.nih.gov/pubmed/23273259>

## Depression, somatization, and somatic dysfunction in patients with nonspecific chronic low back pain: results from the OSTEOPATHIC Trial.

Licciardone JC, Gatchel RJ, Kearns CM, Minotti DE.

J Am Osteopath Assoc. 2012 Dec;112(12):783-91

### CONTEXT:

Depression and somatization are often present in patients with chronic low back pain (LBP).

### OBJECTIVES:

To measure the presence of depression and somatization in patients with chronic LBP and to study the associations of depression and somatization with somatic dysfunction, LBP severity, back-specific functioning, and general health.

### DESIGN:

Cross-sectional study using baseline measures collected within a randomized controlled trial.

### SETTING:

University-based study in Dallas-Fort Worth, Texas.

### PATIENTS:

A total of 202 adult research participants with nonspecific chronic LBP.

### MAIN STUDY MEASURES:

Depression was self-reported and also measured with the Modified Zung Depression Index (MZDI). Somatization was measured with the Modified Somatic Perception Questionnaire (MSPQ). The MZDI and MSPQ scores were used to classify patients as "normal," "at risk," or "distressed" using the Distress and Risk Assessment Method. Somatic dysfunction was assessed using the Outpatient Osteopathic SOAP Note Form. A 100-mm visual analog scale (VAS), the Roland-Morris Disability Questionnaire (RMDQ), and

the Medical Outcomes Study Short Form-36 Health Survey (SF-36) were used to measure LBP severity, back-specific functioning, and general health, respectively.

## RESULTS:

There were 53 patients (26%) and 44 patients (22%) who were classified as having depression on the basis of self-reports and the MZDI cut point, respectively. A total of 38 patients (19%) were classified as having somatization on the basis of the MSPQ cut point. There were significant correlations among self-reported depression and the MZDI and MSPQ scores ( $P < .001$  for each pairwise correlation). Similarly, the MZDI and MSPQ scores were both correlated with LBP severity and back-specific disability, and they were inversely correlated with general health ( $P < .001$  for each pairwise correlation). Depression and the number of key osteopathic lesions were also each correlated with back-specific disability and inversely correlated with general health ( $P < .001$  for each pairwise correlation). The MZDI ( $P = .006$ ) and MSPQ ( $P = .004$ ) scores were also correlated with the number of key osteopathic lesions.

## CONCLUSIONS:

The associations among depression, somatization, and LBP in this study are consistent with the findings of previous studies. These associations, coupled with the findings that MZDI and MSPQ scores are correlated with somatic dysfunction, may have important implications for the use of osteopathic manual treatment in patients with chronic LBP.

PMID: 23212429



<https://www.ncbi.nlm.nih.gov/pubmed/23212429>

## Osteopathic manipulative medicine for carpal tunnel syndrome.

Siu G, Jaffe JD, Rafique M, Weinik MM.

J Am Osteopath Assoc. 2012 Mar;112(3):127-39.

### ABSTRACT

Carpal tunnel syndrome (CTS) is 1 of the most common peripheral nerve entrapment disorders. Osteopathic manipulative medicine can be invaluable in diagnosing and managing CTS. Combined with a patient's history and a standard physical examination, an osteopathic structural examination can facilitate localizing the nerve entrapment, diagnosing CTS, and monitoring the disease process. Osteopathic manipulative treatment is noninvasive and can be used to supplement traditional CTS treatment methods. The authors also review the relevant anatomy involving CTS and the clinical efficacy of osteopathic manipulative medicine in the management of this disorder.

PMID: 22411967



<https://www.ncbi.nlm.nih.gov/pubmed/22411967>

## Immediate effect of T2, T5, T11 thoracic spine manipulation of asymptomatic patient on autonomic nervous system response: Single-blind, parallel-arm controlled-group experiment

Minarini G, Ford M, Esteves, J .

International Journal Of Osteopathic Medicine. Volume: 30. 2018 Dec; 12-17

### PURPOSE:

Investigating the immediate effect of thoracic spinal manipulation on autonomic nervous system targeting three segments arbitrarily chosen, T2/T5/T11, compared to a sham-treatment randomised controlled group.

### METHODS:

73 participants completed the study protocol. Paired-t test were used to compare within-group and ANOVA repeated measures for between-groups results. Subjects were randomised into a single-blind controlled trial involving two study groups: intervention group and sham treatment group. Outcome measure was the rMSSD, electronically recorded through R-R intervals, continuously registered over a period of 60 s before and 60 s after the spinal manipulation/sham.

### RESULTS:

Within-group and between-group changes suggest a significant increase in rMSSD ( $p < 0.05$ ) in intervention group compared to sham treatment, immediately after the postero-anterior thoracic HVLAT.

### CONCLUSION

The result of this study suggests that thoracic OMT could affect ANS balance with a shift towards parasympathetic increase activity. Due to population sample, this study shouldn't be used for clinical application, but as a baseline for future research on the argument.

DOI: 10.1016/j.ijosm.2018.10.002



## Intervertebral kinematics of the cervical spine before, during, and after high-velocity low-amplitude manipulation

Anderst WJ, Gale T, LeVasseur C, Raj S, Gongaware K, Schneider M.

Spine J. 2018 Dec;18(12):2333-2342. doi: 10.1016/j.spinee.2018.07.026. Epub 2018 Aug 22

### BACKGROUND CONTEXT:

Neck pain is one of the most commonly reported symptoms in primary care settings, and a major contributor to health-care costs. Cervical manipulation is a common and clinically effective intervention for neck pain. However, the in vivo biomechanics of manipulation are unknown due to previous challenges with accurately measuring intervertebral kinematics in vivo during the manipulation.

### PURPOSE:

The objectives were to characterize manual forces and facet joint gapping during cervical spine manipulation and to assess changes in clinical and functional outcomes after manipulation. It was hypothesized that patient-reported pain would decrease and intervertebral range of motion (ROM) would increase after manipulation.

### STUDY DESIGN/SETTING:

Laboratory-based prospective observational study. Patient sample: 12 patients with acute mechanical neck pain (4 men and 8 women; average age 40 +/- 15 years).

### OUTCOME MEASURES:

Amount and rate of cervical facet joint gapping during manipulation, amount and rate of force applied during manipulation, change in active intervertebral ROM from before to after manipulation, and numeric pain rating scale (NPRS) to measure change in pain after manipulation.

### METHODS:

Initially, all participants completed a NPRS (0-10). Participants then performed full ROM flexion-extension, rotation, and lateral bending while seated within a custom biplane

radiography system. Synchronized biplane radiographs were collected at 30 images/s for 3 seconds during each movement trial. Next, synchronized, 2.0-millisecond duration pulsed biplane radiographs were collected at 160 images/s for 0.8 seconds during the manipulation. The manipulation was performed by a licensed chiropractor using an articular pillar push technique. For the final five participants, two pressure sensors placed on the thumb of the chiropractor (Novel pliance system) recorded pressure at 160 Hz. After manipulation, all participants repeated the full ROM movement testing and once again completed the NPRS. A validated volumetric model-based tracking process that matched subject-specific bone models (from computed tomography) to the biplane radiographs was used to track bone motion with submillimeter accuracy. Facet joint gapping was calculated as the average distance between adjacent articular facet surfaces. Pre-to postmanipulation changes were assessed using the Wilcoxon signed-rank test.

## RESULTS:

The facet gap increased 0.9 +/- 0.40 mm during manipulation. The average rate of facet gapping was 6.2 +/- 3.9 mm/s. The peak force and rate of force application during manipulation were 65 +/- 4 N and 440 +/- 58 N/s. Pain score improved from 3.7 +/- 1.2 before manipulation to 2.0 +/- 1.4 after manipulation ( $p < .001$ ). Intervertebral ROM increased after manipulation by 1.2 degrees ( $p = .006$ ), 2.1 degrees ( $p = .01$ ), and 3.1 degrees ( $p = .003$ ) at the C4/C5, C5/C6, and C6/C7 motion segments, respectively, during flexion-extension; by 1.5 degrees ( $p = .028$ ), 1.9 degrees ( $p = .005$ ), and 1.3 degrees ( $p = .050$ ) at the C3/C4, C4/C5, and C5/C6 motion segments, respectively, during rotation; and by 1.3 degrees ( $p = .034$ ) and 1.1 degrees ( $p = .050$ ) at the C4/C5 and C5/C6 motion segments, respectively, during lateral bending. Global head ROM relative to the torso increased after manipulation by 8 degrees ( $p = .023$ ), 10 degrees ( $p = .002$ ), and 13 degrees ( $p = .019$ ) during lateral bending, axial rotation and flexion-extension, respectively, after manipulation.

## CONCLUSIONS:

This study is the first to measure facet gapping during cervical manipulation on live humans. The results demonstrate that target and adjacent motion segments undergo facet joint gapping during manipulation and that intervertebral ROM is increased in all three planes of motion after manipulation. The results suggest that clinical and functional improvement after manipulation may occur as a result of small increases

in intervertebral ROM across multiple motion segments. This study demonstrates the feasibility of characterizing in real time the manual inputs and biological responses that comprise cervical manipulation, including clinician-applied force, facet gapping, and increased intervertebral ROM. This provides a basis for future clinical trials to identify the mechanisms behind manipulation and to optimize the mechanical factors that reliably and sufficiently impact the key mechanisms behind manipulation. (C) 2018 Elsevier Inc. All rights reserved.

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## Cost-effectiveness of spinal manipulation, exercise, and self-management for spinal pain using an individual participant data meta-analysis approach: a study protocol

Leininger B, Bronfort G, Evans R, Hodges J, Kuntz K, Nyman JA.

Chiropr Man Therap. 2018 Nov 13;26:46. doi: 10.1186/s12998-018-0216-9. eCollection 2018.

### ABSTRACT

**Background** Spinal pain is a common and disabling condition with considerable socioeconomic burden. Spine pain management in the United States has gathered increased scrutiny amidst concerns of overutilization of costly and potentially harmful interventions and diagnostic tests. Conservative interventions such as spinal manipulation, exercise and self-management may provide value for the care of spinal pain, but little is known regarding the cost-effectiveness of these interventions in the U.S. Our primary objective for this project is to estimate the incremental cost-effectiveness of spinal manipulation, exercise therapy, and self-management for spinal pain using an individual patient data meta-analysis approach. **Methods/design** We will estimate the incremental cost-effectiveness of spinal manipulation, exercise therapy, and self-management using cost and clinical outcome data collected in eight randomized clinical trials performed in the U.S. Cost-effectiveness will be assessed from both societal and healthcare perspectives using QALYs, pain intensity, and disability as effectiveness measures. The eight randomized clinical trials used similar methods and included different combinations of spinal manipulation, exercise therapy, or self-management for spinal pain. They also collected similar clinical outcome, healthcare utilization, and work productivity data. A two-stage approach to individual patient data meta-analysis will be conducted. **Discussion** This project capitalizes on a unique opportunity to combine clinical and economic data collected in a several clinical trials that used similar methods. The findings will provide important information on the value of spinal manipulation, exercise therapy, and self-management for spinal pain management in the U.S.

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<https://www.ncbi.nlm.nih.gov/pubmed/30473764>

## Vertebral Displacements and Muscle Activity During Manual Therapy: Distinct Behaviors Between spinal manipulation and Mobilization

Pagé I, Biner É, Descarreaux M.

J Manipulative Physiol Ther. 2018 Nov - Dec;41(9):753-761. doi: 10.1016/j.jmpt.2018.07.004.

### OBJECTIVE:

The purpose of this study was to compare vertebral displacements (absolute and relative) and muscle responses induced by spinal manipulative therapy of short (spinal manipulation ) and long (spinal mobilization) impulse duration.

### METHODS:

Twenty-five healthy adults (without thoracic pain) were recruited for this crossover study. Six spinal manipulative therapies (255 N peak force) of different impulse durations (100, 125, 200, 500, 1000, and 1500 ms) were delivered to each participant's T7 transverse process using a mechanical device. Impulse duration effect on the vertebral displacement (absolute displacement of T6, T7, and T8 and relative displacement between T7 and T6 and between T7 and T8) and the thoracic muscle response (surface electromyography) were assessed using mixed-model analyses of variance and predefined linear trend analyses.

### RESULTS:

Results showed a linear increase in the absolute vertebral displacement for T8 ( $P = .002$ ) and a linear decrease in the T7/T6 and T7/T8 relative displacement ( $P < .0001$ ) when impulse duration was increased. The data of 24 participants were available for electromyography analysis. A significant main effect of impulse duration on surface electromyography response was observed ( $P < .0001$ ,  $\eta^2(p)=0.43$ ). Planned comparisons for a linear trend between these variables revealed a negative relationship ( $P < .0001$ ). Only 13 of the 24 participants with available data presented a muscle response at every impulse duration.

## CONCLUSION:

These results support the assumption that spinal manipulation and spinal mobilization might operate under distinct mechanisms.

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<https://www.ncbi.nlm.nih.gov/pubmed/30871712>

## Dose-response and efficacy of spinal manipulation for care of cervicogenic headache: a dual-center randomized controlled trial

Haas M, Bronfort G, Evans R, Schulz C, Vavrek D, Takaki L, Hanson L, Leininger B, Nera-dilek MB.

Spine J. 2018 Oct;18(10):1741-1754. doi: 10.1016/j.spinee.2018.02.019. Epub 2018 Feb 23.

### BACKGROUND CONTEXT:

The optimal number of visits for the care of cervicogenic headache (CGH) with spinal manipulation therapy (SMT) is unknown.

### PURPOSE:

The present study aimed to identify the dose-response relationship between visits for SMT and chronic CGH outcomes and to evaluate the efficacy of SMT by comparison with a light-massage control.

### STUDY DESIGN/SETTING:

This is a two-site, open-label randomized controlled trial.

### PATIENT SAMPLE:

Participants were 256 adults with chronic CGH.

### OUTCOME MEASURES:

The primary outcome was days with CGH in the previous 4 weeks evaluated at the 12- and 24-week primary end points. Secondary outcomes included CGH days at remaining end points, pain intensity, disability, perceived improvement, medication use, and patient satisfaction.

### METHODS:

Participants were randomized to four dose levels of chiropractic SMT: 0, 6, 12, or 18 sessions. They were treated three times per week for 6 weeks and received a focu-

sed light-massage control at sessions when SMT was not assigned. Linear dose effects and comparisons with the no-manipulation control group were evaluated at 6, 12, 24, 39, and 52 weeks. The present study was funded by the National Center for Complementary and Integrative Health (R01AT006330) and is registered at ClinicalTrials.gov (NCT01530321). The authors declare no conflicts of interest.

## RESULTS:

A linear dose-response was observed for all follow-ups, a reduction of approximately 1 CGH day/4 weeks per additional 6 SMT visits ( $p < .05$ ); a maximal effective dose could not be determined. Cervicogenic headache days/4 weeks were reduced from about 16 to 8 for the highest and most effective dose of 18 SMT visits. Mean differences in CGH days/4 weeks between 18 SMT visits and control were -3.3 ( $p = .004$ ) and -2.9 ( $p = .017$ ) at the primary end points, and were similar in magnitude at the remaining end points ( $p < .05$ ). Differences between other SMT doses and control were smaller in magnitude ( $p > .05$ ). Cervicogenic headache intensity showed no important improvement nor differed by dose. Other secondary outcomes were generally supportive of the primary outcome.

## CONCLUSIONS:

There was a linear dose-response relationship between SMT visits and days with CGH. For the highest and most effective dose of 18 SMT visits. CGH days were reduced by half and about 3 more days per month than for the light-massage control. (C) 2018 Elsevier Inc. All rights reserved.

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<https://www.ncbi.nlm.nih.gov/pubmed/29481979>

## A suspected case of ulnar tunnel syndrome relieved by chiropractic extremity adjustment methods.

Russell BS.

J Manipulative Physiol Ther. 2003 Nov-Dec;26(9):602-7.

### BACKGROUND:

There has been little published about ulnar tunnel syndrome (UTS) as it relates to the practice of chiropractic, despite chiropractors' apparent interest in nerve compression syndromes and a growing trend toward providing chiropractic extremity care. This syndrome is not very common and could be mistaken for carpal tunnel syndrome by practitioners who are not aware of the differences.

### OBJECTIVE:

To discuss the case of a patient with ulnar tunnel syndrome whose symptoms were resolved by chiropractic extremity adjustment. Clinical features A 45-year-old female patient complained of numbness in her little finger. Standard orthopedic testing procedures for the wrist and hand reproduced the symptom, but tests for the cervical spine and thoracic outlet region were negative. Intervention and outcome Care for this patient consisted of adjustment procedures directed to the wrist, primarily the hamate and pisiform articulations with the triquetrum. Her symptoms were resolved in 4 office visits, with corresponding improvement in examination findings.

### CONCLUSIONS:

This case report represents what a patient could expect during a typical chiropractic treatment. The examination and the care given were simple and cost-effective but might not be sufficient for a more complicated or persistent case. The costs for the care in this case were borne solely by the patient and were affordable. Hard conclusions cannot be reached without more sophisticated diagnostic procedures, additional similar cases, and controlled research conditions.

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<https://www.elsevier.es/es-revista-osteopatia-cientifica-281-articulo-influen-cia-thumb-move-c7-t1-combinada-X1886929711327908?referer=coleccion>

## Manipulation of the wrist for management of lateral epicondylitis: a randomized pilot study.

Struijs PA, Damen PJ, Bakker EW, Blankevoort L, Assendelft WJ, van Dijk CN.

Phys Ther. 2003 Jul;83(7):608-16.

### BACKGROUND AND PURPOSE:

Lateral epicondylitis ("tennis elbow") is a common entity. Several nonoperative interventions, with varying success rates, have been described. The aim of this study was to compare the effectiveness of 2 protocols for the management of lateral epicondylitis: manipulation of the wrist and (2) ultrasound, friction massage, and muscle stretching and strengthening exercises.

### SUBJECTS AND METHODS:

Thirty-one subjects with a history and examination results consistent with lateral epicondylitis participated in the study. The subjects were randomly assigned to either a group that received manipulation of the wrist (group 1) or a group that received ultrasound, friction massage, and muscle stretching and strengthening exercises (group 2). Three subjects were lost to follow-up, leaving 28 subjects for analysis. Follow-up was at 3 and 6 weeks. The primary outcome measure was a global measure of improvement, as assessed on a 6-point scale. Analysis was performed using independent t tests, Mann-Whitney U tests, and Fisher exact tests.

### RESULTS:

Differences were found for 2 outcome measures: success rate at 3 weeks and decrease in pain at 6 weeks. Both findings indicated manipulation was more effective than the other protocol. After 3 weeks of intervention, the success rate in group 1 was 62%, as compared with 20% in group 2. After 6 weeks of intervention, improvement in pain as measured on an 11-point numeric scale was 5.2 (SD=2.4) in group 1, as compared with 3.2 (SD=2.1) in group 2.

### DISCUSSION AND CONCLUSION:

Manipulation of the wrist appeared to be more effective than ultrasound, friction mas-

sage, and muscle stretching and strengthening exercises for the management of lateral epicondylitis when there was a short-term follow-up. However, replication of our results is needed in a large-scale randomized clinical trial with a control group and a longer-term follow-up.

PMID: 12837122



[https://www.researchgate.net/publication/10681901\\_Manipulation\\_of\\_the\\_Wrist\\_for\\_Management\\_of\\_Lateral\\_Epicondylitis\\_A\\_Randomized\\_Pilot\\_Study](https://www.researchgate.net/publication/10681901_Manipulation_of_the_Wrist_for_Management_of_Lateral_Epicondylitis_A_Randomized_Pilot_Study)

## Palpatory diagnosis and manipulative management of carpal tunnel syndrome.

Sucher BM.

J Am Osteopath Assoc. 1995 Aug;95(8):471-9.

### ABSTRACT

Carpal tunnel syndrome was studied by use of supplemental palpatory diagnosis in 20 abnormal wrists. Restriction in motion at the carpal tunnel was quantified with a rating system. All wrists with carpal tunnel syndrome revealed at least moderate restriction to motion, as compared with only mild or no restriction in 20 wrists in normal, symptom-free subjects. Several participants (16 abnormal wrists) underwent osteopathic manipulative treatment, including a new "opponens roll" maneuver, and self-stretching, or a similar treatment accomplished by use of a self-treatment accomplished by use of a self-treatment appliance. In those treated, palpatory restriction decreased into the normal range, often before symptoms decreased. Improvement in nerve conduction studies usually followed within 1 to 3 months. Palpatory diagnosis is a useful adjunctive method of assessing patient status in carpal tunnel syndrome and helpful in prognosticating outcome. The modified manipulative technique described for the treatment of mild to moderate carpal tunnel syndrome may be effective in more severe cases.

PMID: 7960973



<https://www.ncbi.nlm.nih.gov/pubmed/7673008>

## The immediate effects of sigmoid colon manipulation on pressure pain thresholds in the lumbar spine.

McSweeney TP, Thomson OP, Johnston R.

J Bodyw Mov Ther. 2012 Oct;16(4):416-23. doi: 10.1016/j.jbmt.2012.02.004. Epub 2012 Mar 28.

### ABSTRACT

Visceral manual therapy is increasingly used by UK osteopaths and manual therapists, but there is a paucity of research investigating its underlying mechanisms, and in particular in relation to hypoalgesia. The aim of this study was to investigate the immediate effects of osteopathic visceral mobilisation on pressure pain thresholds. A single-blinded, randomised, within subjects, repeated measures design was conducted on 15 asymptomatic subjects. Pressure pain thresholds were measured at the L1 paraspinal musculature and 1st dorsal interossei before and after osteopathic visceral mobilisation of the sigmoid colon. The results demonstrated a statistically significant improvement in pressure pain thresholds immediately after the intervention ( $P < 0.001$ ). This effect was not observed to be systemic, affecting only the L1 paraspinal musculature. This novel study provides new experimental evidence that visceral manual therapy can produce immediate hypoalgesia in somatic structures segmentally related to the organ being mobilised, in asymptomatic subjects.

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<https://www.ncbi.nlm.nih.gov/pubmed/23036875>

## Chiropractic spinal manipulation alters TMS induced I-wave excitability and shortens the cortical silent period

Haavik H, Niazi IK, Jochumsen M, Uginčius P, Sebik O, Yılmaz G, Navid MS, Özyurt MG, Türker KS.

J Electromyogr Kinesiol. 2018 Oct;42:24-35. doi: 10.1016/j.jelekin.2018.06.010. Epub 2018 Jun 19.

### ABSTRACT

The objective of this study was to construct peristimulus time histogram (PSTH) and peristimulus frequencygram (PSF) using single motor unit recordings to further characterize the previously documented immediate sensorimotor effects of spinal manipulation . Single pulse transcranial magnetic stimulation (TMS) via a double cone coil over the tibialis anterior (TA) motor area during weak isometric dorsiflexion of the foot was used on two different days in random order; pre/post spinal manipulation (in eighteen subjects) and pre/post a control (in twelve subjects) condition. TA electromyography (EMG) was recorded with surface and intramuscular fine wire electrodes. Three subjects also received sham double cone coil TMS pre and post a spinal manipulation intervention. From the averaged surface EMG data cortical silent periods (CSP) were constructed and analysed. Twenty-one single motor units were identified for the spinal manipulation intervention and twelve single motor units were identified for the control intervention. Following spinal manipulation there was a shortening of the silent period and an increase in the single unit I-wave amplitude. No changes were observed following the control condition. The results provide evidence that spinal manipulation reduces the TMS-induced cortical silent period and increases low threshold motoneurone excitability in the lower limb muscle. These finding may have important clinical implications as they provide support that spinal manipulation can be used to strengthen muscles. This could be followed up on populations that have reduced muscle strength, such as stroke victims.

DOI: 10.1016/j.jelekin.2018.06.010 | PMID: 29936314



<https://www.ncbi.nlm.nih.gov/pubmed/29936314>

## Changes in Cervicocephalic Kinesthetic Sensibility, Widespread Pressure Pain Sensitivity, and Neck Pain After Cervical Thrust Manipulation in Patients With Chronic Mechanical Neck Pain: A Randomized Clinical Trial

García-Pérez-Juana D, Fernández-de-Las-Peñas C, Arias-Burúa JL, Cleland JA, Plaza-Manzano G, Ortega-Santiago R.

J Manipulative Physiol Ther. 2018 Sep;41(7):551-560. doi: 10.1016/j.jmpt.2018.02.004.

### OBJECTIVE:

The purpose of the current randomized clinical trial was to examine the effects of cervical thrust manipulation or sham manipulation on cervicocephalic kinaesthetic sense, pain, pain-related disability, and pressure pain sensitivity in patients with mechanical neck pain.

### METHODS:

Fifty-four individuals with neck pain were randomly assigned to receive either a cervical manipulation (right or left) or a sham manipulation. Immediate outcomes included cervical kinesthetic sense as assessed by joint position sense error (JPSE) and pressure pain thresholds (PPTs). At 1 week, neck pain intensity (numerical pain rate scale) and neck pain-related disability (Neck Disability Index [NDI]) outcomes were also collected.

### RESULTS:

The mixed-model analysis of covariance revealed a significant group x time interaction in favor of the cervical thrust manipulation group for the JPSE on rotation and extension. There was also a significant interaction for changes in PPTs at C5 to C6 and trapezius anterior. At the 1-week follow-up, a significant interaction existed for neck-related disability but not for neck pain at rest, worst pain, or lowest pain experienced the preceding week.

### CONCLUSIONS:

Our results suggest that cervical spine thrust manipulation improves JPSE, PPT and NDI in participants with chronic mechanical neck pain. Furthermore, changes in JPSE and NDI were large and surpass published minimal detectable changes for these outcome

measures. In addition, the effect sizes of PPTs were medium; however, only C5 to C6 zygapophyseal joint exceeded the minimal detectable change. In contrast, cervical thrust manipulation did not improve neck pain intensity at 1 week after the intervention.

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 <https://www.ncbi.nlm.nih.gov/pubmed/30442354>

## Immediate Effects of Thoracic Spine Manipulation Upon Shoulder Functionality in Patients With Sutured Rotator Cuff Repair: A Prospective Study

Belón-Perez P, Cuesta-Vargas AI.

J Manipulative Physiol Ther. 2018 Sep;41(7):589-595. doi: 10.1016/j.jmpt.2018.02.005.

### OBJECTIVES:

The purpose of this study was to evaluate the immediate effect of thoracic spine manipulation upon active flexion and abduction mobility of the shoulder, spine temperature, and the size of the subacromial space as measured by ultrasound in 3 positions (internal, neutral, and external rotation) of the glenohumeral joint in patients who have undergone surgery because of subacromial impingement.

### METHODS:

Quasi-experimental, prospective, short-term effect study with consecutively sampled participants. Thirty-two patients had undergone subacromial decompression together with supraspinatus tendon suture. The following variables were studied: age, sex, dominant shoulder, presurgery evolution time, working status, surface temperature of dorsal segment with limited mobility, premanipulation functional assessment using the Spanish version of the Upper Limb Functional Index Scale, goniometric range of motion measurement at glenohumeral joint before and after manipulation, and ultrasound measurement of subacromial space before and after manipulation.

### RESULTS:

Significant differences and small effect size were found in measurements for flexion and abduction movements after thoracic spine manipulation ( $P > .001$ ;  $ES > 0.2$ ) and subacromial space measurements in neutral rotation and external rotation ( $P > .001$ ), but without clinical relevance effect size ( $<0.2$ ).

### CONCLUSIONS:

Active shoulder flexion and abduction mobility increase after manipulation of thoracic spine in patients who have undergone surgery for rotator cuff suture. Subacromial space increases significantly with shoulder in neutral and external rotation position

after manipulation. No differences were found regarding surface temperature of manipulated area.

DOI: 10.1016/j.jmpt.2018.02.005 | PMID: 30442357

 <https://www.ncbi.nlm.nih.gov/pubmed/30442357>

## Immediate Effects of Thoracic Spinal Manipulation on Pulmonary Function in Stroke Patients: A Preliminary Study

Joo S, Lee Y, Song CH.

J Manipulative Physiol Ther. 2018 Sep;41(7):602-608. doi: 10.1016/j.jmpt.2017.12.005. Epub 2018 Aug 16.

### OBJECTIVES:

The purpose of this study was to investigate the immediate effects of thoracic spinal manipulation (TSM) on pulmonary function in stroke patients.

### METHODS:

Thirty-six volunteers with stroke (20 men, 16 women) were recruited and randomized to a TSM group (n = 18) and a sham group (n = 18). All participants underwent initial pulmonary function test and then rested supine for 10 minutes before the intervention. Pulmonary function test was repeated immediately after the intervention. Forced vital capacity, forced expiratory volume at 1 second, maximum voluntary ventilation, and residual volume were measured by a spirometer in preintervention and post-intervention.

### RESULTS:

Significant between-group differences were observed in forced vital capacity and forced expiratory volume at 1 second in the TSM group ( $P < .05$ ). No significant changes in dependent variables were seen in the sham group.

### CONCLUSION:

The pulmonary function values for patients in the TSM group were significantly enhanced with no significant improvement in maximum voluntary ventilation and residual volume. Mechanical factors may be responsible for the improved pulmonary function in the TSM group.

DOI: 10.1016/j.jmpt.2017.12.005 | PMID: 30121128



<https://www.ncbi.nlm.nih.gov/pubmed/30121128>

## Influence of spinal manipulation on Muscle Spasticity and Manual Dexterity in Participants With Cerebral Palsy: Randomized Controlled Trial

Kachmar O, Kushnir A, Matiushenko O, Hasiuk M.

J Chiropr Med. 2018 Sep;17(3):141-150. doi: 10.1016/j.jcm.2018.03.004. Epub 2018 Aug 28.

### OBJECTIVES:

The aim of this study was to investigate the short-term effects of spinal manipulation (SM) on wrist muscle spasticity and manual dexterity in participants with cerebral palsy (CP).

### METHODS:

After baseline examination, 78 participants with spastic CP (7-18 years) without contractures or hyperkinetic syndrome were randomly allocated into 2 groups. The experimental group underwent SM to the cervical, thoracic, and lumbar spine, and the control group received sham SM. A second evaluation was performed 5 minutes postintervention. Wrist muscle spasticity was measured quantitatively with NeuroFlexor (Aggero MedTech AB, Solna, Sweden), a device assessing resistance to passive movements of different velocities. Between-group difference was calculated using the Mann-Whitney U test. Manual dexterity was evaluated by the Box and Block test.

### RESULTS:

In the experimental group, muscle spasticity was reduced by 2.18 newton from median 5.53 with interquartile range 8.66 to median 3.35 newton with interquartile range 7.19; the difference was statistically significant ( $P=.002$ ). In the control group, reduction in spasticity was negligible. The between-group difference in change of muscle spasticity was statistically significant ( $P=.034$ ). Improvement of manual dexterity was not statistically significant ( $P=.28$ ).

### CONCLUSIONS:

These findings suggest that SM may, in the short term, help to reduce spasticity in participants with CP. Long-term effects of SM on muscle spasticity have yet to be studied.



<https://www.ncbi.nlm.nih.gov/pubmed/30228805>

## Immediate Changes After Manual Therapy in Patients With Persistent, Nonspecific Back Pain: A Randomized Controlled Trial

Espí-López GV, Ruescas-Nicolau MA, Sanchez-Sanchez ML, Arnal-Gómez A, Balasch-Bernat M, Marques-Sule E.

Altern Ther Health Med. 2018 Jul;24(4):14-23.

### CONTEXT .

Thoracic manipulation decreases pain and disability. However, when such manipulation is contraindicated, the use of other manual techniques based on the regional interdependence of the thoracic spine, upper ribs, and shoulders is an alternative approach.

### OBJECTIVE .

The study intended to investigate the immediate changes resulting from 3 manual therapy treatments on spinal mobility, flexibility, comfort, and pain perception in patients with persistent, nonspecific back pain as well as changes in their sense of physical well-being and their perception of change after treatment.

### DESIGN .

The study was a randomized, double-blind, controlled trial.

### SETTING .

The study took place in the Department of Physiotherapy of the Faculty of Physiotherapy at the University of Valencia (Valencia, Spain).

### PARTICIPANTS .

Participants were 112 individuals from the community-56.6% female, with a mean age of 21.8 +/- 0.2 y-who had persistent, nonspecific back pain.

### INTERVENTION .

Participants were randomly assigned to 1 of 3 groups, receiving neurolymphatic therapy (NL group), (2) articular spinal manual therapy (AS group), or (3) articular

costal manual therapy (AC group).

## OUTCOME MEASURES .

Cervical mobility, lumbar flexibility, comfort, pain perception, and physical well-being were assessed at baseline and immediately postintervention. Perception of change was evaluated postintervention.

## RESULTS .

Between baseline and postintervention, the AC group showed a significant increase in cervical flexion ( $P = .010$ ), whereas the NL and AS groups improved in lumbar flexibility,  $P = .047$  and  $P = .012$ , respectively. For that period, significant changes were found in lumbar comfort for the AS group ( $P < .001$ ) and the NL group ( $P < .026$ ) and in thoracic comfort ( $P < .001$ ) for the AC group. All groups improved in physical well-being and pain perception ( $P < .05$ ). Changes in thoracic comfort, lumbar comfort, and physical well-being differed among the groups, with some differences being statistically significant.

## CONCLUSIONS .

All treatments improved pain perception and increased physical well-being. The NL and AS treatments were more effective in lumbar flexibility, the AC treatment in cervical flexion and thoracic comfort, and the NL treatment in lumbar comfort.

PMID: 29428926



<https://www.ncbi.nlm.nih.gov/pubmed/29428926>

## Characteristics of Chiropractic Patients Being Treated for Chronic Low Back and Neck Pain

Herman PM, Kommareddi M, Sorbero ME, Rutter CM, Hays RD, Hilton LG, Ryan GW, Coulter ID.

J Manipulative Physiol Ther. 2018 Jul-Aug;41(6):445-455. doi: 10.1016/j.jmpt.2018.02.001. Epub 2018 Aug 16.

### OBJECTIVES:

Chronic low back pain (CLBP) and chronic neck pain (CNP) are the most common types of chronic pain, and chiropractic spinal manipulation is a common nonpharmacologic treatment. This study presents the characteristics of a large United States sample of chiropractic patients with CLBP and CNP.

### METHODS:

Data were collected from chiropractic patients using multistage systematic stratified sampling with 4 sampling levels: regions and states, sites (ie, metropolitan areas), providers and clinics, and patients. The sites and regions were San Diego, California; Tampa, Florida; Minneapolis, Minnesota; Seneca Falls and Upstate New York; Portland, Oregon; and Dallas, Texas. Data were collected from patients through an iPad-based prescreening questionnaire in the clinic and emailed links to full screening and baseline online questionnaires. The goal was 20 providers or clinics and 7 patients with CLBP and 7 with CNP from each clinic.

### RESULTS:

We had 6342 patients at 125 clinics complete the prescreening questionnaire, 3333 patients start the full screening questionnaire, and 2024 eligible patients completed the baseline questionnaire: 518 with CLBP only, 347 with CNP only, and 1159 with both. In general, most of this sample were highly-educated, non-Hispanic, white females with at least partial insurance coverage for chiropractic care who have been in pain and using chiropractic care for years. Over 90% reported high satisfaction with their care, few used narcotics, and avoiding surgery was the most important reason they chose chiropractic care.

## CONCLUSIONS:

Given the prevalence of CLBP and CNP, the need to find effective nonpharmacologic alternatives for chronic pain, and the satisfaction these patients found with their care, further study of these patients is worthwhile.

DOI: 10.1016/j.jmpt.2018.02.001 | PMID: 30121129 | PMCID: PMC6386466



<https://www.ncbi.nlm.nih.gov/pubmed/30121129>

## Spinal high-velocity low-amplitude manipulation with exercise in women with chronic temporomandibular disorders. A randomized controlled trial comparing to patient education

Corum M, Basoglu C, Topaloglu M, Diracoglu D, Aksoy C,

Manuelle Medizin. Volume 56. 2018 Jun; 230-238

### ABSTRACT

Evidence indicates that manual therapy alone or in combination with exercise can be beneficial for temporomandibular disorders (TMD). However, there is still insufficient information demonstrating the effectiveness of treatment directed to the cervical spine for the management of TMD.

To investigate the effects of spinal high-velocity low-amplitude (HVLA) manipulation with exercise compared to patient education in patients with chronic TMD. Another objective was to assess the effects of adding spinal HVLA manipulation to exercise.

Sixty female patients with TMD were randomized to three groups: cervical spinal manipulation plus neck exercise (CSMaEuro+ NE), sham manipulation plus neck exercise (SMaEuro+ NE), and patient education only (PE). Scores on a numeric rating scale (NRS), pressure pain thresholds (PPT), pain-free maximum mouth opening (MMO), and Short Form 36 (SF-36) were evaluated at baseline, posttreatment, and 1aEuromonth follow-up after randomization. No further treatment of TMD (like dental correction) was applied during the study period.

In terms of pain, significant differences were observed in the CSMaEuro+ NE group vs. the SMaEuro+ NE and PE groups posttreatment. Although PPT increased significantly in the CSMaEuro+ NE group, no significant changes in any PPT were found in either the SMaEuro+ NE or PE group. Regarding pain-free MMO and SF-36 scores, there were significant increases posttreatment in the CSMaEuro+ NE and SMaEuro+ NE groups compared to the PE group.

Our study suggests that HVLA manipulation of the upper cervical spine with neck exercise can be effective for treatment of pain and dysfunction in patients with chronic

TMD, it is not the TMD treatment itself. Therefore, it seems reasonable to add cervical spinal manipulation to the rehabilitation program.

DOI: 10.1007/s00337-018-0406-5



[https://www.researchgate.net/scientific-contributions/2104750639\\_Mustafa\\_Corum](https://www.researchgate.net/scientific-contributions/2104750639_Mustafa_Corum)

## 3-Dimensional Cervical Movement Characteristics and the Influence of Thoracic Treatment on a Subgroup of Acute Neck Pain Patients

Krott NL, Bloyinski GM, Cattrysse E.

J Manipulative Physiol Ther. 2018 May;41(4):304-314. doi: 10.1016/j.jmpt.2017.11.002. Epub 2018 Apr 16.

### OBJECTIVE:

The purpose of this study was to investigate the influence of thoracic high-velocity low-amplitude thrust (HVLAT) manipulation on quantitative and qualitative 3-dimensional cervical spine kinematic patterns in a subgroup of patients with acute neck pain.

### METHODS:

Thirty patients with acute neck pain, aged 20 to 59, received a thoracic HVLAT manipulation. Three-dimensional kinematics of the cervical spine were registered pretreatment and posttreatment using an electromagnetic tracking system. Quantitative and qualitative parameters were calculated for axial rotation, lateral bending, and flexion-extension movement. Subjective pain ratings were measured with the visual analogue scale and the Neck Disability Index and were collected pretreatment and posttreatment.

### RESULTS:

After treatment, the range of motion of the main motion improved significantly for axial rotation ( $P = .034$ ), lateral bending ( $P < .001$ ), and flexion-extension ( $P = .031$ ). Although for axial rotation as the main motion, the smoothness of the flexion-extension movement improved significantly after treatment ( $P = .036$ ), the reverse was true for flexion-extension as the main motion. Visual analogue scale scores exhibited a statistically ( $P < .001$ ) and clinically significant reduction of pain sensation. The mean change in Neck Disability Index scores only exhibited a statistically significant improvement 1 week after treatment.

### CONCLUSION:

Thoracic HVLAT manipulation led to positive changes in quantitative and qualitative aspects of 3-dimensional cervical spine kinematics. Because of the 1-intervention group

design, external factors influencing the healing process could not be eliminated.

DOI: 10.1016/j.jmpt.2017.11.002 | PMID: 29669689

 <https://www.ncbi.nlm.nih.gov/pubmed/29669689>

## Immediate Effects of Thoracic Spine Thrust Manipulation on Neurodynamic Mobility

By: Hartstein, AJ (Hartstein, Aaron J.) ; Lievre, AJ (Lievre, Arthur J.) ; Grimes, JK (Grimes, Jason K.) ; Hale, SA (Hale, Sheri A.)

J Manipulative Physiol Ther. 2018 May;41(4):332-341. doi: 10.1016/j.jmpt.2017.10.006. Epub 2018 Apr 16.

### OBJECTIVE:

The purpose of this study was to investigate the immediate effects of thoracic spine thrust manipulation (TSM) on the upper limb provocation test (ULPT) and seated slump test (SST) in individuals with identified neurodynamic mobility impairments. A secondary aim was to determine if correlation existed between the perception of effect and improvements in neurodynamic mobility following a thrust manipulation compared with mobilization.

### METHODS:

A pretest-posttest experimental design randomized 48 adults into 2 groups: TSM or mobilization. Participants with identified neurodynamic mobility impairment as assessed with the ULPT or SST received a preassigned intervention (TSM, n = 64 limbs; mobilization, n = 66 limbs). Perception of effect was assessed to determine its influence on outcome. Repeated-measures analysis of variance was used to examine the effects of intervention, and Fisher's exact test and independent t tests were used to determine the influence of perception.

### RESULTS:

Both the ULPT ( $P < .001$ ) and SST ( $P < .001$ ) revealed improvements at posttest regardless of intervention. The ULPT effect sizes for TSM ( $d = 0.70$ ) and mobilization ( $d = 0.69$ ) groups were medium. For the SST, the effect size for the TSM group ( $d = 0.53$ ) was medium, whereas that for the mobilization group ( $d = 0.26$ ) was small. Participants in the mobilization group with positive perception had significantly greater ( $P < .05$ ) mean neurodynamic mobility changes than those with a negative perception.

## CONCLUSIONS:

Neurodynamic mobility impairment improved regardless of intervention. The magnitude of change was greater in the ULPT than SST. Although both interventions appeared to yield similar outcomes, individuals who received mobilization and expressed a positive perception of effect exhibited significantly greater changes in neurodynamic mobility than those without a positive perception.

DOI: 10.1016/j.jmpt.2017.10.006 | PMID: 29669688



<https://www.ncbi.nlm.nih.gov/pubmed/29669688>

## The regional effect of spinal manipulation on the pressure pain threshold in asymptomatic subjects: a systematic literature review

Honore M, Leboeuf-Yde C, Gagey O.

Chiropractic & Manual Therapies volume 26, Article number: 11 (2018)

### BACKGROUND:

Spinal manipulation (SM) has been shown to have an effect on pain perception. More knowledge is needed on this phenomenon and it would be relevant to study its effect in asymptomatic subjects.

### OBJECTIVES:

To compare regional effect of SM on pressure pain threshold (PPT) vs. sham, inactive control, mobilisation, another SM, and some type of physical therapy. In addition, we reported the results for the three different spinal regions.

### METHOD:

A systematic search of literature was done using PubMed, Embase and Cochrane. Search terms were ( (spinal manipulation) AND (experimental pain)); ((spinal manipulative therapy OR spinal manipulation) AND ((experimental pain OR quantitative sensory testing OR pressure pain threshold OR pain threshold)) (Final search: June 13th 2017). The inclusion criteria were SM performed anywhere in the spine; the use of PPT, PPT tested in an asymptomatic region and on the same day as the SM. Studies had to be experimental with at least one external or internal control group. Studies on only spinal motion or tenderness, other reviews, case reports, and less than 15 invited participants in each group were excluded. Evidence tables were constructed with information relevant to each research question and by spinal region. Results were reported in relation to statistical significance and were interpreted taking into account their quality.

### RESULTS:

Only 12 articles of 946 were accepted. The quality of studies was generally good. In 8 sham controlled studies, a psychologically and physiologically "credible" sham was found in only 2 studies. A significant difference was noted between SM vs. Sham, and

between SM and an inactive control. No significant difference in PPT was found between SM and another SM, mobilisation or some type of physical therapy. The cervical region more often obtained significant findings as compared to studies in the thoracic or lumbar regions.

## CONCLUSION:

SM has an effect regionally on pressure pain threshold in asymptomatic subjects. The clinical significance of this must be quantified. More knowledge is needed in relation to the comparison of different spinal regions and different types of interventions.

DOI: 10.1186/s12998-018-0181-3

 <https://link.springer.com/article/10.1186/s12998-018-0181-3>

## The effects of a single session of spinal manipulation on strength and cortical drive in athletes

Christiansen TL, Niazi IK, Holt K, Nedergaard RW, Duehr J, Allen K, Marshall P, Türker KS, Hartvigsen J, Haavik H.

Eur J Appl Physiol. 2018 Apr;118(4):737-749. doi: 10.1007/s00421-018-3799-x. Epub 2018 Jan 11.

### ABSTRACT

The primary purpose of this study was to investigate whether a single session of spinal manipulation (SM) increases strength and cortical drive in the lower limb (soleus muscle) of elite Taekwondo athletes.

Soleus-evoked V-waves, H-reflex and maximum voluntary contraction (MVC) of the plantar flexors were recorded from 11 elite Taekwondo athletes using a randomized controlled crossover design. Interventions were either SM or passive movement control. Outcomes were assessed at pre-intervention and at three post-intervention time periods (immediate post, post 30 min and post 60 min). A multifactorial repeated measures ANOVA was conducted to assess within and between group differences. Time and session were used as factors. A post hoc analysis was carried out, when an interactive effect was present. Significance was set at  $p < 0.05$ .

SM increased MVC force [ $F(3,30) = 5.95, p < 0.01$ ], and V-waves [ $F(3,30) = 4.25, p = 0.01$ ] over time compared to the control intervention. Between group differences were significant for all time periods ( $p < 0.05$ ) except for the post60 force measurements ( $p = 0.07$ ).

A single session of SM increased muscle strength and corticospinal excitability to ankle plantar flexor muscles in elite Taekwondo athletes. The increased MVC force lasted for 30 min and the corticospinal excitability increase persisted for at least 60 min.

DOI: 10.1007/s00421-018-3799-x | PMID: 29327170 | PMCID: PMC5843672



<https://www.ncbi.nlm.nih.gov/pubmed/29327170>

## The effects of osteopathic treatment on psychosocial factors in people with persistent pain: A systematic review

Saracutu M, Rance J, Davies H, Edwards DJ.

International Journal Of Osteopathic Medicine. Volume 27. 2018 Mar; 23-33

### ABSTRACT

Persistent pain is considered a complex biopsychosocial phenomenon whose understanding and management is yet to be improved. More research is needed to determine the common paths that lead to developing persistent pain, to identify the populations most at risk and to develop and evaluate interventions. The last decades have seen a shift in pain management, from the biomedical model to a biopsychosocial model. There is also a significant body of evidence emphasizing the effects of osteopathy in persistent pain management. Given the relevance of psychosocial factors in aetiology and maintenance of pain, it is essential to investigate whether osteopathy has an influence on depression, anxiety, fear avoidance or pain catastrophizing. This review will identify and synthesize relevant primary research focused on the effects of osteopathic interventions on psychosocial factors in patients living with different pain conditions. Studies were identified by searching seven databases (Medline complete, CINAHL, Cochrane Library, Psychinfo, Psycharticles, Web of Science and Scopus) between 1980 and 2017. Peer reviewed articles reporting effects of: Osteopathic manual therapy, Osteopathic Manipulation, Mobilization, Spinal manipulation, high velocity and low amplitude manipulation, massage and soft tissue treatment were extracted. A total of 16 RCTs were selected. Two out of five reported significant differences in depression; in regards to anxiety, all the four trials found significant effects; two out of three trials reported a significant reduction in fear avoidance while six out of seven trials found a significant enhancement of health status and three out of four found an increase in quality of life. The findings of this review are encouraging; suggesting that osteopathic treatment may have some effects on anxiety, fear avoidance, quality of life and general health status in populations living with persistent pain. (C) 2017 Elsevier Ltd. All rights reserved.

DOI: 10.1016/j.ijosm.2017.10.005



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(16\)30116-X/](https://www.journalofosteopathicmedicine.com/article/S1746-0689(16)30116-X/)

abstract

## Pragmatically Applied Cervical and Thoracic Nonthrust Manipulation Versus Thrust Manipulation for Patients With Mechanical Neck Pain: A Multicenter Randomized Clinical Trial

Griswold D, Learman K, Kolber MJ, O'Halloran B, Cleland JA.

J Orthop Sports Phys Ther. 2018 Mar;48(3):137-145. doi: 10.2519/jospt.2018.7738. Epub 2018 Feb 6.

### BACKGROUND:

The comparative effectiveness between nonthrust manipulation (NTM) and thrust manipulation (TM) for mechanical neck pain has been investigated, with inconsistent results.

### OBJECTIVE:

To compare the clinical effectiveness of concordant cervical and thoracic NTM and TM for patients with mechanical neck pain.

### METHODS:

The Neck Disability Index (NDI) was the primary outcome. Secondary outcomes included the Patient-Specific Functional Scale (PSFS), numeric pain-rating scale (NPRS), deep cervical flexion endurance (DCF), global rating of change (GROC), number of visits, and duration of care. The covariate was clinical equipoise for intervention. Outcomes were collected at baseline, visit 2, and discharge. Patients were randomly assigned to receive either NTM or TM directed at the cervical and thoracic spines. Techniques and dosages were selected pragmatically and applied to the most symptomatic level. Two-way mixed-model analyses of covariance were used to assess clinical outcomes at 3 time points. Analyses of covariance were used to assess between-group differences for the GROC, number of visits, and duration of care at discharge.

### RESULTS:

One hundred three patients were included in the analyses (NTM, n = 55 and TM, n = 48). The between-group analyses revealed no differences in outcomes on the NDI (P = .67), PSFS (P = .26), NPRS (P = .25), DCF (P = .98), GROC (P = .77), number of visits (P =

.21), and duration of care ( $P = .61$ ) for patients with mechanical neck pain who received either NTM or TM.

## CONCLUSION:

NTM and TM produce equivalent outcomes for patients with mechanical neck pain. The trial was registered with ClinicalTrials.gov (NCT02619500).

DOI: 10.2519/jospt.2018.7738 | PMID: 29406835



<https://www.ncbi.nlm.nih.gov/pubmed/29406835>

## Short-term effects of manipulative treatment versus a therapeutic home exercise protocol for chronic cervical pain: A randomized clinical trial

Galindez-Ibarbengoetxea X, Setuain I, Ramírez-Velez R, Andersen LL, González-Izal M, Jauregi A, Izquierdo M.

J Back Musculoskelet Rehabil. 2018 Feb 6;31(1):133-145. doi: 10.3233/BMR-169723.

### BACKGROUND:

While both manipulative treatment and physical exercises are used to treat cervical pain, it remains unclear which is most effective.

### OBJECTIVE:

To compare the short-term effects of high-velocity, low-amplitude manipulation techniques (MT) with those of home-exercise (HE) with stretching and low-intensity (10% of max) isometric contractions on pain and function.

### METHODS:

Single-blind randomized clinical trial was performed. A total of 27 asymptomatic subjects were randomly assigned to 2 groups: manipulation techniques (MT, n = 13) and home exercise (HE, n = 14). The visual analogue scale (VAS); neck disability index (NDI); pressure pain thresholds; cervical spine range of motion and electromyography during the cranio-cervical flexion test was measured before and one week after the intervention.

### RESULTS:

After the intervention, both groups showed improved ( $P < 0.05$ ) NDI and VAS scores and flexion in both rotation ranges compared with the pre-intervention values. For the NDI, pain intensity, and neck flexion, the effects sizes were large; for the majority of the other measurements, the effect sizes were small to moderate. The MT group showed significantly better results than the HE group for 2 out of 17 tests.

### CONCLUSIONS:

Both interventions improved function and pain after one week, with only marginal be-

tween-group differences in favor of MT.

DOI: 10.3233/BMR-169723 | PMID: 28826170



<https://www.ncbi.nlm.nih.gov/pubmed/28826170>

## The impact of pragmatic vs. prescriptive study designs on the outcomes of low back and neck pain when using mobilization or manipulation techniques: a systematic review and meta-analysis

Roenz D, Broccolo J, Brust S, Billings J, Perrott A, Hagadorn J, Cook C, Cleland J.

J Man Manip Ther. 2018 Jul;26(3):123-135. doi: 10.1080/10669817.2017.1398923. Epub 2017 Nov 20.

### OBJECTIVE:

The purpose of this systematic review and meta-analysis was to examine the impact of pragmatic versus prescriptive study designs on the outcomes of low back and neck pain when using mobilization or manipulation techniques.

### METHODS:

This study design was a systematic review and meta-analysis, which was performed according to the PRISMA guidelines. A search of MEDLINE and CINAHL complete databases was performed. Article titles and abstracts were reviewed to identify studies comparing mobilization and manipulation in low back or neck pain that met eligibility criteria. Validity of studies was examined using the Cochrane Risk of Bias tool. Data analysis was performed using RevMan 5.3. Forest plots were constructed after data were analyzed to determine effect sizes.

### RESULTS:

Thirteen studies with a total of 1313 participants were included in the systematic review, and 12 studies with 977 participants in the meta-analysis. For most time-points prescriptive studies found manipulation to be superior to mobilization for both pain and disability. At no time-point did pragmatic designs find a difference between mobilization and manipulation for either pain or disability.

### DISCUSSION:

When a pragmatic design was used, representing actual clinical practice, patients improved with both techniques with no difference between mobilization and manipulation. When clinicians were prescribed techniques, not representing true clinical prac-

tice, manipulation showed better outcomes than mobilization for pain and disability.

DOI: 10.1080/10669817.2017.1398923 | PMID: 30042627 | PMCID: PMC6055961



<https://www.ncbi.nlm.nih.gov/pubmed/30042627>

## Effects of spinal manipulation and myofascial techniques on heart rate variability: A systematic review

Amoroso Borges BL, Bortolazzo GL, Neto HP.

J Bodyw Mov Ther. 2018 Jan;22(1):203-208. doi: 10.1016/j.jbmt.2017.09.025. Epub 2017 Oct 3.

### BACKGROUND:

The analysis of heart rate variability is important to the investigation of stimuli from the autonomic nervous system. Osteopathy is a form of treatment that can influence this system in healthy individuals as well as those with a disorder or disease.

### OBJECTIVES:

The aim of the present study was to perform a systematic review of the literature regarding the effect of spinal manipulation and myofascial techniques on heart rate variability.

### METHODS:

Searches were performed of the Pubmed, Scielo, Lilacs, PEDro, Ibesco, Cochrane and Scopus databases for relevant studies. The PEDro scale was used to assess the methodological quality of each study selected.

### RESULTS:

A total of 505 articles were retrieved during the initial search. After an analysis of the abstracts, nine studies were selected for the present review.

### CONCLUSION:

Based on the findings, osteopathy exerts an influence on the autonomic nervous system depending on the stimulation site and type. A greater parasympathetic response was found when stimulation was performed in the cervical and lumbar regions, whereas a greater sympathetic response was found when stimulation was performed in the thoracic region.

DOI: 10.1016/j.jbmt.2017.09.025 | PMID: 29332747



<https://www.ncbi.nlm.nih.gov/pubmed/29332747>

## Utilization of Manipulative Treatment for Spine and Shoulder Conditions Between Different Medical Providers in a Large Military Hospital

Rhon D, Greenlee T, Fritz J

Arch Phys Med Rehabil. 2018 Jan;99(1):72-81. doi: 10.1016/j.apmr.2017.06.010. Epub 2017 Jul 14.

### OBJECTIVE:

To describe the use of manipulative treatment for shoulder and spine conditions among various provider types.

### DESIGN:

Retrospective observational cohort.

### SETTING:

Single military hospital.

### PARTICIPANTS:

Consecutive sample of patients (N=7566) seeking care for an initial spine or shoulder condition from January 1 to December 31, 2009.

### INTERVENTIONS:

Manipulative treatment (eg, manual therapy, spinal and joint manipulation).

### MAIN OUTCOME MEASURE:

Manipulation treatment was identified with procedure billing codes in the medical records. Spine and shoulder conditions were identified by using the International Classification of Diseases, 9th Revision codes. All data were abstracted from the Department of Defense Military Health System Management and Analysis Tool.

### RESULTS:

Of 7566 total patients seeking care, 2014 (26.6%) received manipulative treatment at

least once, and 1870 of those received this treatment in a military facility (24.7%). Manipulative treatment was used most often for thoracic conditions and least often for shoulder conditions (50.8% and 24.2% of all patients). There was a total of 6706 unique medical visits with a manipulative treatment procedure (average of 3.3 manipulative treatment procedure visits per patient).

## CONCLUSIONS:

Manipulative treatment utilization rates for shoulder and spine conditions ranged from 26.6% to 50.2%. Chiropractors used manipulation the most and physical therapists the least. Published by Elsevier Inc. on behalf of the American Congress of Rehabilitation Medicine

DOI: 10.1016/j.apmr.2017.06.010 | PMID: 28712922



<https://www.ncbi.nlm.nih.gov/pubmed/28712922>

## The Quality of Life of Children Under Chiropractic Care Using PROMIS-25: Results from a Practice-Based Research Network

Alcantara J, Lamont AE, Ohm J, Alcantara J.

J Altern Complement Med. 2018 Apr;24(4):378-384. doi: 10.1089/acm.2017.0141. Epub 2017 Dec 20.

### OBJECTIVES:

To characterize pediatric chiropractic and assess pediatric quality of life (QoL). Design: A prospective cohort. Setting/Locations: Individual offices within a practice-based research network located throughout the United States.

### SUBJECTS:

A convenience sample of children (8-17 years) under chiropractic care and their parents.

### EXPOSURE:

Chiropractic spinal adjustments and adjunctive therapies. Outcome measures: Survey instrument measuring sociodemographic information and correlates from the clinical encounter along with the Patient Reported Outcomes Measurement Information System (PROMIS)-25 to measure QoL (i.e., depression, anxiety, and pain interference). Sociodemographic and clinical correlates were analyzed using descriptive statistics (i.e., frequencies/percentages, means, and standard deviations). The PROMIS-25 data were analyzed using scoring manuals, converting raw scores to T score metric (mean=50; SD=10). A generalized linear mixed model was utilized to examine covariates (i.e., sex, number of visits, and motivation for care) that may have played an important role on the PROMIS outcome.

### RESULTS: T

he original data set consisted of 915 parent-child dyads. After data cleaning, a total of 881 parents (747 females, 134 males; mean age=42.03 years) and 881 children (467 females and 414 males; mean age=12.49 years) comprised this study population. The parents were highly educated and presented their child for mainly wellness care. The

mean number of days and patient visits from baseline to comparative QoL measures was 38.12 days and 2.74 (SD=2.61), respectively. After controlling for the effects of motivation for care, patient visits, duration of complaint, sex, and pain rating, significant differences were observed in the probability of experiencing problems (vs. no reported problems) across all QoL domains (Wald=82.897, df=4, p<0.05). Post hoc comparisons demonstrated the children were less likely to report any symptoms of depression (Wald=6.1474, df=1, p<0.05), anxiety (Wald=20.603, df=1, p<0.05), fatigue (Wald=22.191, df=1, p<0.05), and pain interference (Wald=47.422, df=1, p<0.05) after a trial of chiropractic care.

## CONCLUSIONS:

The QoL of children improved with chiropractic care as measured by PROMIS.

DOI: 10.1089/acm.2017.0141 | PMID: 29260883



<https://www.ncbi.nlm.nih.gov/pubmed/29260883>

## Effect of spinal manipulative treatment on cardiovascular autonomic control in patients with acute low back pain

Younes M, Nowakowski K, Didier-Laurent B, Gombert M, Cottin F .

Chiropractic & Manual Therapies volume 25, Article number: 33 (2017)

### BACKGROUND:

This study aimed to quantify the effect of spinal manipulative treatment (SMT) from an analysis of baroreflex, systolic blood pressure and heart rate variability (HRV) on patients with acute back pain. It was hypothesized that SMT would increase the parasympathetic cardiovascular autonomic control.

### METHODS:

Twenty-two patients with acute back pain were randomly divided into two groups: one receiving sham treatment (Sham) and the other receiving SMT. Recordings were completed during the first day and the seventh day, immediately before and after treatment on both days. ECG and systolic blood pressure were continuously recorded to compute cardiovascular variability and baroreflex sensitivity components. The perceived level of pain was measured with the numeric pain scale (NPS) 48 h before, just before and just after each treatment. The NPS ranged from 0 to 100% (peak of pain before treatment). ECG and systolic blood pressure recordings were analyzed in time frequency domain using the Smoothed pseudo Wigner-Ville distribution.

### RESULTS:

Root mean square of the successive differences, high frequency power of the heart rate variability, and high frequency baroreflex sensitivity differences between post and pre tests were higher in the SMT group than in the Sham group ( $p < 0.01$ ), whereas no differences were observed with the other heart rate variability components. Also, no differences were observed with the systolic blood pressure components. Although the estimated pain scale values decreased over time, no difference was observed between the SMT and Sham groups.

### CONCLUSIONS:

This seems to be the first study to assess the effect of SMT on both heart rate variability and baroreflex sensitivity in patients with acute back pain. SMT can be seen to provoke an increase in parasympathetic control known to relate to a person's healthy state. Thus, cardiovascular variability analysis may be a useful tool for clinicians to quantify and objectify the beneficial effects of spinal manipulation treatment.

DOI: 10.1186/s12998-017-0167-6



<https://chiromt.biomedcentral.com/articles/10.1186/s12998-017-0167-6>

## Chiropractic Care in the Management of Inactive Ankylosing Spondylitis: A Case Series

Cornelson SM, Beavers D, Harvey A, Hogarth W, Kettner NW.

J Chiropr Med. 2017 Dec;16(4):300-307. doi: 10.1016/j.jcm.2017.10.002. Epub 2017 Dec 7.

### OBJECTIVE:

This report describes chiropractic management for 3 cases of inactive ankylosing spondylitis (AS).

### CLINICAL FEATURES:

A 25-year-old woman presented with chronic, mechanical neck pain and stiffness that was ultimately diagnosed as AS. A 23-year-old man presented with chronic low back and left hip pain that was diagnosed as AS. A 31-year-old man with low back pain presented with a known diagnosis of AS. Physical examination in 2 cases failed to identify systemic findings associated with AS. In the third case, examination revealed a history of ulcerative colitis. Laboratory examination of case 2 yielded a positive HLA-B27, but cases 1 and 3 were HLA-B27 negative. The acute reactants were negative in all 3 patients, indicating an inactive phase of disease. All 3 patients underwent spinal imaging including sacroiliac joint radiography. In case 3, magnetic resonance imaging of the sacroiliac joints was performed. All 3 imaging examinations revealed bilateral, symmetric sacroiliitis.

### INTERVENTIONS AND OUTCOME:

Patients were managed by both a medical rheumatologist and a doctor of chiropractic. Chiropractic care ranged from instrument-assisted spinal manipulation to diversified spinal and soft tissue manipulation and Cox flexion-distraction. Patients were given home stretches and rehabilitation exercises. All 3 patients experienced some relief of their symptoms including pain reduction and improved activities of daily living.

### CONCLUSION:

These 3 patients displayed differences and commonalities in clinical, laboratory, and

imaging features. Chiropractic manipulation and rehabilitation seemed to be beneficial in reducing symptomatology and improving musculoskeletal function for these 3 patients. These findings suggest the potential for collaborative or integrative management in similar cases.

DOI: 10.1016/j.jcm.2017.10.002 | PMID: 29276462 | PMCID: PMC5731838



<https://www.ncbi.nlm.nih.gov/pubmed/29276462>

## A systematic review and meta-analysis of the efficacy of manipulative therapy in women with primary dysmenorrhea

Abaraogu UO, Igwe SE, Tabansi-Ochiogu CS, Duru DO.

Explore (NY). 2017 Nov - Dec;13(6):386-392. doi: 10.1016/j.explore.2017.08.001. Epub 2017 Aug 30.

### OBJECTIVE:

To assess the robustness of evidence for the efficacy of manipulative therapy in women with primary dysmenorrhea.

### METHOD:

Seven electronic databases were searched for studies reporting data on manipulative therapy for women with primary dysmenorrhea. The primary and secondary outcomes were pain relief and quality of life, respectively. Quality of eligible studies was assessed using the Physiotherapy Evidence Database (PEDro) guideline.

### RESULTS:

The search yielded 19 citations of which four were systematically reviewed and three eligible for meta-analysis. The systematic review showed above moderate methodological quality with a mean of 6.7 out of 10 on the PEDro quality scale. Manipulative therapy showed evidence of pain reduction in primary dysmenorrhea.

### CONCLUSION:

Manipulative therapy could be considered as adjunct therapy in the relief of pain in primary dysmenorrhea. More high-quality research is needed before the evidence for their utilization can be ascertained. Particularly, items related to assessor blinding should be considered in future studies.

DOI: 10.1016/j.explore.2017.08.001 | PMID: 28988817

 <https://www.ncbi.nlm.nih.gov/pubmed/28988817>

## Functional Magnetic Resonance Imaging of Cerebral Hemodynamic Responses to Pain Following Thoracic Thrust Manipulation in Individuals With Neck Pain: A Randomized Trial

Sparks CL, Liu WC, Cleland JA, Kelly JP, Dyer SJ, Szetela KM, Elliott JM.

J Manipulative Physiol Ther. 2017 Nov - Dec;40(9):625-634. doi: 10.1016/j.jmpt.2017.07.010.

### OBJECTIVE:

The purpose of this study was to examine whether cerebral activation in response to noxious mechanical stimuli varies with thrust manipulation (TM) when compared with sham manipulation (SM) as measured by blood oxygenation level-dependent functional magnetic resonance imaging.

### METHODS:

Twenty-four volunteers (67% female) with complaints of acute or subacute mechanical (nontraumatic) neck pain satisfied eligibility requirements and agreed to participate. Participants were randomized to receive TM to the thoracic spine or SM, and then underwent functional magnetic resonance scanning while receiving noxious stimuli before and after TM or SM. An 11-point numeric pain rating scale was administered pre- and postmanipulation for neck pain and to determine perceptions of pain intensity with respect to neck pain and mechanical stimuli. Blood oxygenation level-dependent functional magnetic resonance imaging recorded the cerebral hemodynamic response to the mechanical stimuli.

### RESULTS:

Imaging revealed significant group differences, with those individuals in the manipulation group exhibiting increased areas of activation (postmanipulation) in the insular and somatosensory cortices and individuals in the sham group exhibiting greater areas of activation in the precentral gyrus, supplementary motor area, and cingulate cortices ( $P < .05$ ). However, between-group differences on the numeric pain rating scale for mechanical stimuli and for self-reported neck pain were not statistically significant.

## CONCLUSIONS:

This study provides preliminary level 2b evidence suggesting cortical responses in patients with nontraumatic neck pain may vary between thoracic TM and a sham comparator.

DOI: 10.1016/j.jmpt.2017.07.010 | PMID: 29229052

 <https://www.ncbi.nlm.nih.gov/pubmed/29229052>

## Spinal Manipulative Therapy and Sports Performance Enhancement: A Systematic Review

Botelho MB, Alvarenga BAP, Molina N, Ribas M, Baptista AF.

J Manipulative Physiol Ther. 2017 Sep;40(7):535-543. doi: 10.1016/j.jmpt.2017.03.014.

### OBJECTIVE:

The purpose of this study was to review the literature regarding the relationship between spinal manipulative therapy (SMT) and sports performance.

### METHODS:

PubMed and Embase databases were searched for original studies published up to July 2016. Inclusion criteria were if SMT has been applied to athletes and if any sports performance-related outcome was measured.

### RESULTS:

Of the 581 potential studies, 7 clinical trials were selected. Most studies had adequate quality ( $\geq 6/11$ ) when assessed by the PEDro scale. None of those studies assessed performance at an event or competition. Four studies revealed improvement in a sports performance test after SMT. Meta-analysis could not be performed because of the wide differences in methodologies, design, and outcomes measured. Spinal manipulative therapy influences a wide range of neurophysiological parameters that could be associated with sports performance. Of the 3 studies where SMT did not improve test performance, 2 used SMT not for therapeutic correction of a dysfunctional vertebral joint but to an arbitrary previously set joint.

### CONCLUSIONS:

Although 4 of 7 studies showed that SMT improved sports performance tests, the evidence is still weak to support its use. Spinal manipulative therapy may be a promising approach for performance enhancement that should be investigated with more consistent methodologic designs.

DOI: 10.1016/j.jmpt.2017.03.014 | PMID: 29191288



<https://www.ncbi.nlm.nih.gov/pubmed/29191288>

## Neuroendocrine Response Following a Thoracic Spinal Manipulation in Healthy Men

Sampath KK, Botnmark E, Mani R, Cotter JD, Katare R, Munasinghe PE, Tumilty S.

J Orthop Sports Phys Ther. 2017 Sep;47(9):617-627. doi: 10.2519/jospt.2017.7348. Epub 2017 Jul 13.

### STUDY DESIGN:

Controlled laboratory study.

### BACKGROUND:

Spinal manipulation (SM) can trigger a cascade of responses involving multiple systems, including the sympathetic nervous system and the endocrine system, specifically, the hypothalamic-pituitary axis. However, no manual therapy study has investigated the neuroendocrine response to SM (ie, sympathetic nervous system hypothalamic-pituitary axis) in the same trial.

### OBJECTIVE:

To determine short-term changes in sympathetic nervous system activity, heart rate variability, and endocrine activity (cortisol, testosterone, and testosterone-cortisol [T/C] ratio) following a thoracic SM.

### METHODS:

Twenty-four healthy men aged between 18 and 45 years were randomized into 2 groups: thoracic SM (n = 12) and sham (n = 12). Outcome measures were salivary cortisol (micrograms per deciliter), salivary testosterone (picograms per milliliter), T/C ratio, heart rate variability, and changes in oxyhemoglobin concentration of the right calf muscle (micromoles per liter). Measurements were done before and at 5 minutes, 30 minutes, and approximately 6 hours after intervention.

### RESULTS:

A statistically significant group-by time interaction was noted for T/C ratio ( $P < .05$ ) and salivary cortisol ( $P < .01$ ) concentrations. Significant between-group differences were

noted for salivary cortisol concentration at 5 minutes (mean difference, 0.35; 95% confidence interval: 0.12, 0.6; interaction:  $P < .01$ ) and for T/C ratio at 6 hours postintervention (mean difference, -0.09; 95% confidence interval: -0.16, -0.04;  $P = .02$ ). However, SM did not differentially alter oxyhemoglobin, testosterone, or heart rate variability relative to responses in the sham group.

## CONCLUSION:

Thoracic SM resulted in an immediate decrease in salivary cortisol concentration and reduced T/C ratio 6 hours after intervention. A pattern of immediate sympathetic excitation was also observed in the SM group.

DOI: 10.2519/jospt.2017.7348 | PMID: 28704625



<https://www.ncbi.nlm.nih.gov/pubmed/28704625>

## Randomised controlled pilot trial of high-velocity, low-amplitude manipulation on cervical and upper thoracic spine levels in asymptomatic subjects

Galindez-Ibarbengoetxea X, Setuain I, Gonzalez-Izal M, Jauregi A, Ramirez-Velez R, Andersen LL, Izquierdo M.

International Journal Of Osteopathic Medicine. Volume 25. 2017 Sep; 6-14

### BACKGROUND:

High-velocity, low-amplitude (HVLA) manipulation techniques are habitually used on the cervical spine but the effects are not completely clear. The aim of this prospective comparative trial was to evaluate effects of an indiscriminate manipulation on the C5 (AMC5) a manipulation treatment based on a previous evaluation (MT) and a sham intervention (ST) on cervical spine range of motion (ROM); cervical flexion isometric peak force; EMG activation of sternocleidomastoid muscle (SCM) during the cranio-cervical flexion test (CCFT); and EMG signals of right and left biceps at rest were analyzed.

### METHODS/DESIGN:

Randomised controlled pilot study and intention-to-treat analysis was performed.

### SETTING:

The study was conducted at an osteopathic clinic.

### METHODS:

The outcomes were measured pre and immediately post intervention.

### PARTICIPANTS:

A total of 36 asymptomatic subjects (18 male, mean age 30 years) were randomly enrolled into 3 groups: AMC5 (n = 12), MT (n = 12), and ST (n = 12).

### RESULTS:

Significant changes ( $p < 0.1$ ) were found in the cervical flexion isometric peak force (-13.15%), however, the effect size was considered moderate ( $d = 0.52$ ). The extension

(10.44%) and left rotation ROM (12.25%) showed significant improvement in MT group. During CCFT significant changes were not reported.

## CONCLUSIONS:

The current pilot study suggested that a tendency toward a decrease in the isometric strength peak in the cervical flexion of the MT group may appear. In cervical ROM the MT group achieved significant effects in extension and left rotation movement. (C) 2016 Elsevier Ltd. All rights reserved.

DOI: 10.1016/j.ijosm.2016.11.004



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(16\)30118-3/ppt](https://www.journalofosteopathicmedicine.com/article/S1746-0689(16)30118-3/ppt)

## Characteristics of Paraspinal Muscle Spindle Response to Mechanically Assisted Spinal Manipulation: A Preliminary Report

Reed WR, Pickar JG, Sozio RS, Liebschner MAK, Little JW, Gudavalli MR.

J Manipulative Physiol Ther. 2017 Jul-Aug;40(6):371-380. doi: 10.1016/j.jmpt.2017.03.006. Epub 2017 Jun 17.

### OBJECTIVES:

The purpose of this preliminary study is to determine muscle spindle response characteristics related to the use of 2 solenoid powered clinical mechanically assisted manipulation (MAM) devices.

### METHODS:

L6 muscle spindle afferents with receptive fields in paraspinal muscles were isolated in 6 cats. Neural recordings were made during L7 MAM thrusts using the Activator V (Activator Methods Int. Ltd., Phoenix, AZ) and/or Pulstar (Sense Technology Inc., Pittsburgh, PA) devices at their 3 lowest force settings. Mechanically assisted manipulation response measures included (a) the time required post-thrust until the first action potential, (b) differences in mean frequency (MF) and mean instantaneous frequency (MIF) 2 seconds before and after MAM, and (c) the time required for muscle spindle discharge (MF and MIF) to return to 95% of baseline after MAM.

### RESULTS:

Depending on device setting, between 44% to 80% (Pulstar) and 11% to 63% (Activator V) of spindle afferents required >6 seconds to return to within 95% of baseline MF values; whereas 66% to 89% (Pulstar) and 75% to 100% (Activator V) of spindle responses returned to within 95% of baseline MIF in <6 seconds after MAM. Nonparametric comparisons between the 22N and 44N settings of the Pulstar yielded significant differences for the time required to return to baseline MF and MIF.

### CONCLUSION:

Short duration (<10 ms) MAM thrusts decrease muscle spindle discharge with a majority of afferents requiring prolonged periods (>6 seconds) to return to baseline MF

activity. Physiological consequences and clinical relevance of described MAM mechanoreceptor responses will require additional investigation.

DOI: 10.1016/j.jmpt.2017.03.006 | PMID: 28633885 | PMCID: PMC5679286



<https://www.ncbi.nlm.nih.gov/pubmed/28633885>

## Effects of 12 Weeks of Chiropractic Care on Central Integration of Dual Somatosensory Input in Chronic Pain Patients: A Preliminary Study

Haavik H, Niazi IK, Holt K, Murphy B.

J Manipulative Physiol Ther. 2017 Mar - Apr;40(3):127-138. doi: 10.1016/j.jmpt.2016.10.002. Epub 2017 Feb 10.

### OBJECTIVE:

The purpose of this preliminary study was to assess whether the dual somatosensory evoked potential (SEP) technique is sensitive enough to measure changes in cortical intrinsic inhibitory interactions in patients with chronic neck or upper extremity pain and, if so, whether changes are associated with changes in pain scores.

### METHODS:

The dual peripheral nerve stimulation SEP ratio technique was used for 6 subjects with a history of chronic neck or upper limb pain. SEPs were recorded after left or right median and ulnar nerve stimulation at the wrist. SEP ratios were calculated for the N9, N13, P14-18, N20-P25, and P22-N30 peak complexes from SEP amplitudes obtained from simultaneous median and ulnar stimulation divided by the arithmetic sum of SEPs obtained from individual stimulation of the median and ulnar nerves. Outcome measures of SEP ratios and subjects' visual analog scale rating of pains were recorded at baseline, after a 2-week usual care control period, and after 12 weeks of multimodal chiropractic care (chiropractic spinal manipulation and 1 or more of the following: exercises, peripheral joint adjustments/manipulation, soft tissue therapy, and pain education).

### RESULTS:

A significant decrease in the median and ulnar to median plus ulnar ratio and the median and ulnar amplitude for the cortical P22-N30 SEP component was observed after 12 weeks of chiropractic care, with no changes after the control period. There was a significant decrease in visual analog scale scores (both for current pain and for pain last week).

## CONCLUSION:

The dual SEP ratio technique appears to be sensitive enough to measure changes in cortical intrinsic inhibitory interactions in patients with chronic neck pain. The observations in 6 subjects revealed that 12 weeks of chiropractic care improved suppression of SEPs evoked by dual upper limb nerve stimulation at the level of the motor cortex, premotor areas, and/or subcortical areas such as basal ganglia and/or thalamus. It is possible that these findings explain one of the mechanisms by which chiropractic care improves function and reduces pain for chronic pain patients.

DOI: 10.1016/j.jmpt.2016.10.002 | PMID: 28196631



<https://www.ncbi.nlm.nih.gov/pubmed/28196631>

## Combining Spinal Manipulation With Standard Counseling for Tobacco Cessation: Results of a Feasibility Randomized Clinical Trial

Rose KA, Kizhakkeveettil A, Kadar GE, Losack M.

J Chiropr Med. 2017 Mar;16(1):41-48. doi: 10.1016/j.jcm.2016.09.004. Epub 2016 Nov 9.

### OBJECTIVE:

The purpose of this study was to test the feasibility of a randomized clinical trial on the effectiveness of combining spinal manipulation (SM) with standard tobacco cessation counseling.

### METHODS:

A randomized clinical trial was conducted. Participants in the intervention group received 2 months of counseling plus SM delivered by doctors of chiropractic, whereas control group participants received counseling alone. Primary outcome measures were smoking decreases and 7-day smoking abstinence as measured by a tobacco diary and urinary cotinine. Descriptive statistics were calculated.

### RESULTS:

Recruitment proved to be difficult because of reluctance of participants to commit to a 2-month course of care. Ten participants completed this pilot study. Counseling plus SM group participants had greater improvement in the number of cigarettes smoked and urinary cotinine. Three participants achieved at least 7 days of tobacco abstinence, all in the counseling plus SM group.

### CONCLUSIONS:

In this feasibility study, doctors of chiropractic appeared to be capable of conducting effective smoking cessation counseling. The preliminary information indicated that there may be some benefit for including chiropractic care in addition to counseling. Researchers conducting future studies that are adequately powered should consider using multiple locations and incentives adequate to recruit participants.

DOI: 10.1016/j.jcm.2016.09.004 | PMID: 28228696 | PMCID: PMC5310958



<https://www.ncbi.nlm.nih.gov/pubmed/28228696>

## Suboccipital decompression enhances heart rate variability indices of cardiac control in healthy subjects.

Giles PD, Hensel KL, Pacchia CF, Smith ML.

J Altern Complement Med. 2013 Feb;19(2):92-6. doi: 10.1089/acm.2011.0031. Epub 2012 Sep 20.

### OBJECTIVES:

Osteopathic manipulative treatment (OMT) focused on the upper cervical spine is theorized to affect the function of the vagus nerve and thereby influence the parasympathetic branch of the autonomic nervous system. This study was designed to determine the acute effect of upper cervical spine manipulation on cardiac autonomic control as measured by heart rate variability.

### DESIGN:

Nineteen healthy, young adult subjects underwent three different experimental interventions administered in random order: cervical OMT, sham manipulation, and time control. Six minutes of electrocardiographic data were collected before and after each intervention, and heart rate variability was assessed by both time-domain and frequency-domain measures.

### RESULTS:

No differences in resting heart rate or any measure of heart rate variability were observed between the baseline periods prior to each intervention. The OMT protocol resulted in an increase in the standard deviation of the normal-to-normal intervals ( $0.12 \pm 0.082$  seconds,  $p < 0.01$ ), an increase in the high frequency spectral power ( $p = 0.03$ ), and a decrease in the low/high frequency spectral ratio ( $p = 0.01$ ) relative to the sham and time control conditions. No significant differences between sham and time control were observed ( $p > 0.11$  for all variables).

### CONCLUSIONS:

These data support the hypothesis that upper cervical spine manipulation can acutely affect measures of heart rate variability in healthy individuals.

DOI:10.1089/acm.2011.0031 | PMID: 22994907 | PMCID: PMC3576914

 <https://www.ncbi.nlm.nih.gov/pubmed/22994907>

## Associations of cytokine concentrations with key osteopathic lesions and clinical outcomes in patients with nonspecific chronic low back pain: results from the OSTEOPATHIC Trial.

Licciardone JC, Kearns CM, Hodge LM, Bergamini MV.

J Am Osteopath Assoc. 2012 Sep;112(9):596-605.

### CONTEXT:

Little is known about the role that cytokines play in osteopathic manual treatment (OMT) of patients with chronic low back pain (LBP).

### OBJECTIVE:

To measure the baseline concentrations of interleukin (IL)-1 $\beta$ , IL-6, IL-8, IL-10, and tumor necrosis factor (TNF)- $\alpha$  in patients with chronic LBP; the correlations of these cytokine concentrations with clinical measures, including the number of key osteopathic lesions; the changes in cytokine concentrations with OMT; and the association of such changes with clinical outcomes.

### DESIGN:

Substudy nested within a randomized controlled trial of OMT for nonspecific chronic LBP.

### SETTING:

University-based study in Dallas-Fort Worth, Texas.

### PATIENTS:

Seventy adult research patients with nonspecific chronic LBP.

### MAIN OUTCOME MEASURES:

A 10-cm visual analog scale, the Roland-Morris Disability Questionnaire, and the Medical Outcomes Study Short Form-36 Health Survey were used to measure LBP severity, back-specific functioning, and general health, respectively.

## RESULTS:

At baseline, IL-1 $\beta$  ( $\rho = 0.33$ ;  $P = .005$ ) and IL-6 ( $\rho = 0.32$ ;  $P = .006$ ) were each correlated with the number of key osteopathic lesions; however, only IL-6 was correlated with LBP severity ( $\rho = 0.28$ ;  $P = .02$ ). There was a significantly greater reduction of TNF- $\alpha$  concentration after 12 weeks in patients who received OMT compared with patients who received sham OMT (Mann-Whitney  $U = 251.5$ ;  $P = .03$ ). Significant associations were found between OMT and a reduced TNF- $\alpha$  concentration response at week 12 among patients who achieved moderate (response ratio, 2.13; 95% confidence interval [CI], 1.11-4.06;  $P = .006$ ) and substantial (response ratio, 2.13; 95% CI, 1.07-4.25;  $P = .01$ ) LBP improvements, and improvement in back-specific functioning (response ratio, 1.68; 95% CI, 1.04-2.71;  $P = .03$ ).

## CONCLUSIONS:

This study found associations between IL-1 $\beta$  and IL-6 concentrations and the number of key osteopathic lesions and between IL-6 and LBP severity at baseline. However, only TNF- $\alpha$  concentration changed significantly after 12 weeks in response to OMT. These discordant findings indicate that additional research is needed to elucidate the underlying mechanisms of action of OMT in patients with nonspecific chronic LBP.

DOI: 10.7556/jaoa.2012.112.9.596 | PMID: 22984233



<https://www.ncbi.nlm.nih.gov/pubmed/22984233>

## Preventative osteopathic manipulative treatment and the elderly nursing home resident: a pilot study.

Snider KT, Snider EJ, Johnson JC, Hagan C, Schoenwald C.

J Am Osteopath Assoc. 2012 Aug;112(8):489-501.

### CONTEXT:

Elderly nursing home residents are generally in poor health. Many residents report pain on a daily basis, few are independent in their activities of daily living, and most take a large number of medications.

### OBJECTIVE:

To investigate the benefits elderly nursing home residents may receive from preventative osteopathic manipulative treatment (OMT) designed to optimize structure and function and enhance their bodies' homeostatic mechanisms.

### METHODS:

Volunteer nursing home residents were randomly assigned to 1 of 3 groups: OMT, (2) light touch (LT), or (3) treatment as usual (TAU). The OMT group received an OMT protocol twice per month for 5 months, for a total of 10 visits. The LT group received a light-touch protocol meant to simulate OMT at the same frequency as the OMT group. The TAU group received no intervention. Participant health information from Minimum Data Set assessments was monitored during the study, along with hospitalizations, emergency room visits, and outpatient procedures. The nursing home personnel and the participants' attending physicians were blinded to treatment group assignment.

### RESULTS:

Twenty-one participants completed the study: 8 in the OMT group, 6 in the LT group, and 7 in the TAU group. The OMT and LT groups had fewer hospitalizations ( $P=.04$ ) and decreased medication usage ( $P=.001$ ) compared with the TAU group.

### CONCLUSION:

Twice monthly OMT and LT protocols reduced the number of hospitalizations and de-

creased medication usage in elderly nursing home residents.

**TRIAL REGISTRATION:**

ClinicalTrials.gov NCT01000142.

PMID: 22904246

 <https://www.ncbi.nlm.nih.gov/pubmed/22904246>

## Low back pain and kidney mobility: local osteopathic fascial manipulation decreases pain perception and improves renal mobility.

Tozzi P1, Bongiorno D2, Vitturini C.

J Bodyw Mov Ther. 2012 Jul;16(3):381-391. doi: 10.1016/j.jbmt.2012.02.001. Epub 2012 Mar 3.

### OBJECTIVES:

a) To calculate and compare a Kidney Mobility Score (KMS) in asymptomatic and Low Back Pain (LBP) individuals through real-time Ultrasound (US) investigation. b) To assess the effect of Osteopathic Fascial Manipulation (OFM), consisting of Still Technique (ST) and Fascial Unwinding (FU), on renal mobility in people with non-specific LBP. c) To evaluate 'if' and 'to what degree' pain perception may vary in patients with LBP, after OFM is applied.

### METHODS:

101 asymptomatic people (F 30; M 71; mean age  $38.9 \pm 8$ ) were evaluated by abdominal US screening. The distance between the superior renal pole of the right kidney and the ipsilateral diaphragmatic pillar was calculated in both maximal expiration (RdE) and maximal inspiration (RdI). The mean of the RdE-RdI ratios provided a Kidney Mobility Score (KMS) in the cohort of asymptomatic people. The same procedure was applied to 140 participants (F 66; M 74; mean age  $39.3 \pm 8$ ) complaining of non-specific LBP: 109 of whom were randomly assigned to the Experimental group and 31 to the Control group. For both groups, a difference of RdE and RdI values was calculated ( $RD = RdE - RdI$ ), before (RD-T0) and after (RD-T1) treatment was delivered, to assess the effective range of right kidney mobility.

### EVALUATION:

A blind assessment of each patient was carried using US screening. Both groups completed a Short-Form McGill Pain Assessment Questionnaire (SF-MPQ) on the day of recruitment (SF-MPQ T0) as well as on the third day following treatment (SF-MPQ T1). An Osteopathic assessment of the thoraco-lumbo-pelvic region to all the Experimental participants was performed, in order to identify specific areas of major myofascial ten-

sion.

## INTERVENTION:

Each individual of the Experimental group received OFM by the same Osteopath who had previously assessed them. A sham-treatment was applied to the Control group for the equivalent amount of time.

## RESULTS:

a) The factorial ANOVA test showed a significant difference (p-value < 0.05) between KMS in asymptomatic individuals (1.92 mm, Std. Dev. 1.14) compared with the findings in patients with LBP (1.52 mm, Std. Dev. 0.79). b) The ANOVA test at repeated measures showed a significant difference (p-value < 0.0001) between pre- to post-RD values of the Experimental group compared with those found in the Control. c) A significant difference (p-value < 0.0001) between pre- to post-SF-MPQ results was found in the Experimental cohort compared with those obtained in the Control.

## CONCLUSIONS:

People with non-specific LBP present with a reduced range of kidney mobility compared to the findings in asymptomatic individuals. Osteopathic manipulation is shown to be an effective manual approach towards improvement of kidney mobility and reduction of pain perception over the short-term, in individuals with non-specific LBP.

DOI: 10.1016/j.jbmt.2012.02.001 | PMID: 22703751



<https://www.ncbi.nlm.nih.gov/pubmed/22703751>

## Does effectiveness of exercise therapy and mobilisation techniques offer guidance for the treatment of lateral and medial epicondylitis? A systematic review.

Hoogvliet P, Randsdorp MS, Dingemanse R, Koes BW, Huisstede BM.

Br J Sports Med. 2013 Nov;47(17):1112-9. doi: 10.1136/bjsports-2012-091990. Epub 2013 May 24.

### BACKGROUND:

Owing to the change in paradigm of the histological nature of epicondylitis, therapeutic modalities as exercises such as stretching and eccentric loading and mobilisation are considered for its treatment.

### OBJECTIVE:

To assess the evidence for effectiveness of exercise therapy and mobilisation techniques for both medial and lateral epicondylitis.

### METHODS:

Searches in PubMed, Embase, Cinahl and Pedro were performed to identify relevant randomised clinical trials (RCTs) and systematic reviews. Two reviewers independently extracted data and assessed the methodological quality.

### RESULTS:

One review and 12 RCTs, all studying lateral epicondylitis, were included. Different therapeutic regimes were evaluated: stretching, strengthening, concentric/eccentric exercises and manipulation of the cervical or thoracic spine, elbow or wrist. No statistical pooling of the results could be performed owing to heterogeneity of the included studies. Therefore, a best-evidence synthesis was used to summarise the results. Moderate evidence for the short-term effectiveness was found in favour of stretching plus strengthening exercises versus ultrasound plus friction massage. Moderate evidence for short-term and mid-term effectiveness was found for the manipulation of the cervical and thoracic spine as add-on therapy to concentric and eccentric stretching plus mobilisation of wrist and forearm. For all other interventions only limited, conflicting

or no evidence was found.

## CONCLUSIONS:

Although not yet conclusive, these results support the belief that strength training decreases symptoms in tendinosis. The short-term analgesic effect of manipulation techniques may allow more vigorous stretching and strengthening exercises resulting in a better and faster recovery process of the affected tendon in lateral epicondylitis.

DOI: 10.1136/bjsports-2012-091990 | PMID: 23709519



<https://www.ncbi.nlm.nih.gov/pubmed/23709519>

## Combination of manipulation, exercise, and physical therapy for the treatment of a 57-year-old woman with lateral epicondylitis.

Radpasand M.

J Manipulative Physiol Ther. 2009 Feb;32(2):166-72. doi: 10.1016/j.jmpt.2008.12.007.

### OBJECTIVE:

This case report presents a simple systematic approach consisting of a 10-week specific sequential multimodal conservative management approach to chronic lateral epicondylitis.

### CLINICAL FEATURES:

A 57-year-old female science teacher experiencing elbow pain for 5 months presented to our multidisciplinary clinic complaining of whole-arm pain extending to the wrist.

### INTERVENTION AND OUTCOME:

In the 10-week protocol, we used high-velocity and low-amplitude manipulation, high-voltage pulsed galvanic stimulation, a hard-padded elbow brace, ice, and exercise, along with restricted use of the affected elbow. The Patient-Rated Forearm Evaluation Questionnaire, currently named as the Patient-Rated Tennis Elbow Evaluation, was used for an outcomemeasurement. Overall, there was a systematic reduction of pain (92.86%), specific activity (100%), and usual activity (96.87%), and even after 3 weeks of follow-up, we did not notice significant changes in all of the data.

### CONCLUSIONS:

This case study showed the possible beneficial effects of the specific sequential multimodal treatment approach in a patient with resistant chronic lateral epicondylitis.

DOI: 10.1016/j.jmpt.2008.12.007 | PMID: 19243730



<https://www.ncbi.nlm.nih.gov/pubmed/19243730>

## Chiropractic treatment of upper extremity conditions: a systematic review.

McHardy A, Hoskins W, Pollard H, Onley R, Windsham R.

J Manipulative Physiol Ther. 2008 Feb;31(2):146-59. doi: 10.1016/j.jmpt.2007.12.004.

### OBJECTIVE:

This study investigates the scope, type, and quality of chiropractic research conducted on the management of upper limb peripheral conditions.

### METHOD:

A literature search regarding upper limb and chiropractic treatment was performed on CINAHL, MEDLINE, and MANTIS databases. Search terms included chiropractic, shoulder, elbow, wrist, hand, forearm, and arm, with MeSH terms for each region. For articles to be considered relevant, there had to be a peripheral diagnosis and chiropractic intervention. Papers were excluded if pain was referred from spinal sites. Duplicates, articles published in non-peer-reviewed literature, conference proceedings, grand rounds, and discussion papers where no treatment was actually rendered were also removed. The articles were then reviewed and assessed for quality using the Physiology Evidence Database (PEDro) scale.

### RESULTS:

There was a total of 64 articles found. There were 36 case reports for the shoulder, 8 case reports for the elbow, 14 case reports for the wrist/hand, and 6 clinical trials (3 shoulder, 1 elbow 2 wrist). For the PEDro score, 58 case reports scored 0, 1 clinical trial scored 7, 2 clinical trials scored 6, 2 clinical trials scored 4, and 1 clinical trial scored 0.

### CONCLUSION:

There is a small amount of chiropractic research into upper limb conditions that is comprised mostly of case studies (level 4 evidence) and a small number of higher-level publications (level 1-3 evidence). Most treatments are multimodal in nature, which address both spinal and peripheral structures, with joint and soft tissue methods. There is a need for future research to be directed at higher-level evidence, in particular, randomized controlled trials for the chiropractic treatment of upper limb conditions.

DOI: 10.1016/j.jmpt.2007.12.004 | PMID: 18328941



<https://www.ncbi.nlm.nih.gov/pubmed/18328941>

## [Osteopathic versus orthopedic treatments for chronic epicondylopathia humeri radialis: a randomized controlled trial].

Geldschläger S.

Forsch Komplementarmed Klass Naturheilkd. 2004 Apr;11(2):93-7.

### BACKGROUND:

The Epicondylopathia humeri radialis is mainly caused by an overload of the extensor muscles of the hand, the afflicted side is generally the dominant hand. There is a multitude of treatment methods, none of them, however, can guarantee success.

### OBJECTIVE:

Can an osteopathic treatment of the chronic Epicondylopathia humeri radialis reduce the pain more effectively than an orthopedic treatment?

### STUDY DESIGN:

Randomized controlled clinical study.

### MATERIAL AND METHODS:

53 patients were randomly distributed among examination and control group. They were treated for 8 weeks. The osteopathic treatment was done exclusively manually, with parietal, visceral, and craniosacral techniques, individually chosen for each patient. The orthopedic treatment was performed with chiropractic techniques, antiphlogistics, and mostly with injections of cortison. Four common tests were used, all 4 valuing pain and development of power: pressure pain test, Thomsen test, middlefinger extension test, and test for strength. Additionally a questionnaire about the attendant circumstances of the chronic Epicondylopathia humeri radialis was raised.

### RESULTS:

Subjective pain sensation reduced from 50% to 33% ( $p < 0.01$ ) in the intervention group and from 48% to 32% ( $p = 0.03$ ) in the orthopedic group. A reduction of pain as well as an increase of power could be measured. The difference between the two treatment methods, however, was not statistically significant.

## CONCLUSIONS:

In this study it was possible to successfully treat the chronic Epicondylopathia humeri radialis with an osteopathic approach. A significant difference to an orthopedic treatment could not be proved.

DOI: 10.1159/000078230 | PMID: 15138373



<https://www.ncbi.nlm.nih.gov/pubmed/15138373>

## Manipulation of the wrist for management of lateral epicondylitis: a randomized pilot study.

Struijs PA, Damen PJ, Bakker EW, Blankevoort L, Assendelft WJ, van Dijk CN.

Phys Ther. 2003 Jul;83(7):608-16.

### BACKGROUND AND PURPOSE:

Lateral epicondylitis ("tennis elbow") is a common entity. Several nonoperative interventions, with varying success rates, have been described. The aim of this study was to compare the effectiveness of 2 protocols for the management of lateral epicondylitis: manipulation of the wrist and (2) ultrasound, friction massage, and muscle stretching and strengthening exercises.

### SUBJECTS AND METHODS:

Thirty-one subjects with a history and examination results consistent with lateral epicondylitis participated in the study. The subjects were randomly assigned to either a group that received manipulation of the wrist (group 1) or a group that received ultrasound, friction massage, and muscle stretching and strengthening exercises (group 2). Three subjects were lost to follow-up, leaving 28 subjects for analysis. Follow-up was at 3 and 6 weeks. The primary outcome measure was a global measure of improvement, as assessed on a 6-point scale. Analysis was performed using independent t tests, Mann-Whitney U tests, and Fisher exact tests.

### RESULTS:

Differences were found for 2 outcome measures: success rate at 3 weeks and decrease in pain at 6 weeks. Both findings indicated manipulation was more effective than the other protocol. After 3 weeks of intervention, the success rate in group 1 was 62%, as compared with 20% in group 2. After 6 weeks of intervention, improvement in pain as measured on an 11-point numeric scale was 5.2 (SD=2.4) in group 1, as compared with 3.2 (SD=2.1) in group 2.

### DISCUSSION AND CONCLUSION:

Manipulation of the wrist appeared to be more effective than ultrasound, friction mas-

sage, and muscle stretching and strengthening exercises for the management of lateral epicondylitis when there was a short-term follow-up. However, replication of our results is needed in a large-scale randomized clinical trial with a control group and a longer-term follow-up.

PMID: 12837122



<https://www.ncbi.nlm.nih.gov/pubmed/12837122>

## Increase of lower esophageal sphincter pressure after osteopathic intervention on the diaphragm in patients with gastroesophageal reflux.

Da Silva RC, de Sá CC, Pascual-Vaca ÁO, de Souza Fontes LH, Herbella Fernandes FA, Dib RA, Blanco CR, Queiroz RA, Navarro-Rodriguez T.

Dis Esophagus. 2013 Jul;26(5):451-6. doi: 10.1111/j.1442-2050.2012.01372.x. Epub 2012 Jun 7.

### ABSTRACT

The treatment of gastroesophageal reflux disease may be clinical or surgical. The clinical consists basically of the use of drugs; however, there are new techniques to complement this treatment, osteopathic intervention in the diaphragmatic muscle is one these. The objective of the study is to compare pressure values in the examination of esophageal manometry of the lower esophageal sphincter (LES) before and immediately after osteopathic intervention in the diaphragm muscle. Thirty-eight patients with gastroesophageal reflux disease - 16 submitted to sham technique and 22 submitted osteopathic technique - were randomly selected. The average respiratory pressure (ARP) and the maximum expiratory pressure (MEP) of the LES were measured by manometry before and after osteopathic technique at the point of highest pressure. Statistical analysis was performed using the Student's t-test and Mann-Whitney, and magnitude of the technique proposed was measured using the Cohen's index. Statistically significant difference in the osteopathic technique was found in three out of four in relation to the group of patients who performed the sham technique for the following measures of LES pressure: ARP with  $P=0.027$ . The MEP had no statistical difference ( $P=0.146$ ). The values of Cohen  $d$  for the same measures were: ARP with  $d=0.80$  and MEP  $d=0.52$ . Osteopathic manipulative technique produces a positive increment in the LES region soon after its performance.

DOI: 10.1111/j.1442-2050.2012.01372.x | PMID: 22676647



<https://www.ncbi.nlm.nih.gov/pubmed/22676647>

## Osteopathic manipulative treatment in obese patients with chronic low back pain: a pilot study.

Vismara L, Cimolin V, Menegoni F, Zaina F, Galli M, Negrini S, Villa V, Capodaglio P.

Man Ther. 2012 Oct;17(5):451-5. doi: 10.1016/j.math.2012.05.002. Epub 2012 May 31.

### BACKGROUND:

Obesity is frequently associated with various musculoskeletal disorders including chronic low back pain (cLBP). Osteopathy is a discipline emphasizing the conservative treatment of the disease in an olistic vision. We designed a randomized controlled study to investigate whether Osteopathic Manipulative Treatment (OMT) combined with specific exercises (SE) is more effective than SE alone in obese patients with cLBP.

### METHODS:

nineteen obese females with cLBP, randomized into 2 groups: SE + OMT and SE were studied during the forward flexion of the spine using an optoelectronic system. A biomechanical model was developed in order to analyse kinematics and define angles of clinical interest.

### OUTCOME MEASURES:

kinematic of the thoracic and lumbar spine and pelvis during forward flexion, pain according to a visual analogue scale (VAS), Roland Morris Disability Questionnaire and Oswestry Low Back Pain Disability Questionnaire.

### RESULTS:

significant effects on kinematics were reported only for OMT + SE with an improvement in thoracic range of motion of nearly 20%. All scores of the clinical scales used improved significantly. The greatest improvements occurred in the OMT + SE group.

### CONCLUSIONS:

combined rehabilitation treatment including Osteopathic Manipulative Treatment (OMT + SE) showed to be effective in improving biomechanical parameters of the thoracic spine in obese patients with cLBP. Such results are to be attributed to OMT, since

they were not evident in the SE group. We also observed a reduction of disability and pain. The clinical results should be considered preliminary due to the small sample size.

DOI: 10.1016/j.math.2012.05.002 | PMID: 22658268



<https://www.ncbi.nlm.nih.gov/pubmed/22658268>

## Osteopathy improves the severity of irritable bowel syndrome: a pilot randomized sham-controlled study.

Florance BM, Frin G, Dainese R, Nébot-Vivinus MH, Marine Barjoan E, Marjoux S, Laurens JP, Payrouse JL, Hébuterne X, Piche T.

EurJGastroenterolHepatol.2012Aug;24(8):944-9.doi:10.1097/MEG.0b013e3283543eb7.

### BACKGROUND:

Effective therapies for irritable bowel syndrome (IBS) are disappointing. Therefore, IBS patients have a growing interest for alternative medicines including osteopathy.

### AIM:

We aimed to evaluate the effect of osteopathy on the severity of IBS in a randomized sham-controlled trial.

### METHODS:

We prospectively assigned 30 patients with IBS (23F, 7M, mean age  $45.8 \pm 16.4$  years) fulfilling the Rome III criteria in a 2/1 ratio to receive either osteopathy or sham osteopathy. Two separate sessions were performed at a 7-day interval (days 0 and 7) with a further 3 weeks of follow-up (day 28). The primary outcome included at least a 25% improvement in the IBS severity score at day 7. The secondary outcomes included the impact of IBS on quality of life, psychological factors, and bowel habits.

### RESULTS:

The severity of IBS decreased in both groups at days 7 and 28. At day 7, this decrease was significantly more marked in patients receiving osteopathy compared with those receiving the sham procedure ( $-32.2 \pm 29.1$  vs.  $-9.0 \pm 16.0$ , mean difference normalized to the baseline  $P=0.01$ ). This difference did not persist at day 28 ( $P=0.4$ ). Both anxiety and depression scores decreased without difference between groups. Stool frequency and consistency were not significantly modified.

### CONCLUSION:

Osteopathy improves the severity of IBS symptoms and its impact on quality of life.

Osteopathy should therefore be considered for future research as an effective complementary alternative medicine in the management of IBS symptoms.

DOI: 10.1097/MEG.0b013e3283543eb7 | PMID: 22546751



<https://www.ncbi.nlm.nih.gov/pubmed/22546751>

## Stress reduction with osteopathy assessed with GDV electrophotonic imaging: effects of osteopathy treatment.

Korotkov K, Shelkov O, Shevtsov A, Mohov D, Paoletti S, Mirosnichenko D, Labkovskaya E, Robertson L.

J Altern Complement Med. 2012 Mar;18(3):251-7. doi: 10.1089/acm.2010.0853.

### OBJECTIVES:

The purpose of this study is to explore how osteopathy treatments influence certain measurable aspects of the human biofield; namely, various calculated parameters of finger corona discharge patterns produced by high-voltage electrophotography.

### METHODS:

The Gas Discharge Visualization camera was used to assess subjects before and after osteopathy treatment. Thirty-three (33) apparently healthy adults (20-56 years old) took part in the study. The patterns of light emitted from the subjects' fingertips were digitally recorded and computer analyzed. Parameters including normalized area, brightness, and right- and left-hand integrals were calculated and statistically compared.

### RESULTS:

Most of the recipients of these osteopathic treatments experienced increase in fingertip fluorescence area and average intensity, reduction in stress levels, and improved blood pressure measurements. With all of these parameters simultaneously improving, the patients received a good benefit from these sessions.

### CONCLUSIONS:

Virtually all subjects were in a good mood after treatment. Many of them had pain and muscle tension that disappeared. These changes were reflected in all parameters analyzed, in both psychosomatic and somatic states. Thus, osteopathic manipulations as administered in these two studies provide good, lasting relaxation. This study also provides the interesting observation that daily relaxation practices done by Dr. Paoletti enable him to work hard without additional stress.

DOI: 10.1089/acm.2010.0853 | PMID: 22420738



<https://www.ncbi.nlm.nih.gov/pubmed/22420738>

## Osteopathic manipulative treatment effectiveness in severe chronic obstructive pulmonary disease: a pilot study.

Zanotti E, Berardinelli P, Bizzarri C, Civardi A, Manstretta A, Rossetti S, Fracchia C.

Complement Ther Med. 2012 Feb-Apr;20(1-2):16-22. doi: 10.1016/j.ctim.2011.10.008. Epub 2011 Nov 27.

### OBJECTIVES:

Few and contrastingly data are available about use of osteopathic manipulative treatment (OMT) in patients with chronic obstructive pulmonary disease (COPD).

### DESIGN:

Comparing the effects of the combination of pulmonary rehabilitation and OMT compared with pulmonary rehabilitation (PR) in patients with severely impaired COPD.

### SETTING:

Rehabilitative pulmonary department.

### INTERVENTIONS:

Patients underwent exercise training, OMT, educational support and nutritional and psychological counselling.

### MAIN OUTCOMES MEASURES:

Exercise capacity through 6 min walk test (6MWT--primary outcome) and pulmonary function test (secondary outcomes) were evaluated at the beginning and at the end of the training. Patients were randomly assigned to receive PR+soft manipulation (G1) or OMT+PR (G2) for 5 days/week for 4 weeks.

### RESULTS:

20 stable COPD patients (5 female--mean age, 63.8±5.1 years; FEV1 26.9±6.3% of predicted) referred for in-patient pulmonary rehabilitation were evaluated. Respect to the baseline, 6 MWT statistically improved in both group. In particular, G2 group gained

72.5±7.5 m (p=0.01) and G1 group 23.7±9.7 m. Between group comparison showed a difference of 48.8 m (95% CI: 17 to 80.6 m, p=0.04). Moreover, in G2 group we showed a decrease in residual volume (RV--from 4.4±1.5 l to 3.9±1.5 l, p=0.05). Between group comparison showed an important difference (-0.44 l; 95% CI: -0.26 to -0.62 l, p=0.001). Furthermore, only in G2 group we showed an increase in FEV1.

## CONCLUSIONS:

This study suggests that OMT+PR may improve exercise capacity and reduce RV in severely impaired COPD patients with respect to PR alone.

DOI: 10.1016/j.ctim.2011.10.008 | PMID: 22305244



<https://www.ncbi.nlm.nih.gov/pubmed/22305244>

## The Use of Osteopathic Manual Therapy and Rehabilitation for Subacromial Impingement Syndrome: A Case Report.

Bennett S, Macfarlane C, Vaughan B.

Explore (NY). 2017 Sep - Oct;13(5):339-343. doi: 10.1016/j.explore.2017.01.002. Epub 2017 Jul 11.

### ABSTRACT

Rotator cuff dysfunction is common in athletes involved with overhead sports. Secondary subacromial impingement is a common cause of pain for patients with rotator cuff dysfunction. Exercise rehabilitation and manual therapy can be used in the treatment of subacromial impingement to decrease pain, increase functionality and support a return to activity. The current case report describes a 24-year-old patient with supraspinatus tendinosis and secondary subacromial impingement who was experiencing pain when playing tennis, and during daily activities involving overhead movements. Osteopathic manual therapy and rehabilitation was undertaken leading to significant improvements in pain and function over a six-week period. The current case report describes an evidence-informed approach to the management of subacromial impingement syndrome whilst incorporating a manual therapy technique, balanced ligamentous tension, that has received little attention in the literature.

DOI: 10.1016/j.explore.2017.01.002 | PMID: 28780211



<https://www.ncbi.nlm.nih.gov/pubmed/28780211>

## Utilization of Manipulative Treatment for Spine and Shoulder Conditions Between Different Medical Providers in a Large Military Hospital.

Rhon D, Greenlee T, Fritz J.

Arch Phys Med Rehabil. 2018 Jan;99(1):72-81. doi: 10.1016/j.apmr.2017.06.010. Epub 2017 Jul 14.

### OBJECTIVE:

To describe the use of manipulative treatment for shoulder and spine conditions among various provider types.

### DESIGN:

Retrospective observational cohort.

### SETTING:

Single military hospital.

### PARTICIPANTS:

Consecutive sample of patients (N=7566) seeking care for an initial spine or shoulder condition from January 1 to December 31, 2009.

### INTERVENTIONS:

Manipulative treatment (eg, manual therapy, spinal and joint manipulation).

### MAIN OUTCOME MEASURE:

Manipulation treatment was identified with procedure billing codes in the medical records. Spine and shoulder conditions were identified by using the International Classification of Diseases, 9th Revision codes. All data were abstracted from the Department of Defense Military Health System Management and Analysis Tool.

### RESULTS:

Of 7566 total patients seeking care, 2014 (26.6%) received manipulative treatment at

least once, and 1883 of those received this treatment in a military facility (24.7%). Manipulative treatment was used most often for thoracic conditions and least often for shoulder conditions (50.8% and 24.2% of all patients). There was a total of 6706 unique medical visits with a manipulative treatment procedure (average of 3.3 manipulative treatment procedure visits per patient).

## CONCLUSIONS:

Manipulative treatment utilization rates for shoulder and spine conditions ranged from 26.6% to 50.2%. Chiropractors used manipulation the most and physical therapists the least.

DOI: 10.1016/j.apmr.2017.06.010 | PMID: 28712922



<https://www.ncbi.nlm.nih.gov/pubmed/28712922>

## The immediate effects of muscle energy technique on posterior shoulder tightness: a randomized controlled trial.

Moore SD, Laudner KG, McLoda TA, Shaffer MA.

J Orthop Sports Phys Ther. 2011 Jun;41(6):400-7. doi: 10.2519/jospt.2011.3292. Epub 2011 Apr 6.

### STUDY DESIGN:

Randomized controlled trial.

### OBJECTIVES:

To compare a muscle energy technique (MET) for the glenohumeral joint (GHJ) horizontal abductors and an MET for the GHJ external rotators to improve GHJ range of motion (ROM) in baseball players.

### BACKGROUND:

Overhead athletes often exhibit loss of GHJ ROM in internal rotation, which has been associated with shoulder pathology. Current stretching protocols aimed at improving flexibility of the posterior shoulder have resulted in inconsistent outcomes. Although utilization of MET has been hypothesized to lengthen tissue, there are limited empirical data describing the effectiveness of such stretches for treating posterior shoulder tightness.

### METHODS:

Sixty-one Division I baseball players were randomly assigned to 1 of 3 groups: MET for the GHJ horizontal abductors (n = 19), MET for the GHJ external rotators (n = 22), and control (n = 20). We measured preintervention and postintervention GHJ horizontal adduction and internal rotation ROM, and conducted analyses of covariance, followed by Tukey honestly significant difference post hoc analysis for significant group-by-time interactions (P<.05).

### RESULTS:

The group treated with the MET for the horizontal abductors had a significantly greater

increase in GHJ horizontal adduction ROM postintervention (mean  $\pm$  SD,  $6.8^\circ \pm 10.5^\circ$ ) compared to the control group ( $-1.1^\circ \pm 6.8^\circ$ ) ( $P = .011$ ) and a greater increase in internal rotation ROM postintervention ( $4.2^\circ \pm 5.3^\circ$ ) compared to the group treated with the MET for the external rotators ( $0.2^\circ \pm 6.3^\circ$ ) ( $P = .020$ ) and the control group ( $-0.2^\circ \pm 4.0^\circ$ ) ( $P = .029$ ). No significant differences among groups were found for any other variables ( $P > .05$ ).

## CONCLUSION:

A single application of an MET for the GHJ horizontal abductors provides immediate improvements in both GHJ horizontal adduction and internal rotation ROM in asymptomatic collegiate baseball players. Application of MET for the horizontal abductors may be useful to gain ROM in overhead athletes.

## LEVEL OF EVIDENCE:

Therapy, level 2b-.

DOI: 10.2519/jospt.2011.3292 | PMID: 21471651



<https://www.ncbi.nlm.nih.gov/pubmed/21471651>

## J Manipulative Physiol Ther. 2004 Nov-Dec;27(9):580-90. Rotator cuff impingement.

Pribicevic M, Pollard H.

J Manipulative Physiol Ther. 2004 Nov-Dec;27(9):580-90.

### OBJECTIVE:

To present a case of shoulder impingement syndrome managed with a conservative multimodal treatment approach.

### CLINICAL FEATURES:

A patient had anterior shoulder pain and a diffuse ache in the right upper arm, with tenderness in the shoulder region on palpation. Shoulder range of motion was limited with pain and catching, coupled with limited and painful cervical motion. After physical and orthopedic examination, a clinical diagnosis of shoulder impingement syndrome was made.

### INTERVENTIONS AND OUTCOME:

The patient underwent a multimodal treatment protocol including soft tissue therapy, phonophoresis, diversified manipulation; and rotator cuff and shoulder girdle muscle exercises. Outcomes included pain measurement; range of motion of the shoulder, and return to normal daily, work, and sporting activities. At the end of the treatment protocol the patient was symptom free with all outcome measures normal. The patient was followed up at 4 and 12 weeks and continued to be symptom free with full range of motion and complete return to normal daily and pre-treatment activities.

### CONCLUSION:

This case report shows the potential benefit of a multimodal chiropractic protocol in resolving symptoms associated with shoulder impingement syndrome.

DOI: 10.1016/j.jmpt.2004.10.004 | PMID: 15614246



<https://www.ncbi.nlm.nih.gov/pubmed/15614246>

## Improving functional ability in the elderly via the Spencer technique, an osteopathic manipulative treatment: a randomized, controlled trial.

Knebl JA, Shores JH, Gamber RG, Gray WT, Herron KM.

J Am Osteopath Assoc. 2002 Jul;102(7):387-96.

### ABSTRACT

Twenty-nine elderly patients with preexisting shoulder problems voluntarily enrolled as subjects in this study, which was undertaken to determine the efficacy of osteopathic manipulative treatment (OMT) in an elderly population to increase functional independence, increase range of motion (ROM) of the shoulder, and decrease pain associated with common shoulder problems. Each subject had chronic pain, decreased ROM, and/or decreased functional ability in the shoulder before entering the study. Subjects were randomly assigned to either a treatment (OMT) group or a control group for 14 weeks. Over the course of treatment, both groups had significantly increased ROM ( $P < .01$ ) and decreased perceived pain ( $P < .01$ ). All subjects continued on their preexisting course of therapy for any concurrent medical problems. After treatment, those subjects who had received OMT demonstrated continued improvement in their ROM, while ROM in the placebo group decreased.

PMID: 12138953



<https://www.ncbi.nlm.nih.gov/pubmed/12138953>

## Effect of cranial osteopathic manipulative medicine on cerebral tissue oxygenation.

Shi X, Rehrer S, Prajapati P, Stoll ST, Gamber RG, Downey HF.

J Am Osteopath Assoc. 2011 Dec;111(12):660-6.

### CONTEXT:

The use of cranial osteopathic manipulative medicine (OMM) to alter cerebral tissue oxygen saturation could play a role in the maintenance of cerebral homeostasis.

### OBJECTIVE:

To examine the effects of cranial OMM on cerebral tissue oxygen saturation (S(CT)O(2)) and cardiac autonomic function in healthy adults.

### METHODS:

Cranial OMM augmentation and suppression techniques and sham therapy were randomly applied to healthy adults. During cranial OMM and sham therapy, S(CT)O(2) of the prefrontal cortex was determined bilaterally by using near-infrared spectroscopy. Heart rate, blood pressure, and systemic arterial blood oxygen saturation (SaO(2)) were also measured. Power spectral analysis was applied to continuous 4-minute R-R intervals. Measurements were made during 2-minute baseline periods, during 4-minute applications of the techniques, and during 5-minute recovery periods.

### RESULTS:

Twenty-one adults (age range, 23-32 y) participated in the present study. Differences in mean baseline measurements for the augmentation technique, suppression technique, and sham therapy were not statistically significant for heart rate, blood pressure, SaO(2), left S(CT)O(2), or right S(CT)O(2). During the suppression technique, there was a statistically significant decrease in both left (slope [standard deviation]= -0.33 [0.08] %/min, R(2)=0.85, P=.026) and right (slope [standard deviation]=-0.37 [0.06] %/min, R(2)=0.94, P=.007) S(CT)O(2) with increased cranial OMM time. However, neither the augmentation technique nor the sham therapy had a statistically significant effect on S(CT)O(2). Decreases in normalized low-frequency power of R-R interval variability and

enhancements of its high-frequency power were statistically significant ( $P=.05$ ) during cranial OMM and sham therapy, indicating a decrease in cardiac sympathetic influence and an enhanced parasympathetic modulation.

## CONCLUSION:

The cranial OMM suppression technique effectively and progressively reduced S(CT) O(2) in both prefrontal lobes with the treatment time.

PMID: 22182951



<https://www.ncbi.nlm.nih.gov/pubmed/22182951>

## Exploring the impact of osteopathic treatment on cranial asymmetries associated with nonsynostotic plagiocephaly in infants.

Lessard S, Gagnon I, Trottier N.

Complement Ther Clin Pract. 2011 Nov;17(4):193-8. doi: 10.1016/j.ctcp.2011.02.001. Epub 2011 Mar 5.

### OBJECTIVES:

To document the evolution of cranial asymmetries in infants with signs of nonsynostotic occipital plagiocephaly (NSOP) who were to undergo a course of four osteopathic treatments (in addition to the standard positioning recommendations) as well as to determine the feasibility of using this methodology to conduct a randomized clinical trial investigating the impact of osteopathic intervention for infants with NSOP.

### DESIGN:

Pilot clinical standardization project using pre-post design in which 12 infants participated. Ten infants presented an initial Oblique Diameter Difference Index (ODDI) over 104% and five of them had an initial moderate to severe Cranial Vault Asymmetry (CVA) (over 12mm).

### INTERVENTIONS:

Infants received four osteopathic treatments at 2-week intervals.

### MAIN OUTCOME MEASURES:

Anthropometric, plagiocephalometric as well as qualitative measures were administered pre-intervention (T1), during the third treatment (T2) and two weeks after the fourth treatment (T3).

### RESULTS:

Participants showed a significant decrease in CVA ( $p=0.02$ ), Skull Base Asymmetry (SBA) ( $p=0.01$ ), Trans-Cranial Vault Asymmetry (TCVA) ( $p<0.003$ ) between the first and third evaluations.

## CONCLUSIONS:

These clinical findings support the hypothesis that osteopathic treatments contribute to the improvement of cranial asymmetries in infants younger than 6.5 months old presenting with NSOP characteristics.

DOI: 10.1016/j.ctcp.2011.02.001 | PMID: 21982132



<https://www.ncbi.nlm.nih.gov/pubmed/21982132>

## Contribution of osteopathic medicine to care of patients with chronic wounds.

Anglund DC, Channell MK.

J Am Osteopath Assoc. 2011 Sep;111(9):538-42.

### ABSTRACT

Since its inception, osteopathic medicine has been concerned with the lymphatic system. Research has demonstrated the effectiveness of lymphatic osteopathic manipulative treatment (OMT) techniques in affecting fluid management and immune function. Many of the functions provided by the lymphatic system and augmented by OMT are necessary for proper wound healing. The authors highlight the unique contribution of the lymphatics to wound healing, as well as the unique contribution of OMT to lymphatic-directed treatment of patients with chronic wounds. The authors propose that this information be used as a basis for research into the effects of OMT on chronic wound healing in patients.

PMID: 21955533



<https://www.ncbi.nlm.nih.gov/pubmed/21955533>

## Impact of osteopathic manipulative treatment on secretory immunoglobulin a levels in a stressed population.

Saggio G, Docimo S, Pilc J, Norton J, Gilliar W.

J Am Osteopath Assoc. 2011 Mar;111(3):143-7.

### CONTEXT:

High levels of human secretory immunoglobulin A (sIgA) have been shown to decrease the incidence of acquiring upper respiratory tract infections. Osteopathic manipulative treatment (OMT) has been shown to improve cardiac indices, increase lymph flow rates through the thoracic duct, and decrease sympathetic tone in postoperative patients and those in intensive care. Therefore, we hypothesized that OMT may also increase sIgA levels in people under high levels of emotional and psychological stress, thereby enhancing immunity and potentially preventing subsequent infections.

### OBJECTIVE:

To determine if OMT increases sIgA levels in highly stressed individuals.

### METHODS:

Twenty-five second-year osteopathic medical students were randomly assigned to an experimental group (n=12) or a control group (n=13). All participants were scheduled to take their national board examination (Comprehensive Osteopathic Medical Licensing Examination-USA) within 2 to 3 weeks after the experiment. After each participant submitted a saliva sample for a baseline sIgA level assessment, the experimental group received 20 minutes of OMT while the control group sat quietly and relaxed in a separate area for 20 minutes. Participants in both groups rested quietly for 1 hour after the 20-minute session and then submitted a second saliva sample.

### RESULTS:

A 2 × 2 repeated measures analysis of variance revealed that the experimental group displayed a statistically significant greater increase in postintervention sIgA levels than the control group ( $F_{(1,22)} = 5.92$ ;  $P < .025$ ).

## CONCLUSION:

This study demonstrates the positive effect of OMT on sIgA levels in persons experiencing high stress. Results suggest that OMT may then have therapeutic preventive and protective effects on both healthy and hospitalized patients, especially those experiencing high levels of emotional or physiological stress and those at higher risk of acquiring upper respiratory tract infections.

PMID: 21464262



<https://www.ncbi.nlm.nih.gov/pubmed/21464262>

## Efficacy of osteopathic manipulative treatment of female patients with migraine: results of a randomized controlled trial.

Voigt K, Liebnitzky J, Burmeister U, Sihvonen-Riemenschneider H, Beck M, Voigt R, Bergmann A.

J Altern Complement Med. 2011 Mar;17(3):225-30. doi: 10.1089/acm.2009.0673. Epub 2011 Mar 8.

### OBJECTIVES:

Migraine is one of the most prevalent neurological disorders in Europe, severely affecting ability to work and quality of life. Medical therapies are considered to be the “gold standard” of treatment. This study addresses osteopathic treatment for acute therapy or prophylactic therapy as an alternative to traditional therapies.

### DESIGN:

Forty-two (42) female patients with migraine were randomized into an intervention group (n = 21) and a control group (n = 21). Outcomes were evaluated with three questionnaires before the treatment (t1) and 6 months later (t2).

### INTERVENTIONS:

The intervention group received five 50-minute osteopathic manipulative treatments (OMT) over a 10-week period. The control group did not receive OMT, sham treatment, or physical therapy. Patients of this group only filled the questionnaires. Both groups continued with previously prescribed medication.

### METHODS:

The Migraine Disability Assessment (MIDAS) and Short Form-36 (SF-36) questionnaires as well as a German “pain questionnaire” were used to assess pain intensity, the impact of migraine on daily life and health-related quality of life (HRQoL), and the number of days subjects suffered from migraine.

### RESULTS:

Three (3) of the eight HRQoL domains of the SF-36 form in the intervention group

showed significant improvement (from t1 to t2), with a general betterment exhibited in the other domains. The total MIDAS score, pain intensity, and disturbance in occupation due to migraine as well as number of days of disablements were also significantly reduced. The control group showed insignificant differences in these areas.

## CONCLUSIONS:

This study affirms the effects of OMT on migraine headache in regard to decreased pain intensity and the reduction of number of days with migraine as well as working disability, and partly on improvement of HRQoL. Future studies with a larger sample size should reproduce the results with a control group receiving placebo treatment in a long-term follow-up.

DOI: 10.1089/acm.2009.0673 | PMID: 21385086



<https://www.ncbi.nlm.nih.gov/pubmed/21385086>

## Osteopathic manipulation as a complementary treatment for the prevention of cardiac complications: 12-Months follow-up of intima media and blood pressure on a cohort affected by hypertension.

Cerritelli F, Carinci F, Pizzolorusso G, Turi P, Renzetti C, Pizzolorusso F, Orlando F, Cozzolino V, Barlafante G.

J Bodyw Mov Ther. 2011 Jan;15(1):68-74. doi: 10.1016/j.jbmt.2010.03.005. Epub 2010 May 8.

### BACKGROUND:

Aim of the present study was to investigate the association between osteopathic treatment and hypertension.

### METHODS:

The design was a non-randomized trial including consecutive subjects affected by hypertension and vascular alterations, using pre-post differences in intima-media thickness, systolic and diastolic blood pressure as primary endpoints. Statistical analysis was based on univariate t tests and multivariate linear regression.

### RESULTS:

A total of N = 31 out of N = 63 eligible subjects followed by a single cardiologist received osteopathic treatment in addition to routine care. Clinical measurements were recorded at baseline and after 12 months. Univariate analysis found that osteopathic treatment was significantly associated to an improvement in all primary endpoints. Multivariate linear regression showed that, after adjusting for all potential confounders, osteopathic treatment was performing significantly better for intima-media thickness (delta between pre-post differences in treated and control groups: -0.517; 95% c.i.: -0.680, -0.353) and systolic blood pressure (-4.523; -6.291, -2.755), but not for diastolic blood pressure.

### CONCLUSION:

Our study shows that, among patients affected by cardiovascular disorders, osteopathic treatment is significantly associated to an improvement in intima-media and sys-

tolic blood pressure after one year. Multicentric randomized trials of adequate sample size are needed to evaluate the efficacy of OMT in the treatment of hypertension.

DOI: [10.1016/j.jbmt.2010.03.005](https://doi.org/10.1016/j.jbmt.2010.03.005) | PMID: 21147421



<https://www.ncbi.nlm.nih.gov/pubmed/21147421>

## Osteopathic manipulative treatment is effective on pain control associated to spinal cord injury.

Arienti C, Daccò S, Piccolo I, Redaelli T.

Spinal Cord. 2011 Apr;49(4):515-9. doi: 10.1038/sc.2010.170. Epub 2010 Dec 7.

### STUDY DESIGN:

This study was designed as an experimental study (trial).

### OBJECTIVES:

To verify the effects of the association between conventional pharmacological treatment and osteopathic manipulative treatment (OMT) for chronic pain management in spinal cord injury (SCI).

### SETTING:

This study was carried out at Spinal Unit, Ospedale Niguarda Ca' Granda, Milan, Italy. Istituto Superiore di Osteopatia, Milan, Italy.

### METHODS:

We enrolled 47 patients with SCI, 26 with pain of both nociceptive and neuropathic origin, and 21 with pure neuropathic pain. In all, 33 patients had a complete spinal cord lesion (ASIA level A) and 14 had incomplete lesion (ASIA level B, C and D). The patients were subdivided in a pharmacological group (Ph), a pharmacological osteopathic (PhO) group and a osteopathic (Os) group. The verbal numeric scale (VNS) was used at various time intervals to evaluate treatment outcomes.

### RESULTS:

Ph patients reached a 24% improvement in their pain perception, assessed by the VNS scale after 3 weeks of treatment, whereas Os patients reached a 16% improvement in their pain perception for the same weeks. Both treatments per se failed to induce further improvements at later time points. In contrast, the combination of the two approaches yielded a significantly better pain relief both in patients with nociceptive or pure neuropathic pain in the PhO group.

## CONCLUSIONS:

Our results suggest the OMT is a feasible approach in patients in whom available drugs cannot be used. Moreover, a benefit can be expected by the association of OMT in patients treated according to existing pharmacological protocols.

DOI: 10.1038/sc.2010.170 | PMID: 21135862

 <https://www.ncbi.nlm.nih.gov/pubmed/21135862>

## Effects of rib raising on the autonomic nervous system: a pilot study using noninvasive biomarkers.

Henderson AT, Fisher JF, Blair J, Shea C, Li TS, Bridges KG.

J Am Osteopath Assoc. 2010 Jun;110(6):324-30.

### CONTEXT:

Rib raising is an osteopathic manipulative treatment technique used to address restricted excursion of the rib cage and modulate sympathetic nervous system (SNS) activity. However, the physiologic effects of this technique have not been well documented.

### OBJECTIVE:

To investigate the effects of rib raising on the autonomic nervous system and the hypothalamic-pituitary-adrenal axis using noninvasive biomarkers.

### METHODS:

Changes in salivary biomarkers after rib raising were investigated using a pretest-posttest, placebo-controlled design. Healthy adult participants were recruited and randomly assigned to rib raising or placebo (light touch) groups. All participants provided baseline saliva samples and samples immediately and 10 minutes after receiving the rib raising or placebo procedure. Salivary flow rate, alpha-amylase activity, and cortisol levels were measured for each sample.

### RESULTS:

Twenty-three participants were recruited, of whom 14 completed the study (7 in each group). Subjects who received rib raising had a statistically significant decrease in alpha-amylase activity both immediately after ( $P=.014$ ) and 10 minutes after ( $P=.008$ ) the procedure. A statistically significant change in alpha-amylase activity was not seen in the placebo group at either time point. Changes in salivary cortisol levels and flow rate were not statistically significant in either group.

### CONCLUSIONS:

The results of the present pilot study suggest that SNS activity may decrease immedia-

tely after rib raising, but the hypothalamic-pituitary-adrenal axis and parasympathetic activity are not altered by this technique. Salivary alpha-amylase may be a useful biomarker for investigating manipulative treatments targeting the SNS. Additional studies with a greater number of subjects are needed to expand on these results.

PMID: 20606239



<https://www.ncbi.nlm.nih.gov/pubmed/20606239>

## Manipulative therapy and rehabilitation for recurrent ankle sprain with functional instability: a short-term, assessor-blind, parallel-group randomized trial.

Lubbe D, Lakhani E(2), Brantingham JW(3), Parkin-Smith GF(4), Cassa TK(5), Globe GA(6), Korporaal C(7).

J Manipulative Physiol Ther. 2015 Jan;38(1):22-34. doi: 10.1016/j.jmpt.2014.10.001. Epub 2014 Nov 6.

### OBJECTIVE:

The purpose of this study was to compare manipulative therapy (MT) plus rehabilitation to rehabilitation alone for recurrent ankle sprain with functional instability (RASFI) to determine short-term outcomes.

### METHODS:

This was an assessor-blind, parallel-group randomized comparative trial. Thirty-three eligible participants with RASFI were randomly allocated to receive rehabilitation alone or chiropractic MT plus rehabilitation. All participants undertook a daily rehabilitation program over the course of the 4-week treatment period. The participants receiving MT had 6 treatments over the same treatment period. The primary outcome measures were the Foot and Ankle Disability Index and the visual analogue pain scale, with the secondary outcome measure being joint motion palpation. Data were collected at baseline and during week 5. Missing scores were replaced using a multiple imputation method. Statistical analysis of the data composed of repeated-measures analysis of variance.

### RESULTS:

Between-group analysis demonstrated a difference in scores at the final consultation for the visual analogue scale and frequency of joint motion restrictions ( $P \leq .006$ ) but not for the Foot and Ankle Disability Index ( $P = .26$ ).

### CONCLUSIONS:

This study showed that the patients with RASFI who received chiropractic MT plus rehabilitation showed significant short-term reduction in pain and the number of joint res-

trictions in the short-term but not disability when compared with rehabilitation alone.

DOI: 10.1016/j.jmpt.2014.10.001 | PMID: 25457977

 <https://www.ncbi.nlm.nih.gov/pubmed/25457977>

## Effect of chiropractic manipulation on vertical jump height in young female athletes with talocrural joint dysfunction: a single-blind randomized clinical pilot trial.

Hedlund S, Nilsson H, Lenz M, Sundberg T.

J Manipulative Physiol Ther. 2014 Feb;37(2):116-23. doi: 10.1016/j.jmpt.2013.11.004. Epub 2014 Jan 2.

### OBJECTIVE:

The main objective of this pilot study was to explore the effect of chiropractic high-velocity, low-amplitude (HVLA) manipulation on vertical jump height in young female athletes with talocrural joint dysfunction.

### METHODS:

This was a randomized assessor-blind clinical pilot trial. Twenty-two female handball players with talocrural joint dysfunction were randomized to receive either HVLA manipulation (n = 11) or sham treatment (n = 11) once a week during a 3-week period. The main outcome was change in vertical jump height from baseline to follow-up within and between groups after 3 weeks.

### RESULTS:

Nineteen athletes completed the study. After 3 weeks, the group receiving HVLA manipulation (n = 11) had a statistically significant mean (SD) improvement in vertical jump height of 1.07 (1.23) cm (P = .017). The sham treatment group (n = 8) improved their vertical jump height by 0.59 (2.03) cm (P = .436). The between groups' change was 0.47 cm (95% confidence interval, -1.31 to 2.26; P = .571) in favor of the group receiving HVLA manipulation. Blinding and sham procedures were feasible, and there were no reported adverse events.

### CONCLUSION:

The results of this pilot study show that a larger-scale study is feasible. Preliminary results suggest that chiropractic HVLA manipulation may increase vertical jump height in young female athletes with talocrural joint dysfunction. However, the clinical result in

favor of HVLA manipulation compared with sham treatment needs statistical confirmation in a larger randomized clinical trial.

DOI: 10.1016/j.jmpt.2013.11.004 | PMID: 24387886



<https://www.ncbi.nlm.nih.gov/pubmed/24387886>

## Spinal manipulation does not affect pressure pain thresholds in the absence of neuromodulators: a randomized controlled trial

Jordon MK, Beattie PF, D'Urso S, Scriven S.

J Man Manip Ther. 2017 Sep;25(4):172-181. doi: 10.1080/10669817.2016.1230352. Epub 2016 Sep 12.

### BACKGROUND:

Measurement of pressure pain threshold (PPT) is a way to determine one of the many potential treatment effects of spinal manipulative therapy.

### OBJECTIVE:

To determine how multiple spinal manipulations administered in a single-session affected PPTs at local and distal sites in asymptomatic individuals.

### METHODS:

Participants were randomly assigned into one of three groups: Group one (n = 18) received a lumbar manipulation followed by a cervical manipulation. Group two (n = 17) received a cervical manipulation followed by a lumbar manipulation. The control group (n = 19) received two bouts of five minutes of rest. At baseline and after each intervention or rest period, each participant's PPTs were obtained using a handheld algometer. The PPTs were tested bilaterally over the lateral epicondyles of the humerus and over the mid-bellies of the upper trapezius, lumbar paraspinal, and the tibialis anterior muscles. This study was registered with ClinicalTrials.gov, and its Identifier is NCT02828501.

### RESULTS:

Repeated-measures ANOVAs and Kruskal-Wallis tests showed no significant within- or between-group differences in PPT. Within-group effect sizes in the changes of PPT ranged from -.48 at the left paraspinal muscles to .24 at the left lateral humeral epicondyle. Statistical power to detect significant differences at a of 0.05 was calculated to be 0.94.

### CONCLUSIONS:

This study suggests that in young adults who do not have current or recent symptoms

of spinal pain, multiple within-session treatments of cervical and lumbar spinal manipulation fail to influence PPTs. Changes in PPT that are observed in symptomatic individuals are likely to be primarily influenced by pain-related neuromodulators rather than by an isolated, mechanical effect of spinal manipulation.

DOI: 10.1080/10669817.2016.1230352 | PMID: 28912629 | PMCID: PMC5592341



<https://www.ncbi.nlm.nih.gov/pubmed/28912629>

## The immediate effects of manual stretching and cervicothoracic junction manipulation on cervical range of motion and upper trapezius pressure pain thresholds

Hanney WJ, Puentedura EJ, Kolber MJ, Liu X, Pabian PS, Cheatham SW

J Back Musculoskelet Rehabil. 2017 Sep 22;30(5):1005-1013. doi: 10.3233/BMR-169573.

### INTRODUCTION:

Myofascial pain is a common impairment treated with various manual interventions including spinal thrust manipulation and stretching; however, the comparative efficacy of each intervention is uncertain. Therefore, the purpose of this investigation was to evaluate thrust manipulation targeting the cervicothoracic junction compared to a manual stretch of the upper trapezius muscle on cervical range of motion and upper trapezius pressure pain thresholds (PPTs).

### METHODS:

Healthy participants with no significant history of neck pain were randomized into a thrust manipulation group, a stretching group, or a control group. Within group differences were evaluated via a dependent t-test, and group by time interactions were evaluated by a two-way repeated measures ANOVA.

### RESULTS:

One hundred and two participants were recruited to participate. Baseline demographics revealed no significant differences between groups. Significant group by time interactions were found for changes in PPTs for both the right and left upper trapezius. Also, significant differences were found for changes in cervical extension, as well as right and left cervical side bending favoring the treatment groups.

### DISCUSSION:

This study demonstrates the potential independent effectiveness of spinal thrust manipulation or stretching for reducing PPTs at the upper trapezius. Future research should further evaluate the limitation of PPTs as a measure of muscle sensitivity as well as fac-

tors that may contribute to variability in the measurements among individuals seeking care.

DOI: 10.3233/BMR-169573 | PMID: 28505955



<https://www.ncbi.nlm.nih.gov/pubmed/28505955>

## Changes in Muscle Spasticity in Patients With Cerebral Palsy After Spinal Manipulation: Case Series

Kachmar O, Voloshyn T, Hordiyevych M.

J Chiropr Med. 2016 Dec;15(4):299-304. Epub 2016 Sep 28.

### OBJECTIVE:

The purpose of this case series was to report quantitative changes in wrist muscle spasticity in children with cerebral palsy after 1 spinal manipulation (SM) and a 2-week course of treatment.

### METHODS:

Twenty-nine patients, aged 7 to 18 years, with spastic forms of cerebral palsy and without fixed contracture of the wrist, were evaluated before initiation of treatment, after 1 SM, and at the end of a 2-week course of treatment. Along with daily SM, the program included physical therapy, massage, reflexotherapy, extremity joint mobilization, mechanotherapy, and rehabilitation computer games for 3 to 4 hours' duration. Spasticity of the wrist flexor was measured quantitatively using a Neuroflexor device, which calculates the neural component (NC) of muscle tone, representing true spasticity, and excluding nonneural components, caused by altered muscle properties: elasticity and viscosity.

### RESULTS:

Substantial decrease in spasticity was noted in all patient groups after SM. The average NC values decreased by 1.65 newtons (from 7.6 +/- 6.2 to 5.9 +/- 6.5) after 1 SM. Another slight decrease of 0.5 newtons was noted after a 2-week course of treatment. In the group of patients with minimal spasticity, the decrease in NC after the first SM was almost twofold—from 3.93 +/- 2.9 to 2.01 +/- 1.0. In cases of moderate spasticity, NC reduction was noted only after the 2-week course of intensive treatment.

### CONCLUSIONS:

In this sample of patients with cerebral palsy, a decrease in wrist muscle spasticity was

noted after SM. Spasticity reduction was potentiated during the 2-week course of treatment.

DOI: 10.1016/j.jcm.2016.07.003 | PMID: 27857638 | PMCID: PMC5106424

 <https://www.ncbi.nlm.nih.gov/pubmed/27857638>

## The effect of manipulation plus massage therapy versus massage therapy alone in people with tension-type headache. A randomized controlled clinical trial

Espí-López GV, Zurriaga-Llorens R, Monzani L, Falla D.

Eur J Phys Rehabil Med. 2016 Oct;52(5):606-617. Epub 2016 Mar 18.

### BACKGROUND:

Manipulative techniques have shown promising results for relief of tension-type headache (TTH), however prior studies either lacked a control group, or suffered from poor methodological quality. The aim of this study was to compare the effect of spinal manipulation combined with massage versus massage alone on range of motion of the cervical spine, headache frequency, intensity and disability in patients with TTH.

### DESIGN:

Randomized, single-blinded, controlled clinical trial.

### SETTING:

University clinic.

### POPULATION:

We enrolled 105 subjects with TTH.

### METHODS:

Participants were divided into two groups: 1) manipulation and massage; 2) massage only (control). Four treatment sessions were applied over four weeks. The Headache Disability Inventory (HDI) and range of upper cervical and cervical motion were evaluated at baseline, immediately after the intervention and at a follow-up, 8 weeks after completing the intervention.

### RESULTS:

Both groups demonstrated a large ( $f=1.22$ ) improvement on their HDI scores. Those that received manipulation reported a medium-sized reduction ( $f=0.33$ ) in headache

frequency across all data points ( $P < 0.05$ ) compared to the control group. Both groups showed a large within-subject effect for upper cervical extension ( $f = 0.62$ ), a medium-sized effect for cervical extension ( $f = 0.39$ ), and large effects for upper cervical ( $f = 1.00$ ) and cervical ( $f = 0.27$ ) flexion. The addition of manipulation resulted in larger gains of upper cervical flexion range of motion, and this difference remained stable at the follow-up.

## CONCLUSIONS:

These findings support the benefit of treating TTH with either massage or massage combined with a manipulative technique. However, the addition of manipulative technique was more effective for increasing range of motion of the upper cervical spine and for reducing the impact of headache.

PMID: 26989818



<https://www.ncbi.nlm.nih.gov/pubmed/26989818>

## Manual and instrument applied cervical manipulation for mechanical neck pain: a randomized controlled trial

Gorrell LM, Beath K, Engel RM.

J Manipulative Physiol Ther. 2016 Jun;39(5):319-329. doi: 10.1016/j.jmpt.2016.03.003. Epub 2016 May 12.

### OBJECTIVE:

The purpose of this study was to compare the effects of 2 different cervical manipulation techniques for mechanical neck pain (MNP).

### METHODS:

Participants with MNP of at least 1 month's duration (n = 65) were randomly allocated to 3 groups: stretching (control), (2) stretching plus manually applied manipulation (MAM), and (3) stretching plus instrument-applied manipulation (IAM). MAM consisted of a single high-velocity, low-amplitude cervical chiropractic manipulation, whereas IAM involved the application of a single cervical manipulation using an (Activator IV) adjusting instrument. Preintervention and postintervention measurements were taken of all outcomes measures. Pain was the primary outcome and was measured using visual analogue scale and pressure pain thresholds. Secondary outcomes included cervical range of motion, hand grip-strength, and wrist blood pressure. Follow-up subjective pain scores were obtained via telephone text message 7 days postintervention.

### RESULTS:

Subjective pain scores decreased at 7-day follow-up in the MAM group compared with control (P = .015). Cervical rotation bilaterally (ipsilateral: P = .002; contralateral: P = .015) and lateral flexion on the contralateral side to manipulation (P = .001) increased following MAM. Hand grip-strength on the contralateral side to manipulation (P = .013) increased following IAM. No moderate or severe adverse events were reported. Mild adverse events were reported on 6 occasions (control, 4; MAM, 1; IAM, 1).

### CONCLUSION:

This study demonstrates that a single cervical manipulation is capable of producing

immediate and short-term benefits for MNP. The study also demonstrates that not all manipulative techniques have the same effect and that the differences may be mediated by neurological or biomechanical factors inherent to each technique.

DOI: 10.1016/j.jmpt.2016.03.003 | PMID: 27180949

 <https://www.ncbi.nlm.nih.gov/pubmed/27180949>

## Effect of spinal manipulation on pelvic floor functional changes in pregnant and nonpregnant women: a preliminary study

Haavik H, Murphy BA, Kruger J.

J Manipulative Physiol Ther. 2016 Jun;39(5):339-347. doi: 10.1016/j.jmpt.2016.04.004. Epub 2016 May 6.

### OBJECTIVE:

The aim of this study was to investigate whether a single session of spinal manipulation of pregnant women can alter pelvic floor muscle function as measured using ultrasonographic imaging.

### METHODS:

In this preliminary, prospective, comparative study, transperineal ultrasonographic imaging was used to assess pelvic floor anatomy and function in 11 primigravid women in their second trimester recruited via notice boards at obstetric caregivers, pregnancy keep-fit classes, and word of mouth and 15 nulliparous women recruited from a convenience sample of female students at the New Zealand College of Chiropractic. Following bladder voiding, 3-/4-dimensional transperineal ultrasonography was performed on all participants in the supine position. Levator hiatal area measurements at rest, on maximal pelvic floor contraction, and during maximum Valsalva maneuver were collected before and after either spinal manipulation or a control intervention.

### RESULTS:

Levator hiatal area at rest increased significantly ( $P < .05$ ) after spinal manipulation in the pregnant women, with no change postmanipulation in the nonpregnant women at rest or in any of the other measured parameters.

### CONCLUSION:

Spinal manipulation of pregnant women in their second trimester increased the levator hiatal area at rest and thus appears to relax the pelvic floor muscles. This did not occur in the nonpregnant control participants, suggesting that it may be pregnancy related.

DOI: 10.1016/j.jmpt.2016.04.004 | PMID: 27157677



<https://www.ncbi.nlm.nih.gov/pubmed/27157677>

## Symptomatic, magnetic resonance imaging-confirmed cervical disk herniation patients: a comparative-effectiveness prospective observational study of 2 age- and sex-matched cohorts treated with either imaging-guided indirect cervical nerve root injections or spinal manipulative therapy

Peterson CK, Pfirrmann CW, Hodler J, Leemann S, Schmid C, Anklin B, Humphreys BK.

J Manipulative Physiol Ther. 2016 Mar-Apr;39(3):210-7. doi: 10.1016/j.jmpt.2016.02.004. Epub 2016 Mar 31.

### OBJECTIVE:

The purpose of this study was to compare the outcomes of overall improvement, pain reduction, and treatment costs in matched patients with symptomatic, magnetic resonance imaging-confirmed cervical disk herniations treated with either spinal manipulative therapy (SMT) or imaging-guided cervical nerve root injection blocks (CNRI).

### METHODS:

This prospective cohort comparative-effectiveness study included 104 patients with magnetic resonance imaging-confirmed symptomatic cervical disk herniation. Fifty-two patients treated with CNRI were age and sex matched with 52 patients treated with SMT. Baseline numerical rating scale (NRS) pain data were collected. Three months after treatment, NRS pain levels were recorded and overall "improvement" was assessed using the Patient Global Impression of Change scale. Only responses "much better" or "better" were considered "improved." The proportion of patients "improved" was calculated for each treatment method and compared using the  $\chi^2$  test. The NRS and NRS change scores for the 2 groups were compared at baseline and 3 months using the unpaired t test. Acute and subacute/chronic patients in the 2 groups were compared for "improvement" using the  $\chi^2$  test.

### RESULTS:

"Improvement" was reported in 86.5% of SMT patients and 49.0% of CNRI patients ( $P=.0001$ ). Significantly more CNRI patients were in the subacute/chronic category (77%) compared with SMT patients (46%). A significant difference between the proportion of subacute/chronic CNRI patients (37.5%) and SMT patients (78.3%) reporting "improvement" was noted ( $P=.002$ ).

## CONCLUSION:

Subacute/chronic patients treated with SMT were significantly more likely to report relevant "improvement" compared with CNRI patients. There was no difference in outcomes when comparing acute patients only.

DOI: 10.1016/j.jmpt.2016.02.004 | PMID: 27040033



<https://www.ncbi.nlm.nih.gov/pubmed/27040033>

## Effect of thoracic manipulation and deep craniocervical flexor training on pain, mobility, strength, and disability of the neck of patients with chronic nonspecific neck pain: a randomized clinical trial

Lee KW, Kim WH.

J Phys Ther Sci. 2016 Jan;28(1):175-80. doi: 10.1589/jpts.28.175. Epub 2016 Jan 30.

### PURPOSE

To investigate the effects of thoracic manipulation and deep craniocervical flexor training on the muscle strength and endurance, range of motion, and the disability index of the neck of patients with chronic nonspecific neck pain.

### SUBJECTS AND METHODS

Forty-six patients with chronic neck pain participated. They received an intervention for 35 minutes a day, three times a week for 10 weeks. Subjects were randomly assigned to one control and two experimental groups: group A (thoracic manipulation combined with deep craniocervical flexor training, n=16), group B (deep craniocervical flexor training, n=15), and group C (active self-exercise as a control group, n=15). Muscle strength and endurance, pain, neck disability index, and range of motion of the cervical and thoracic spine were measured before and after the intervention.

### RESULTS

Group A showed significant increases in muscle strength, endurance, and cervical and thoracic range of motion, and significant decreases in the pain and neck disability index, compared with groups B and C.

### CONCLUSION

Although deep craniocervical flexor training is effective at improving neck function, thoracic manipulation combined with deep craniocervical flexor training was a more effective intervention for pain relief and improving the range of motion, muscle function, and neck disability of patients with nonspecific chronic neck pain.

DOI: 10.1589/jpts.28.175 | PMID: 26957752 | PMCID: PMC4755998



<https://www.ncbi.nlm.nih.gov/pubmed/26957752>

## Attenuation effect of spinal manipulation on neuropathic and postoperative pain through activating endogenous anti-inflammatory cytokine interleukin 10 in rat spinal cord

Song XJ, Huang ZJ, Song WB, Song XS, Fuhr AF, Rosner AL, Ndtan H, Rupert RL.

J Manipulative Physiol Ther. 2016 Jan;39(1):42-53. doi: 10.1016/j.jmpt.2015.12.004. Epub 2016 Feb 1.

### OBJECTIVES:

The purpose of this study was to investigate roles of the anti-inflammatory cytokine interleukin (IL) 10 and the proinflammatory cytokines IL-1 beta and tumor necrosis factor alpha (TNF-alpha) in spinal manipulation-induced analgesic effects of neuropathic and postoperative pain.

### METHODS:

Neuropathic and postoperative pain were mimicked by chronic compression of dorsal root ganglion (DRG) (CCD) and decompression (de-CCD) in adult, male, Sprague-Dawley rats. Behavioral pain after CCD and de-CCD was determined by the increased thermal and mechanical hypersensitivity of the affected hindpaw. Hematoxylin and eosin staining, whole-cell patch clamp electrophysiological recordings, immunohistochemistry, and enzyme-linked immunosorbent assay were used to examine the neural inflammation, neural excitability, and expression of c-Fos and PKC as well as levels of IL-1 beta, TNF-alpha, and IL-10 in blood plasma, DRG, or the spinal cord. We used the activator adjusting instrument, a chiropractic spinal manipulative therapy tool, to deliver force to the spinous processes of L-5 and L-6.

### RESULTS:

After CCD and de-CCD treatments, the animals exhibited behavioral and neurochemical signs of neuropathic pain manifested as mechanical allodynia and thermal hyperalgesia, DRG inflammation, DRG neuron hyperexcitability, induction of c-Fos, and the increased expression of PKC. in the spinal cord as well as increased level of IL-1 beta and TNF-alpha in DRG and the spinal cord. Repetitive Activator-assisted spinal manipulative therapy significantly reduced simulated neuropathic and postoperative pain, inhibited

or reversed the neurochemical alterations, and increased the anti-inflammatory IL-10 in the spinal cord.

## CONCLUSION:

These findings show that spinal manipulation may activate the endogenous anti-inflammatory cytokine IL-10 in the spinal cord and thus has the potential to alleviate neuropathic and postoperative pain.

DOI: 10.1016/j.jmpt.2015.12.004 | PMID: 26837229



<https://www.ncbi.nlm.nih.gov/pubmed/26837229>

## Internal carotid artery strains during high-speed, low-amplitude spinal manipulations of the neck

Herzog W, Tang C, Leonard T.

JManipulativePhysiolTher.2015Nov-Dec;38(9):664-671.doi:10.1016/j.jmpt.2012.09.005.  
Epub 2012 Nov 6.

### OBJECTIVE:

The primary objective of this study was to quantify the strains applied to the internal carotid artery (ICA) during neck spinal manipulative treatments and range of motion (ROM)/diagnostic testing of the head and neck.

### METHODS:

Strains of the ICA (n = 12) were measured in 6 fresh, unembalmed cadaveric specimens using sonomicrometry. Peak and average strains of the ICA obtained during cervical spinal manipulations given by experienced doctors of chiropractic were compared with the corresponding strains obtained during ROM and diagnostic testing of the head and neck.

### RESULTS:

Peak and average strains of the ICA for cervical spinal manipulative treatments were significantly smaller ( $P < .001$ ) than the corresponding strains obtained for the ROM and diagnostic testing. All strains during ROM and treatment testing were dramatically smaller than the initial failure strains of the ICA.

### CONCLUSIONS:

This study showed that maximal ICA strains imparted by cervical spinal manipulative treatments were well within the normal ROM. Chiropractic manipulation of the neck did not cause strains to the ICA in excess of those experienced during normal everyday movements. Therefore, cervical spinal manipulative therapy as performed by the trained clinicians in this study, did not appear to place undue strain on the ICA and thus does not seem to be a factor in ICA injuries.

DOI: 10.1016/j.jmpt.2012.09.005 | PMID: 23140796



<https://www.ncbi.nlm.nih.gov/pubmed/23140796>

## Adverse events due to chiropractic and other manual therapies for infants and children: a review of the literature

Todd AJ, Carroll MT, Robinson A, Mitchell EKL

JManipulativePhysiolTher.2015Nov-Dec;38(9):699-712.doi:10.1016/j.jmpt.2014.09.008.  
Epub 2014 Oct 30.

### OBJECTIVE:

The purpose of this study was to review the literature for cases of adverse events in infants and children treated by chiropractors or other manual therapists, identifying treatment type and if a preexisting pathology was present.

### METHOD:

English language, peer-reviewed journals and non-peer-reviewed case reports discussing adverse events (ranging from minor to serious) were systematically searched from inception of the relevant searchable bibliographic databases through March 2014. Articles not referring to infants or children were excluded.

### RESULTS:

Thirty-one articles met the selection criteria. A total of 12 articles reporting 15 serious adverse events were found. Three deaths occurred under the care of various providers (1 physical therapist, 1 unknown practitioner, and 1 craniosacral therapist) and 12 serious injuries were reported (7 chiropractors/doctors of chiropractic, 1 medical practitioner, 1 osteopath, 2 physical therapists, and 1 unknown practitioner). High-velocity, extension, and rotational spinal manipulation was reported in most cases, with 1 case involving forcibly applied craniosacral dural tension and another involving use of an adjusting instrument. Underlying preexisting pathology was identified in a majority of the cases.

### CONCLUSION:

Published cases of serious adverse events in infants and children receiving chiropractic, osteopathic, physiotherapy, or manual medical therapy are rare. The 3 deaths that have been reported were associated with various manual therapists; however, no deaths associated with chiropractic care were found in the literature to date. Because

underlying preexisting pathology was associated in a majority of reported cases, performing a thorough history and examination to exclude anatomical or neurologic anomalies before applying any manual therapy may further reduce adverse events across all manual therapy professions.

DOI: 10.1016/j.jmpt.2014.09.008 | PMID: 25439034

 <https://www.ncbi.nlm.nih.gov/pubmed/25439034>

## Changes in shoulder pain and disability after thrust manipulation in subjects presenting with second and third rib syndrome

Dunning J, Mourad F, Giovannico G, Maselli F, Perreault T, Fernández-de-Las-Peñas C.

J Manipulative Physiol Ther. 2015 Jul-Aug;38(6):382-94. doi: 10.1016/j.jmpt.2015.06.008. Epub 2015 Aug 5.

### OBJECTIVE:

The purpose of this preliminary study was to investigate changes in shoulder pain, disability, and perceived level of recovery after 2 sessions of upper thoracic and upper rib high-velocity low-amplitude (HVLA) thrust manipulation in patients with shoulder pain secondary to second and third rib syndrome.

### METHODS:

This exploratory study evaluated 10 consecutive individuals with shoulder pain, with or without brachial pain, and a negative Neer impingement test, who completed the Shoulder Pain and Disability Index (SPADI), the numeric pain rating scale (NPRS), and the global rating of change. Patients received 2 sessions of HVLA thrust manipulation targeting the upper thoracic spine bilaterally and the second and third ribs on the symptomatic side. Outcome measures were completed after the first treatment session, at 48 hours, 1 month, and 3 months.

### RESULTS:

Patients showed a significant decrease in SPADI ( $F = 59.997$ ;  $P = .001$ ) and significant decrease in resting shoulder NPRS ( $F = 63.439$ ;  $P = .001$ ). For both NPRS and SPADI, there were significant differences between the pretreatment scores and each of the postintervention scores through 3-month follow-up ( $P < .05$ ). Large within-group effect sizes (Cohen's  $d \geq 0.8$ ) were found between preintervention data and all postintervention assessments in both outcomes. Mean global rating of change scores (+6.8 at 3 months) indicated "a very great deal better" outcome at long-term follow-up.

### CONCLUSION:

This group of patients with shoulder pain secondary to second and third rib syndrome

who received upper thoracic and upper rib HVLA thrust manipulations showed significant reductions in pain and disability and improvement in perceived level of recovery.

DOI: 10.1016/j.jmpt.2015.06.008 | PMID: 26254852



<https://www.ncbi.nlm.nih.gov/pubmed/26254852>

## The effect of end-range cervical rotation on vertebral and internal carotid arterial blood flow and cerebral inflow: A sub analysis of an MRI study

Thomas LC, McLeod LR, Osmotherly PG, Rivett DA

Man Ther. 2015 Jun;20(3):475-80. doi: 10.1016/j.math.2014.11.012. Epub 2014 Nov 29.

### INTRODUCTION:

Cervical spine manual therapy has been associated with a small risk of serious adverse neurovascular events, particularly to the vertebral arteries. Sustained end-range rotation is recommended clinically as a pre-manipulative screening tool; however ultrasound studies have yielded conflicting results about the effect of rotation on blood flow in the vertebral arteries. There has been little research on internal carotid arterial flow or utilising the reference standard of angiography.

### OBJECTIVES:

To evaluate the mean effect of cervical rotation on blood flow in the craniocervical arteries and blood supply to the brain, as well as individual variation.

### DESIGN:

This was an observational study.

### METHOD:

Magnetic resonance angiography was used to measure average blood flow volume in the vertebral arteries, internal carotid arteries, and total cerebral inflow, in three neck positions: neutral, end-range left rotation and end-range right rotation in healthy adults.

### RESULTS:

Twenty participants were evaluated. There was a decrease in average blood flow volume in the vertebral and internal carotid arteries on contralateral rotation, compared to neutral. This was statistically significant on left rotation only. Ipsilateral rotation had no effect on average blood flow volume in any artery. Total cerebral inflow was not significantly affected by rotation in either direction.

## CONCLUSIONS:

It appears that in healthy adults the cerebral vasculature can compensate for decreased flow in one or more arteries by increasing flow in other arteries, to maintain cerebral perfusion. Sustained end-range rotation may therefore reflect the compensatory capacity of the system as a whole rather than isolated vertebrobasilar function. (C) 2014 Elsevier Ltd. All rights reserved.

DOI: 10.1016/j.math.2014.11.012 | PMID: 25529191



<https://www.ncbi.nlm.nih.gov/pubmed/25529191>

## Effects of Upper and Lower Cervical Spinal Manipulative Therapy on Blood Pressure and Heart Rate Variability in Volunteers and Patients With Neck Pain: A Randomized Controlled, Cross-Over, Preliminary Study

Win NN, Jorgensen AMS, Chen YS, Haneline MT.

Journal of Chiropractic Medicine. Volume 14, Issue 1, March 2015, Pages 1-9

### OBJECTIVE:

The aims of this study were to examine autonomic nervous system responses by using heart rate variability analysis (HRV), hemodynamic parameters and numeric pain scale (NPS) when either upper (C1 and C2) or lower (C6 and C7) cervical segments were manipulated in volunteers, and whether such response would be altered in acute mechanical neck pain patients after spinal manipulative therapy (SMT).

### METHODS:

A randomized controlled, cross-over, preliminary study was conducted on 10 asymptomatic normotensive volunteers and 10 normotensive patients complaining of acute neck pain. HRV, blood pressure (BP) and heart rate (HR), and NPS were recorded after upper cervical and lower cervical segments SMT in volunteer and patient groups.

### RESULTS:

The standard deviation of average normal to normal R-R intervals (SDNN) increased (83.54 +/- 22 vs. 105.41 +/- 20; P =.02) after upper cervical SMT. The normalized unit of high frequency (nuHF), which shows parasympathetic activity, was predominant (40.18 +/- 9 vs. 46.08 +/- 14) after upper cervical SMT (P =.03) with a significant decrease (109 +/- 10 vs. 98 +/- 5) in systolic BP (P =.002). Low frequency to high frequency (LF/HF) ratio, which shows predominance of sympathetic activity increased (1.05 +/- 0.7 vs. 1.51 +/- 0.5; P =.02) after lower cervical SMT in the healthy volunteers group. However, there was an increase in SDNN (70.48 +/- 18 vs. 90.23 +/- 20; P =.02 and 75.19 +/- 16 vs 97.52 +/- 22; P =.01), a decrease in LF/ HF ratio (1.33 +/- 0.3 vs. 0.81 +/- 0.2; P =.001 and 1.22 +/- 0.4 vs. 0.86 +/- 0.3; P =.02), which was associated with decreased systolic BP (105 +/- 10 vs. 95 +/- 9; P =.01 and 102 +/- 9 vs. 91 +/- 10; P =.02) and NPS scores (3 +/- 1 vs. 0; P =.01 and 3 +/- 1 vs. 1 +/- 1; P =.03) following both upper and lower cervical SMT in the

patient's group. The baseline HR was 67 +/- 9 vs 64 +/- 5 (upper cervical) and 65 +/- 7 vs 69 +/- 11 (lower cervical) in both the healthy volunteer' and patient' groups.

## CONCLUSION:

Upper cervical SMT enhances dominance of parasympathetic and lower cervical SMT enhances dominance of sympathetic activity in this young volunteer group. However, dominance of parasympathetic activity was found in patients with neck pain that received both upper and lower cervical SMT. (C) 2015 National University of Health Sciences.

DOI: 10.1016/j.jcm.2014.12.005



<https://www.sciencedirect.com/science/article/abs/pii/S1556370714001710>

## Chiropractic Management of Infantile Torticollis With Associated Abnormal Fixation of One Eye: A Case Report

Siegenthaler MH.

J Chiropr Med. 2015 Mar;14(1):51-6. doi: 10.1016/j.jcm.2014.12.003. Epub 2015 Feb 20.

### OBJECTIVE:

The purpose of this case report is to describe the chiropractic management of a child with abnormal fixation of one eye and torticollis.

### CLINICAL FEATURES:

A mother presented with a concern regarding her 23-month-old son who had a history of torticollis and an abnormal fixation of the right eye. She noticed the head tilt when he was about 7 months old and abnormal alignment of the right eye when the boy was 18 months old. At 15 months when he took his first steps, his head tilt became worse. At 21 months old, a neurological and orthopedic examination at the regional university children`s hospital ruled out presence of a tumor of the cervical spine or posterior fossa. The orthopedist sent the baby for chiropractic evaluation and treatment. Chiropractic exam found decreased active and passive range of motion in the cervical spine and no evidence of mass or contracture of the sternocleidomastoid muscle. Segmental palpation showed a decreased joint play and pain reaction at level C1/C2 on the right.

### INTERVENTION AND OUTCOME:

The chiropractic treatment consisted of spinal manipulative therapy of the cervical spine in addition to massage and stretching of the neck muscles. Within a period of 4 weeks (3 chiropractic treatments) the torticollis was nearly resolved and the abnormal fixation of the right eye was no longer apparent. No relapse of the symptomatology was observed at a follow-up consultation at 26 months.

### CONCLUSION:

The patient responded favorably to chiropractic care, showing a possible mechanical spinal cause for his torticollis and for the secondarily developed abnormal fixation of the right eye. (C) 2015 National University of Health Sciences.

DOI: 10.1016/j.jcm.2014.12.003 | PMID: 26693217 | PMCID: PMC4371108



<https://www.ncbi.nlm.nih.gov/pubmed/26693217>

## Risk of stroke after chiropractic spinal manipulation in medicare b beneficiaries aged 66 to 99 years with neck pain

Whedon JM, Song Y, Mackenzie TA, Phillips RB, Lukovits TG, Lurie JD.

J Manipulative Physiol Ther. 2015 Feb;38(2):93-101. doi: 10.1016/j.jmpt.2014.12.001. Epub 2015 Jan 14.

### OBJECTIVE:

The purpose of this study was to quantify risk of stroke after chiropractic spinal manipulation, as compared to evaluation by a primary care physician, for Medicare beneficiaries aged 66 to 99 years with neck pain.

### METHODS:

This is a retrospective cohort analysis of a 100% sample of annualized Medicare claims data on 1 157 475 beneficiaries aged 66 to 99 years with an office visit to either a chiropractor or primary care physician for neck pain. We compared hazard of vertebral stroke and any stroke at 7 and 30 days after office visit using a Cox proportional hazards model. We used direct adjusted survival curves to estimate cumulative probability of stroke up to 30 days for the 2 cohorts.

### RESULTS:

The proportion of subjects with stroke of any type in the chiropractic cohort was 1.2 per 1000 at 7 days and 5.1 per 1000 at 30 days. In the primary care cohort, the proportion of subjects with stroke of any type was 1.4 per 1000 at 7 days and 2.8 per 1000 at 30 days. In the chiropractic cohort, the adjusted risk of stroke was significantly lower at 7 days as compared to the primary care cohort (hazard ratio, 0.39; 95% confidence interval, 0.33-0.45), but at 30 days, a slight elevation in risk was observed for the chiropractic cohort (hazard ratio, 1.10; 95% confidence interval, 1.01-1.19).

### CONCLUSIONS:

Among Medicare B beneficiaries aged 66 to 99 years with neck pain, incidence of vertebral stroke was extremely low. Small differences in risk between patients who

saw a chiropractor and those who saw a primary care physician are probably not clinically significant.

DOI: 10.1016/j.jmpt.2014.12.001 | PMID: 25596875 | PMCID: PMC4336806



<https://www.ncbi.nlm.nih.gov/pubmed/25596875>

## Short-term effects of thoracic spinal manipulations and message conveyed by clinicians to patients with musculoskeletal shoulder symptoms: a randomized clinical trial

Riley SP, Cote MP, Leger RR, Swanson BT, Tafuto V, Sizer PS, Brismée JM.

J Man Manip Ther. 2015 Feb;23(1):3-11. doi: 10.1179/2042618613Y.0000000066.

### OBJECTIVES:

To evaluate the effects of high-velocity, low-amplitude thrust manipulations (HVLATMs) and various messages on patients with musculoskeletal shoulder symptoms.

### BACKGROUND:

Previous studies indicated that HVLATM directed at the thoracic spine and ribs resulted in improvements of shoulder range of motion, pain, and disability in patients with musculoskeletal shoulder symptoms. These studies did not explore if the outcome was dependent on thrust location, clinician communication with the patient, or if there were any lasting effects.

### METHODS:

A consecutive sample of 100 patients with shoulder pain was randomized into four groups. Patients received one intervention session including: six thoracic HVLATM (spine versus scapula), a message about HVLATM (neutral versus positive), and standardized home exercises. Outcome measures included shoulder Numeric Pain Rating Scale (NPRS), NPRS with impingement testing, and Shoulder Pain and Disability Index (SPADI). Measurements were recorded prior to intervention, immediately following intervention, and at short-term follow-up. Kruskal-Wallis statistics were used for between-group comparisons and Wilcoxon signed ranks for within-group comparisons.

### RESULTS:

Eighty-eight patients (22 per group) completed the study. Statistically significant differences were found for within-group comparisons for most time points assessed. No statistical differences were found for between-group comparisons.

## CONCLUSION:

Patients improved following the interventions. Neither the type of HVLATM nor the message conveyed to the patients had a significant effect on the patients' improvements.

DOI: 10.1179/2042618613Y.0000000066 | PMID: 26309376 | PMCID: PMC4459141



<https://www.ncbi.nlm.nih.gov/pubmed/26309376>

## Immediate effects of upper thoracic spine manipulation on hypertensive individuals

Ward J, Tyer K, Coats J, Williams G, Kulcak K.

J Man Manip Ther. 2015 Feb;23(1):43-50. doi: 10.1179/1066981714Z.000000000106.

### PURPOSE:

The aims of this study were to determine if there were any statistically significant immediate effects of upper thoracic spinal manipulative therapy (SMT) on cardiovascular physiology in hypertensive individuals.

### INTRODUCTION:

Preliminary research suggests that SMT to various regions of the spine may be capable of lowering systolic and diastolic blood pressure in hypertensive individuals. Further studies are warranted to corroborate or refute these findings as well as measure how other attributes of cardiovascular physiology are impacted by SMT.

### METHODS:

Fifty hypertensive participants (age=45.5 +/- 13.9 years, height=1.69 +/- 0.10 m, body mass=93.9 +/- 21.5 kg: mean +/- standard deviation (SD)) were equally randomized into a single-blind, controlled trial involving two study groups: supine diversified anterior upper thoracic SMT of T1-4, or a 'no T-spine contact' control. Outcome measures were electrocardiogram, bilateral pulse oximetry, and bilateral blood pressure measurement performed at baseline, post 1-minute intervention, and post 10-minute intervention. An independent samples t-test was used to compare between-group differences at baseline. A repeated measures ANOVA was used to compare within-group changes over time.

### RESULTS:

Within-group changes in PR interval and QRS duration demonstrated that the atria were transiently less active post-SMT and the ventricles were more active post-SMT, however the changes were clinically minimal.

## CONCLUSION:

The results of this study, and the limited existing normotensive, thoracic-specific SMT research in this field, suggest that cardiovascular physiology, short-term, is not affected by upper thoracic spine SMT in hypertensive individuals to a clinically relevant level.

DOI: 10.1179/1066981714Z.000000000106 | PMID: 26309381 | PMCID: PMC4459143



<https://www.ncbi.nlm.nih.gov/pubmed/26309381>

## Quantifying strain in the vertebral artery with simultaneous motion analysis of the head and neck: A preliminary investigation

Piper SL, Howarth SJ, Triano J, Herzog W.

Clin Biomech (Bristol, Avon). 2014 Dec;29(10):1099-107. doi: 10.1016/j.clinbiomech.2014.10.004. Epub 2014 Oct 23.

### BACKGROUND:

Spontaneous vertebral artery dissection has significant mortality and morbidity among young adults. Unfortunately, causal mechanisms remain unclear.

The purpose of this study was to quantify mechanical strain in the vertebral artery while simultaneously capturing motion analysis data during passive movements of the head and neck relative to the trunk during spinal manipulation and cardinal planes of motion.

### METHODS:

Eight piezoelectric crystals (four per vertebral artery) were sutured into the lumen of the left and right vertebral arteries of 3 cadaveric specimens. Strain was then calculated as changes in length between neighboring crystals from a neutral head/neck reference position using ultrasound pulses. Simultaneously, passive motion of the head and neck on the trunk was captured using eight infrared cameras. The instantaneous strain arising in the vertebral artery was correlated with the relative changes in head position.

### FINDINGS:

Strain in the contralateral vertebral artery during passive flexion-rotation compared to that of extension-rotation is variable ([df = 32]:  $-0.61 < r < 0.55$ ). Peak strain does not coincide with peak angular displacement during spinal manipulation and cardinal planes of motion. Axial rotation displayed the greatest amount of strain. The greatest amount of strain achieved during spinal manipulation was comparably lower than strains achieved during passive end range motions and previously reported failure limits.

### INTERPRETATION:

The results of this study suggest that vertebral artery strains during head movements including spinal manipulation, do not exceed published failure strains. This study provides new evidence that peak strain in the vertebral artery may not occur at the end range of motion, but rather at some intermediate point during the head and neck motion.

DOI: 10.1016/j.clinbiomech.2014.10.004 | PMID: 25457973

 <https://www.ncbi.nlm.nih.gov/pubmed/25457973>

## Immediate effects of spinal manipulation on nitric oxide, substance P and pain perception

Molina-Ortega F, Lomas-Vega R, Hita-Contreras F, Plaza Manzano G, Achalandabaso A, Ramos-Morcillo AJ, Martínez-Amat A

Man Ther. 2014 Oct;19(5):411-7. doi: 10.1016/j.math.2014.02.007. Epub 2014 Mar 5.

### ABSTRACT

Previous studies have analyzed the effects of spinal manipulation on pain sensitivity by using several sensory modalities, but to our knowledge, no studies have focused on serum biomarkers involved in the nociceptive pathway after spinal manipulation. Our objectives were to determine the immediate effect of cervical and dorsal manipulation over the production of nitric oxide and substance P, and establishing their relationship with changes in pressure pain thresholds in asymptomatic subjects. In this single-blind randomized controlled trial, 30 asymptomatic subjects (16 men) were randomly distributed into 3 groups (n = 10 per group): control, cervical and dorsal manipulation groups. Blood samples were extracted to obtain serum. ELISA assay for substance P and chemiluminescence analysis for nitric oxide determination were performed. Pressure pain thresholds were measured with a pressure algometer at the C5-C6 joint, the lateral epicondyle and the tibialis anterior muscle. Outcome measures were obtained before intervention, just after intervention and 2 h after intervention. Our results indicated an increase in substance P plasma level in the cervical manipulation group (70.55%) when compared with other groups ( $p < 0.05$ ). This group also showed an elevation in the pressure pain threshold at C5eC6 (26.75%) and lateral epicondyle level (21.63%) immediately after the intervention ( $p < 0.05$ ). No changes in nitric oxide production were observed. In conclusion, mechanical stimulus provided by cervical manipulation increases substance P levels and pressure pain threshold but does not change nitric oxide concentrations. Part of the hypoalgesic effect of spinal manipulation may be due to the action of substance P. (C) 2014 Elsevier Ltd. All rights reserved.

DOI: 10.1016/j.math.2014.02.007 | PMID: 24674816



<https://www.ncbi.nlm.nih.gov/pubmed/24674816>

## Changes in vertebral artery blood flow following various head positions and cervical spine manipulation

Quesnele JJ, Triano JJ, Noseworthy MD, Wells GD.

J Manipulative Physiol Ther. 2014 Jan;37(1):22-31. doi: 10.1016/j.jmpt.2013.07.008. Epub 2013 Nov 15.

### OBJECTIVE:

The objective of the study was to investigate the cerebrovascular hemodynamic response of cervical spine positions including rotation and cervical spine manipulation in vivo using magnetic resonance imaging technology on the vertebral artery (VA).

### METHODS:

This pilot study was conducted as a blinded examiner cohort with 4 randomized clinical tasks. Ten healthy male participants aged 24 to 30 years (mean, 26.8 years) volunteered to participate in the study. None of the participants had a history of disabling neck, arm, or headache pain within the last 6 months. They did not have any current or history of neurologic symptoms. In a neutral head position, physiologic measures of VA blood flow and velocity at the C1-2 spinal level were obtained using phase-contrast magnetic resonance imaging after 3 different head positions and a chiropractic upper cervical spinal manipulation. A total of 30 flow-encoded phase-contrast images were collected over the cardiac cycle, in each of the 4 conditions, and were used to provide a blood flow profile for one complete cardiac cycle. Differences between flow (in milliliters per second) and velocity (in centimeters per second) variables were evaluated using repeated-measures analysis of variance.

### RESULTS:

The side-to-side difference between ipsilateral and contralateral VA velocities was not significant for either velocities ( $P = .14$ ) or flows ( $P = .19$ ) throughout the conditions. There were no other interactions or trends toward a difference for any of the other blood flow or velocity variables.

## CONCLUSIONS:

There were no significant changes in blood flow or velocity in the vertebral arteries of healthy young male adults after various head positions and cervical spine manipulations.

DOI: 10.1016/j.jmpt.2013.07.008 | PMID: 24239451



<https://www.ncbi.nlm.nih.gov/pubmed/24239451>

## Immediate effects of bilateral manipulation of talocrural joints on standing stability in healthy subjects.

Alburquerque-Sendín F, Fernández-de-las-Peñas C, Santos-del-Rey M, Martín-Vallejo FJ.

Man Ther. 2009 Feb;14:75-80. DOI: 10.1016/j.math.2007.11.005. Epub 2008 Feb 15.

### ABSTRACT

The purpose of this study was to investigate the immediate effects of bilateral talocrural joint manipulation on standing stability in healthy subjects. Sixty-two healthy subjects, 16 males and 46 females, aged from 18 to 32 years old (mean: 21+/-3 years old) participated in the study. Subjects were randomly divided into two groups: an intervention group (n=32), who received manipulation of bilateral talocrural joints and a control group (n=30) which did not receive any intervention. Baropodometric and stabilometric evaluations were assessed pre- and 5 min post-intervention by an assessor blinded to the treatment allocation. Intra-group and inter-group comparisons were analysed using appropriate parametric tests. The results indicated that changes on the X coordinate range, length of motion, and mean speed approximated to statistical significance (P=0.06), and changes on the Y coordinate range reached statistical significance (P=0.02). Average X and Y motions, and anterior-posterior or lateral velocities did not show significant differences. Our results showed that bilateral thrust manipulation of the talocrural joint did not modify standing stability, that is, the behavioural pattern of the projection of the centre of pressure, in healthy subjects.

DOI: 10.1016/j.math.2007.11.005 | PMID: 18280767



<https://www.ncbi.nlm.nih.gov/pubmed/18280767>

## Osteopathic manipulative treatment in the emergency department for patients with acute ankle injuries.

Eisenhart AW, Gaeta TJ, Yens DP.

J Am Osteopath Assoc. 2003 Sep;103(9):417-21.

### STUDY OBJECTIVE:

The purpose of this study was to evaluate the efficacy of osteopathic manipulative treatment (OMT) as administered in the emergency department (ED) for the treatment of patients with acute ankle injuries.

### METHODS:

Patients aged 18 years and older with unilateral ankle sprains were randomly assigned either to an OMT study group or a control group. Independent outcome variables included edema, range of motion (ROM), and pain. Both groups received the current standard of care for ankle sprains and were instructed to return for a follow-up examination. Patients in the OMT study group also received one session of OMT from an osteopathic physician.

### RESULTS:

Patients in the OMT study group had a statistically significant ( $F = 5.92$ ,  $P = .02$ ) improvement in edema and pain and a trend toward increased ROM immediately following intervention with OMT. Although at follow-up both study groups demonstrated significant improvement, patients in the OMT study group had a statistically significant improvement in ROM when compared with patients in the control group.

### CONCLUSIONS:

Data clearly demonstrate that a single session of OMT in the ED can have a significant effect in the management of acute ankle injuries.

PMID: 14527076

 <https://www.ncbi.nlm.nih.gov/pubmed/14527076>

## Effect of osteopathy in the cranial field on visual function-a pilot study.

Sandhouse ME, Shechtman D, Sorkin R, Drowos JL, Caban-Martinez AJ 3rd, Patterson MM, Shallo-Hoffmann J, Hardigan P, Snyder A.

J Am Osteopath Assoc. 2010 Apr;110(4):239-43.

### CONTEXT:

The effects of osteopathy in the cranial field on visual function-particularly on changes in the visual field and on the binocular alignment of the eyes-have been poorly characterized in the literature. The authors examined whether osteopathy in the cranial field resulted in an immediate, measurable change in visual function among a sample of adults with cranial asymmetry.

### STUDY DESIGN:

Randomized controlled double-blinded pilot clinical trial.

### SUBJECTS:

Adult volunteers between ages 18 and 35 years who were free of strabismus or active ocular or systemic disease were recruited. Inclusion criteria were refractive error ranging between six diopters of myopia and five diopters of hyperopia, regular astigmatism of any amount, and cranial somatic dysfunction.

### INTERVENTION:

All subjects were randomly assigned to the treatment or control group. The treatment group received a single intervention of osteopathy in the cranial field to correct cranial dysfunction. The control group received light pressure of a few ounces of force applied to the cranium without osteopathic manipulative treatment.

### MEASUREMENTS:

Preintervention and postintervention optometric examinations consisted of distant visual acuity testing, Donder push-up (ie, accommodative system) testing, local stereoaucuity testing, pupillary size measurements, and vergence system (ie, cover test with

prism neutralization, near point of convergence) testing. Global stereoacuity testing and retinoscopy were performed only in preintervention to determine whether subjects met inclusion criteria. Analysis of variance (ANOVA) was performed for all ocular measures.

## RESULTS:

Twenty-nine subjects completed the trial-15 in the treatment group and 14 in the control group. A hierarchical ANOVA revealed statistically significant effects within the treatment group and within the control group ( $P < .05$ ) in distance visual acuity of the right eye (OD) and left eye (OS), local stereoacuity, pupillary size measured under dim illumination OD and OS, and near point of convergence break and recovery. For the treatment group vs the control group, a statistically significant effect was observed in pupillary size measured under bright illumination OS ( $P < .05$ ).

## CONCLUSIONS:

The present study suggests that osteopathy in the cranial field may result in beneficial effects on visual function in adults with cranial asymmetry. However, this finding requires additional investigation with a larger sample size and longer intervention and follow-up periods. (ClinicalTrials.gov number NCT00510562).

PMID: 20430912



<https://www.ncbi.nlm.nih.gov/pubmed/20430912>

## Osteopathic manual therapy versus conventional conservative therapy in the treatment of temporomandibular disorders: a randomized controlled trial.

Cuccia AM, Caradonna C, Annunziata V, Caradonna D.

J Bodyw Mov Ther. 2010 Apr;14(2):179-84. doi: 10.1016/j.jbmt.2009.08.002. Epub 2009 Sep 20.

### OBJECTIVE:

Temporomandibular disorders (TMD) is a term reflecting chronic, painful, craniofacial conditions usually of unclear etiology with impaired jaw function. The effect of osteopathic manual therapy (OMT) in patients with TMD is largely unknown, and its use in such patients is controversial. Nevertheless, empiric evidence suggests that OMT might be effective in alleviating symptoms. A randomized controlled clinical trial of efficacy was performed to test this hypothesis.

### METHODS:

We performed a randomized, controlled trial that involved adult patients who had TMD. Patients were randomly divided into two groups: an OMT group (25 patients, 12 males and 13 females, age 40.6+/-11.03) and a conventional conservative therapy (CCT) group (25 patients, 10 males and 15 females, age 38.4+/-15.33). At the first visit (T0), at the end of treatment (after six months, T1) and two months after the end of treatment (T2), all patients were subjected to clinical evaluation. Assessments were performed by subjective pain intensity (visual analogue pain scale, VAS), clinical evaluation (Temporomandibular index) and measurements of the range of maximal mouth opening and lateral movement of the head around its axis.

### RESULTS:

Patients in both groups improved during the six months. The OMT group required significantly less medication (non-steroidal medication and muscle relaxants) ( $P < 0.001$ ).

### CONCLUSIONS:

The two therapeutic modalities had similar clinical results in patients with TMD, even

if the use of medication was greater in CCT group. Our findings suggest that OMT is a valid option for the treatment of TMD.

DOI: 10.1016/j.jbmt.2009.08.002 | PMID: 20226365



<https://www.ncbi.nlm.nih.gov/pubmed/20226365>

## Posturography measures and efficacy of different physical treatments in somatic tinnitus.

Amanda B, Manuela M, Antonia M, Claudio M, Gregorio B.

Int Tinnitus J. 2010;16(1):44-50.

### ABSTRACT

Somatic modulation in tinnitus has been demonstrated by several studies although few investigations have been published on the efficacy of physical treatments in tinnitus subjects. In the present study the prevalence of somatic components to tinnitus were evaluated and the efficacy of two different physical treatments were compared: InterX® transcutaneous dynamic electrical stimulation and manual osteopathic therapy. Furthermore, posturographic measurements were analysed to verify the postural control in tinnitus subjects. 40 consecutive tinnitus patients, aged 18-65, were randomly selected for treatment (once a week for 2 months): 20 tinnitus subjects were treated with osteopathic manipulations, 20 with InterX®. They were evaluated pre and post therapy with audiogram up to 16 kHz, tinnitus pitch and loudness match, MML, THI questionnaire, posturography, structured interview with special attention on postural and movement influence on tinnitus, physical evaluation and osteopathic evaluation. 40 controls with no tinnitus, underwent audiological tests, postural and osteopathic evaluation for comparison. In our population, tinnitus sufferers presented more frequently musculoskeletal strains assessed with osteopathic visit and postural problems assessed with posturography measures in comparison with controls. Posturographic test, showed an average oscillating areas significantly greater in tinnitus participants ( $p \leq 0.05$ ), compared with control subjects. On the average in the treated groups, the enveloped areas were not significantly affected by either of the treatments. Tinnitus improved subjectively in most patients: loudness decreased, % time of awareness, % time of annoyance and quality of life was overall perceived as improved. This was mostly evident in subjects with muscular strain and tensions. This study indicates the benefit of physical, manipulation therapy for those patients with somatic modulation of their tinnitus, further studies are needed to establish the diagnostic or prognostic role of posturographic measurements.

PMID: 21609913



<https://www.ncbi.nlm.nih.gov/pubmed/21609913>

## Chronic prostatitis/chronic pelvic pain syndrome. Influence of osteopathic treatment - a randomized controlled study.

Marx S, Cimniak U, Beckert R, Schwerla F, Resch KL.

Urologe A. 2009 Nov;48(11):1339-45. doi: 10.1007/s00120-009-2088-z.

### BACKGROUND:

Prostatitis is the most common urological disease in males under [corrected] the age of 50 years old. As bacteria are detected in only <5% of cases the disease can mostly be classified as chronic nonbacterial prostatitis. The symptoms of this problem complex, often described as chronic prostatitis and chronic pelvic pain syndrome (CP-CPPS), seem to be multifactorial so that an improvement can only rarely be achieved with conventional forms of therapy.

### MATERIALS AND METHODS:

The aim of this study was to investigate whether osteopathic treatment can influence the symptoms of CP-CPPS (randomized controlled study, 5 sessions, follow-up after 6 weeks and 1.5 years without treatment). The study was carried out in a practice for osteopathy. Patients were recruited by referral from urologists, newspaper articles and lectures on the topic. A total of 35 males with medically diagnosed CP-CPPS aged 29-70 years old took part in the study. Of the patients 20 were allocated to the treatment group and 15 to the placebo group whereby 2 patients had to retire from the study prematurely. Patients in the treatment group received 5 osteopathic treatment sessions separated by 1 week at the beginning and by up to 3 weeks at the end (total period 8 weeks). The osteopathic dysfunctions of the patients were treated according to the principles of osteopathy. The placebo treatment in the control group consisted of a training program with simple gymnastic and physiotherapeutic exercises. Improvements of the complaints by urination (LUTS), chronic pelvic pain (CPPS) and quality of life (QOL) were measured using the questionnaires for international prostate symptom score (IPSS), the National Institutes of Health chronic prostatitis symptom index (NIH-CPSI) and the quality of life index (QOL).

## RESULTS:

Comparison of the results from the osteopathy and placebo groups revealed statistically significant differences in favor of the osteopathy group ( $p < 0.0005$ ). During the study period the average IPSS in the osteopathy group improved from 19.7 to 10.3 points (48%,  $p < 0.0005$ ), the NIH from 26.0 to 12.0 (54%;  $p < 0.0005$ ) and the QOL from 4.4 to 1.9 points (58%,  $p < 0.0005$ ). In contrast the corresponding values in the placebo group remained relatively constant. At the follow-up 6 weeks after the last session the improvements in the osteopathy group were found to be stable and remained so at least up to the second follow-up after 1.5 years.

## CONCLUSIONS:

The positive results of this study indicate that osteopathic treatment can be considered a genuine alternative to the conventional treatment of CP-CPPS and a closer cooperation between urologists/internists and osteopaths would be desirable. Further studies with larger numbers of patients should be carried out to substantiate these results.

DOI: 10.1007/s00120-009-2088-z | PMID: 19705093



<https://www.ncbi.nlm.nih.gov/pubmed/19705093>

## Patient perception of osteopathic manipulative treatment in a hospitalized setting: a survey-based study.

Pomykala M, McElhinney B, Beck BL, Carreiro JE.

J Am Osteopath Assoc. 2008 Nov;108(11):665-8.

### CONTEXT:

Although many studies on the effects of osteopathic manipulative treatment (OMT) have been published, few examine its role in treating hospitalized patients.

### OBJECTIVE:

To determine patient perception of receiving OMT while hospitalized.

### METHODS:

Patients were referred to receive OMT through a consultation service and were separated into four groups: medical, musculoskeletal, obstetric, or postsurgical. The same osteopathic physician treated each patient and used various OMT techniques as needed. High-velocity, low-amplitude was not used. Patient perceptions were assessed 24 hours after treatment using a 10-question survey. Main outcome measures included pain, need for pain medication, anxiety about hospitalization, and overall comfort level.

### RESULTS:

Of the 195 hospitalized patients who received OMT, 160 (82%) returned the survey. Of these patients, 43% reported a decreased need for pain medication, 74% indicated a decrease in pain, 90% had reduced anxiety, and 98% reported that OMT improved their overall comfort level. In addition, 94% of patients felt OMT was helpful for their recovery, and 98% would recommend OMT for other hospitalized patients.

### CONCLUSION:

Osteopathic manipulative treatment may be of tremendous benefit to hospitalized patients, regardless of their diagnoses.

PMID: 19011230



<https://www.ncbi.nlm.nih.gov/pubmed/19011230>

## The endocannabinoid system: an osteopathic perspective.

McPartland JM.

J Am Osteopath Assoc. 2008 Oct;108(10):586-600.

### ABSTRACT

The present review provides an update on endocannabinoid basic science and clinical studies and proposes a new model to describe reciprocal interactions between somatic dysfunction and the endocannabinoid system. The endocannabinoid system consists of cannabinoid receptors, endogenous ligands, and ligand-metabolizing enzymes. The system exemplifies the osteopathic principle that the body possesses self-regulatory mechanisms that are self-healing in nature. Enhancing endocannabinoid activity has broad therapeutic potential, including the treatment of patients with somatic dysfunction, chronic pain, and neurodegenerative diseases as well as inflammatory conditions, bowel dysfunctions, and psychological disorders. Blockade of the endocannabinoid system with drugs such as rimonabant and taranabant may oppose self-healing mechanisms and elicit adverse effects. Osteopathic physicians wield several tools that can augment endocannabinoid activity, including lifestyle modifications, pharmaceutical approaches, and osteopathic manipulative treatment.

DOI: 10.7556/jaoa.2008.108.10.586 | PMID: 18948642



<https://www.ncbi.nlm.nih.gov/pubmed/18948642>

## Effectiveness of osteopathy in the cranial field and myofascial release versus acupuncture as complementary treatment for children with spastic cerebral palsy: a pilot study.

Duncan B, McDonough-Means S, Worden K, Schnyer R, Andrews J, Meaney FJ.

J Am Osteopath Assoc. 2008 Oct;108(10):559-70.

### CONTEXT:

Case reports and clinical trials have indicated that osteopathic manipulative treatment (OMT) may improve motor function and quality of life for children with cerebral palsy.

### OBJECTIVE:

To assess the effectiveness of osteopathy in the cranial field, myofascial release, or both versus acupuncture in children with moderate to severe spastic cerebral palsy, as measured by several outcomes instruments in a randomized controlled trial.

### METHODS:

Children between the ages of 20 months and 12 years with moderate to severe spastic cerebral palsy were enrolled in a single-blind, randomized wait-list control pilot study. There were three arms in the study: OMT (ie, osteopathy in the cranial field, myofascial release, or both, using direct or indirect methods), acupuncture, and control (ie, non-therapeutic attention). Children who were initially randomly assigned to the control arm were subsequently randomly reassigned to the intervention arms, increasing the sample size. Outcome measures included standard instruments used in the evaluation of children with cerebral palsy. Less traditional measures were also used, including serial evaluations by an independent blind osteopathic physician and visual analog scale assessments by an independent osteopathic physician and the parents or guardians. A total of 11 outcome variables were analyzed.

### RESULTS:

Fifty-five patients were included in the study. Individual analyses of the 11 outcome variables revealed statistically significant improvement in two mobility measures for patients who received OMT--the total score of Gross Motor Function Measurement and

the mobility domain of Functional Independence Measure for Children ( $P < .05$ ). No statistically significant improvements were seen among patients in the acupuncture treatment arm.

## CONCLUSIONS:

A series of treatments using osteopathy in the cranial field, myofascial release, or both improved motor function in children with moderate to severe spastic cerebral palsy. These results can be used to guide future research into the effectiveness of OMT or acupuncture in treating children with spastic cerebral palsy.

PMID: 18948639



<https://www.ncbi.nlm.nih.gov/pubmed/18948639>

## A randomized controlled trial of the effectiveness of osteopathy-based manual physical therapy in treating pediatric dysfunctional voiding.

Nemett DR, Fivush BA, Mathews R, Camirand N, Eldridge MA, Finney K, Gerson AC.

J Pediatr Urol. 2008 Apr;4(2):100-6. doi: 10.1016/j.jpuro.2007.11.006. Epub 2008 Jan 11.

### OBJECTIVE:

Pediatric dysfunctional voiding (DV) presents physical and emotional challenges as well as risk of progression to renal disease. Manual physical therapy and osteopathic treatment have been successfully used to treat DV in adult women; a pediatric trial of manual physical therapy based on an osteopathic approach (MPT-OA) has not been reported. The aim of this study was to determine whether MPT-OA added to standard treatment (ST) improves DV more effectively than ST alone.

### METHODS:

Twenty-one children (aged 4-11 years) with DV were randomly assigned to receive MPT-OA plus standard treatment (treatment group) or standard treatment alone (control group). Pre-treatment and post-treatment evaluations of DV symptoms, MPT-OA evaluations and inter-rater reliability of DV symptom resolution were completed.

### RESULTS:

The treatment group exhibited greater improvement in DV symptoms than did the control group ( $Z=-2.63$ ,  $p=0.008$ , Mann-Whitney U-test). Improved or resolution of vesicoureteral reflux and elimination of post-void urine residuals were more prominent in the treatment group.

### CONCLUSIONS:

Results suggest that MPT-OA treatment can improve short-term outcomes in children with DV, beyond improvements observed with standard treatments, and is well liked by children and parents. Based on these results, a multi-center randomized clinical trial of MPT-OA in children with vesicoureteral reflux and/or post-void urinary retention is warranted.

DOI: 10.1016/j.jpurol.2007.11.006 | PMID: 18631903

 <https://www.ncbi.nlm.nih.gov/pubmed/18631903>

## Conservative management of a traumatic meniscal injury utilising osteopathy and exercise rehabilitation: A case report.

Feehan J, Macfarlane C, Vaughan B.

Complement Ther Med. 2017 Aug;33:27-31. doi: 10.1016/j.ctim.2017.05.007. Epub 2017 Jun 3.

### ABSTRACT

Meniscal injury is one of the most common knee soft tissue injuries, commonly affecting young athletes and an older, degenerative population. Treatment largely depends on the type and extent of the injury with arthroscopic repair or meniscectomy being mainstays. Although non-surgical approaches have been described, there is no published literature regarding a combination of indirect osteopathic techniques and rehabilitation in the management of these injuries.

The current case report follows a 20-year-old male presenting with a 5-day

history of acute knee pain, following trauma during an Australian Rules Football (AFL) match. An 8-week management plan of indirect osteopathic techniques and a tailored rehabilitation program was implemented. The Knee Injury and Osteoarthritis Outcome Score (KOOS) and the Lower Extremity Functional Scale (LEFS) questionnaires were utilised to measure outcomes. After the 8-week treatment and rehabilitation program, the patient had exceeded the minimum detectable change score for all outcome measures. This case report suggests that osteopathic manipulative treatment and rehabilitation may be an alternative, non-surgical approach in the management of post-traumatic meniscal injuries.

DOI: 10.1016/j.ctim.2017.05.007 | PMID: 28735822

 <https://www.ncbi.nlm.nih.gov/pubmed/28735822>

## Chiropractic Alters TMS Induced Motor Neuronal Excitability: Preliminary Findings

Haavik H, Niazi IK, Duehr J, Kinget M, Ugincius P, Sebik O, Yilmaz G , Turker KS.

Replace, Repair, Restore, Relieve – Bridging Clinical and Engineering Solutions in Neurorehabilitation pp 35-37

### ABSTRACT

The objective of this study was to use the electromyography (EMG) via surface and intramuscular single motor unit recordings to further characterize the immediate sensorimotor effects of spinal manipulation and a control intervention using TMS. The results provide evidence that spinal manipulation of dysfunctional spinal segments increases low threshold motoneurone excitability.

DOI: 10.1007/978-3-319-08072-7\_8



[https://link.springer.com/chapter/10.1007/978-3-319-08072-7\\_8](https://link.springer.com/chapter/10.1007/978-3-319-08072-7_8)

## Short-term effects of spinal thrust joint manipulation in patients with chronic neck pain: a randomized clinical trial

Saavedra-Hernández M, Arroyo-Morales M, Cantarero-Villanueva I, Fernández-Lao C, Castro-Sánchez AM, Puentedura EJ, Fernández-de-las-Peñas C.

Clin Rehabil. 2013 Jun;27(6):504-12. doi: 10.1177/0269215512464501. Epub 2012 Nov 5.

### OBJECTIVE:

To compare the effects of an isolated application of cervical spine thrust joint manipulation vs. the application of cervical, cervico-thoracic junction and thoracic manipulation on neck pain, disability and cervical range of motion in chronic neck pain.

### DESIGN:

Randomized clinical trial.

### SETTING:

Clinical practice.

### PARTICIPANTS:

Eighty-two patients (41 females) with chronic mechanical neck pain.

### INTERVENTIONS:

Patients were randomly assigned to a cervical spine manipulation group or a full manipulative group who received mid-cervical, cervico-thoracic and thoracic joint manipulations.

### MEASUREMENTS:

Neck pain intensity (11-point numeric pain rating scale), self-reported disability (Neck Disability Index) and cervical range of motion were collected at baseline and one week after the intervention by an assessor blinded to the allocation of the patients.

### RESULTS:

A significant Group \* Time interaction for Neck Disability Index ( $P = 0.022$ ), but not for neck pain ( $P = 0.612$ ), was found: patients in the full manipulative group exhibited greater reduction in disability than those who received the cervical spine manipulation alone, whereas both groups experienced similar decreases in neck pain. Patients in both groups experienced similar increases in cervical range of motion ( $P > 0.4$ ). No effect of gender was observed ( $P > 0.299$ ).

## CONCLUSIONS:

In patients with chronic mechanical neck pain, manipulation of the cervical and thoracic spine leads to a greater reduction in disability at one week than after manipulation of the cervical spine alone, whereas changes in pain and range of motion are not affected differently.

DOI: 10.1177/0269215512464501 | PMID: 23129812



<https://www.ncbi.nlm.nih.gov/pubmed/23129812>

## Using Functional Magnetic Resonance Imaging to Determine if Cerebral Hemodynamic Responses to Pain Change Following Thoracic Spine Thrust Manipulation in Healthy Individuals

Sparks C, Cleland JA, Elliott JM, Zagardo M, Liu WC.

Journal of Orthopaedic & Sports Physical Therapy, 2013 Volume:43 Issue:5 Pages:340-348 DOI: 10.2519/jospt.2013.4631

### STUDY DESIGN:

Case series.

### OBJECTIVES:

To use blood oxygenation level-dependent functional magnetic resonance imaging (fMRI) to determine if supraspinal activation in response to noxious mechanical stimuli varies pre-and post-thrust manipulation to the thoracic spine.

### BACKGROUND:

Recent studies have demonstrated the effectiveness of thoracic thrust manipulation in reducing pain and improving function in some individuals with neck and shoulder pain. However, the mechanisms by which manipulation exerts such effects remain largely unexplained. The use of fMRI in the animal model has revealed a decrease in cortical activity in response to noxious stimuli following manual joint mobilization. Supraspinal mediation contributing to hypoalgesia in humans may be triggered following spinal manipulation.

### METHODS:

Ten healthy volunteers (5 women, 5 men) between the ages of 23 and 48 years (mean, 31.2 years) were recruited. Subjects underwent fMRI scanning while receiving noxious stimuli applied to the cuticle of the index finger at a rate of 1 Hz for periods of 15 seconds, alternating with periods of 15 seconds without stimuli, for a total duration of 5 minutes. Subjects then received a supine thrust manipulation directed to the mid-thoracic spine and were immediately returned to the scanner for reimaging with a second delivery of noxious stimuli. An 11-point numeric pain rating scale was administered im-

mediately after the application of noxious stimuli, premanipulation and postmanipulation. Blood oxygenation level-dependent fMRI recorded the cerebral hemodynamic response to the painful stimuli premanipulation and postmanipulation.

## RESULTS:

The data indicated a significant reduction in subjects' perception of pain ( $P < .01$ ), as well as a reduction in cerebral blood flow as measured by the blood oxygenation level-dependent response following manipulation to areas associated with the pain matrix ( $P < .05$ ). There was a significant relationship between reduced activation in the insular cortex and decreased subjective pain ratings on the numeric pain rating scale ( $r = 0.59$ ,  $P < .05$ ).

## CONCLUSION:

This study provides preliminary evidence that suggests that supraspinal mechanisms may be associated with thoracic thrust manipulation and hypoalgesia. However, because the study lacked a control group, the results do not allow for the discernment of the causative effects of manipulation, which may also be related to changes in levels of subjects' fear, anxiety, or expectation of successful outcomes with manipulation. Future investigations should strive to elicit more conclusive findings in the form of randomized clinical trials.

DOI: 10.2519/jospt.2013.4631

 <https://www.jospt.org/doi/10.2519/jospt.2013.4631>

## Analysis of Thoracic Spine Thrust Manipulation for Reducing Neck Pain

Ferreira LAB, Santos LCF, Pereira WM, Neto HP, Grecco LAC, Christovao TCL, Oliveira CS.

Journal of Physical Therapy Science. 2013 Volume 25 Issue 3 Pages 325-329

### PURPOSE

The cervical spine is a common site of pain, which may arise from different parts of the upper limbs or dysfunctions of the upper thoracic spine. The different sections of the spinal column are interlinked, and one region exerts an influence over another. Thus, a low range of motion (hypomobility) in the thoracic spine is an indicator of neck pain, and alterations in the cervical spine can occur due to dysfunctions of the thoracic region. The aim of the present study was to assess the efficacy of upper thoracic spine (T1-T4) thrust manipulation with regard to reduction of pain and disability in patients with neck pain.

### SUBJECTS AND METHODS

Twenty-five individuals with persistent neck pain upon movement participated in this study. The individuals were evaluated using the Neck Disability Index and a visual analog scale for pain. Each individual underwent five sessions of thoracic spine thrust manipulation. Data analysis involved the Student's t-test.

### RESULTS

Significant improvements were found in neck pain and disability.

### CONCLUSION

Based on the results of the present study, thoracic spine thrust manipulation proved effective in the treatment of individuals with neck pain, leading to a reduction in both pain and disability.

DOI: 10.1589/jpts.25.325



[https://www.jstage.jst.go.jp/article/jpts/25/3/25\\_JPTS-2012-334/\\_article](https://www.jstage.jst.go.jp/article/jpts/25/3/25_JPTS-2012-334/_article)

# The Effects of Cervical Mobilization Combined with Thoracic Mobilization on Forward Head Posture of Neck Pain Patients

Lee J, Lee Y, Kim H, Lee J

Journal of Physical Therapy Science. 2013 Volume 25 Issue 1 Pages 7-9

## PURPOSE

The purpose of the present study was to examine the effects of cervical (mobilization combined with thoracic mobilization on neck pain patients' recovery from forward head posture (FHP).

## SUBJECTS

Thirty neck pain patients with FHP were randomly assigned to an experimental group (n=15) and a control group (n=15).

## METHODS

The experimental group received cervical mobilization combined with thoracic mobilization and the control group received only cervical mobilization. Cranial vertical angle (CVA) and cranial rotation angle (CRA) were measured before and after the experiment.

## RESULTS

The experimental group had significantly greater improvements in CVA and CRA than the control group.

## CONCLUSION

Therefore, we recommend cervical mobilization combined with upper thoracic mobilization for the improvement of FHP in neck pain patients.

DOI: 10.1589/jpts.25.7



[https://www.jstage.jst.go.jp/article/jpts/25/1/25\\_JPTS-2012-262/\\_article](https://www.jstage.jst.go.jp/article/jpts/25/1/25_JPTS-2012-262/_article)

## Efficacy of chiropractic manual therapy on infant colic: a pragmatic single-blind, randomized controlled trial

Miller JE, Newell D, Bolton JE.

J Manipulative Physiol Ther. 2012 Oct;35(8):600-7. doi: 10.1016/j.jmpt.2012.09.010.

### OBJECTIVE:

The purpose of this study was to determine the efficacy of chiropractic manual therapy for infants with unexplained crying behavior and if there was any effect of parental reporting bias.

### METHODS:

Infants with unexplained persistent crying (infant colic) were recruited between October 2007 and November 2009 at a chiropractic teaching clinic in the United Kingdom. Infants younger than 8 weeks were randomized to 1 of 3 groups: (i) infant treated, parent aware; (ii) infant treated, parent unaware; and (iii) infant not treated, parent unaware. The primary outcome was a daily crying diary completed by parents over a period of 10 days. Treatments were pragmatic, individualized to examination findings, and consisted of chiropractic manual therapy of the spine. Analysis of covariance was used to investigate differences between groups.

### RESULTS:

One hundred four patients were randomized. In parents blinded to treatment allocation, using 2 or less hours of crying per day to determine a clinically significant improvement in crying time, the increased odds of improvement in treated infants compared with those not receiving treatment were statistically significant at day 8 (adjusted odds ratio [OR], 8.1; 95% confidence interval [CI], 1.4-45.0) and at day 10 (adjusted OR, 11.8; 95% CI, 2.1-68.3). The number needed to treat was 3. In contrast, the odds of improvement in treated infants were not significantly different in blinded compared with non-blinded parents (adjusted ORs, 0.7 [95% CI, 0.2-2.0] and 0.5 [95% CI, 0.1-1.6] at days 8 and 10, respectively).

### CONCLUSIONS:

In this study, chiropractic manual therapy improved crying behavior in infants with colic. The findings showed that knowledge of treatment by the parent did not appear to contribute to the observed treatment effects in this study. Thus, it is unlikely that observed treatment effect is due to bias on the part of the reporting parent. (J Manipulative Physiol Ther 2012;35:600-607)

DOI: 10.1016/j.jmpt.2012.09.010 | PMID: 23158465



<https://www.ncbi.nlm.nih.gov/pubmed/23158465>

## Immediate Changes in Widespread Pressure Pain Sensitivity, Neck Pain, and Cervical Range of Motion After Cervical or Thoracic Thrust Manipulation in Patients With Bilateral Chronic Mechanical Neck Pain: A Randomized Clinical Trial

Martinez-Segura R, De-La-Llave-Rincon AI, Ortega-Santiago R, Cleland JA, Fernandez-De-Las-Penas C.

Journal of Orthopaedic & Sports Physical Therapy, 2012 Volume:42 Issue:9 Pages:806–814 DOI: 10.2519/jospt.2012.4151

### OBJECTIVES:

To compare the effects of cervical versus thoracic thrust manipulation in patients with bilateral chronic mechanical neck pain on pressure pain sensitivity, neck pain, and cervical range of motion (CROM).

### BACKGROUND:

Evidence suggests that spinal interventions can stimulate descending inhibitory pain pathways. To our knowledge, no study has investigated the neurophysiological effects of thoracic thrust manipulation in individuals with bilateral chronic mechanical neck pain, including widespread changes on pressure sensitivity.

### METHODS:

Ninety patients (51% female) were randomly assigned to 1 of 3 groups: cervical thrust manipulation on the right, cervical thrust manipulation on the left, or thoracic thrust manipulation. Pressure pain thresholds (PPTs) over the C5-6 zygapophyseal joint, lateral epicondyle, and tibialis anterior muscle, neck pain (11-point numeric pain rating scale), and cervical spine range of motion (CROM) were collected at baseline and 10 minutes after the intervention by an assessor blinded to the treatment allocation of the patients. Mixed-model analyses of covariance were used to examine the effects of the treatment on each outcome variable, with group as the between-subjects variable, time and side as the within-subject variables, and gender as the covariate. The primary analysis was the group-by-time interaction.

### RESULTS:

No significant interactions were found with the mixed-model analyses of covariance for PPT level (C5-6,  $P>.210$ ; lateral epicondyle,  $P>.186$ ; tibialis anterior muscle,  $P>.268$ ), neck pain intensity ( $P=.923$ ), or CROM (flexion,  $P=.700$ ; extension,  $P=.387$ ; lateral flexion,  $P>.672$ ; rotation,  $P>.192$ ) as dependent variables. All groups exhibited similar changes in PPT, neck pain, and CROM (all,  $P<.001$ ). Gender did not influence the main effects or the interaction effects in the analyses of the outcomes ( $P>.10$ ).

## CONCLUSION:

The results of the current randomized clinical trial suggest that cervical and thoracic thrust manipulation induce similar changes in PPT, neck pain intensity, and CROM in individuals with bilateral chronic mechanical neck pain. However, changes in PPT and CROM were small and did not surpass their respective minimal detectable change values. Further, because we did not include a control group, we cannot rule out a placebo effect of the thrust interventions on the outcomes.

## LEVEL OF EVIDENCE:

Therapy, level 1b. J Orthop Sports Phys Ther 2012;42(9):806-814, Epub 18 June 2012.  
doi:10.2519/jospt.2012.4151

DOI: 10.2519/jospt.2012.4151



<https://www.jospt.org/doi/10.2519/jospt.2012.4151>

## Chiropractic management for veterans with neck pain: a retrospective study of clinical outcomes

Dunn AS, Green BN, Formolo LR, Chicoine DR.

J Manipulative Physiol Ther. 2011 Oct;34(8):533-8. doi: 10.1016/j.jmpt.2011.08.009. Epub 2011 Sep 9.

### OBJECTIVE:

The purpose of this study was to report demographic characteristics, chiropractic treatment methods and frequency, and clinical outcomes for chiropractic management of neck pain in a sample of veteran patients.

### METHODS:

This is a retrospective case series of 54 veterans with a chief complaint of neck pain who received chiropractic care through a Veterans Health Administration medical center. Descriptive statistics and paired (tests were used with the numeric rating scale and Neck Bournemouth Questionnaire serving as the outcome measures. A minimum clinically important difference was set as 30% improvement from baseline for both outcomes.

### RESULTS:

The mean number of chiropractic treatments was 8.7. For the numeric rating scale, the mean raw score improvement was 2.6 points, representing 43% change from baseline. For the Neck Bournemouth Questionnaire, the mean raw score improvement was 13.9 points, representing 33% change from baseline. For both measures, 36 (67%) patients met or exceeded the minimum clinically important difference.

### CONCLUSION:

Mean chiropractic clinical outcomes were both statistically significant and clinically meaningful for this sample of veterans presenting with neck pain. (J Manipulative Physiol Ther 2011;34:533-538)

DOI: 10.1016/j.jmpt.2011.08.009 | PMID: 21908047



<https://www.ncbi.nlm.nih.gov/pubmed/21908047>

## Examination of motor and hypoalgesic effects of cervical vs thoracic spine manipulation in patients with lateral epicondylalgia: a clinical trial

Fernández-Carnero J, Cleland JA, Arbizu RL.

J Manipulative Physiol Ther. 2011 Sep;34(7):432-40. doi: 10.1016/j.jmpt.2011.05.019. Epub 2011 Jul 23.

### OBJECTIVES:

The purpose of this study was to compare the effects of a cervical vs thoracic spine manipulation on pressure pain threshold (PPT) and pain-free grip strength in patients with lateral epicondylalgia (LE).

### METHODS:

A single-blind randomized clinical trial was completed with 18 participants with LE. Each subject attended 1 experimental session. Participants were randomized to receive either a cervical or thoracic spine manipulation. Pressure pain threshold over the lateral epicondyle of both elbows pain-free grip strength on the affected arm and maximum grip force on the unaffected side were assessed preintervention and 5 minutes postintervention by an examiner blind to group assignment. A 3-way analysis of variance with time and side as within-subject variable and intervention as between-subject variable was used to evaluate changes in PPT and pain-free grip.

### RESULTS:

The analysis of variance detected a significant interaction between group and time ( $F = 31.7$ ,  $P < .000$ ) for PPT levels. Post hoc testing revealed that the cervical spine manipulation produced a greater increase of PPT in both sides compared with thoracic spine manipulation ( $P < .001$ ). For pain-free grip strength, no interaction between group and time ( $F = .66$ ,  $P = .42$ ) existed.

### CONCLUSIONS:

Cervical spine manipulation produced greater changes in PPT than thoracic spine manipulation in patients with LE. No differences between groups were identified for pain-free grip. Future studies with larger sample sizes are required to further examine the

effects of manipulation on mechanisms of pain and motor control in upper extremity conditions. (J Manipulative Physiol Ther 2011;34:432-440)

DOI: 10.1016/j.jmpt.2011.05.019 | PMID: 21875517

 <https://www.ncbi.nlm.nih.gov/pubmed/21875517>

## Spinal manipulative therapy for elderly patients with chronic obstructive pulmonary disease: a case series

Dougherty PE, Engel RM, Vemulpad S, Burke J.

J Manipulative Physiol Ther. 2011 Jul-Aug;34(6):413-7. doi: 10.1016/j.jmpt.2011.05.004. Epub 2011 Jun 24.

### OBJECTIVE:

The objective of this case series is to report the results of spinal manipulative therapy (SMT) for people with chronic obstructive pulmonary disease (COPD) who were older than 65 years.

### METHODS:

The study design was a prospective case series. Six patients of a long-term care center who were older than 65 years and having COPD underwent a course of 12 SMT sessions over a 4-week period. Each SMT session consisted of manually applied spinal manipulation and instrument-assisted spinal manipulation delivered by a doctor of chiropractic. Lung function measurements were recorded at baseline and at 2 and 4 weeks. The occurrence and type of any adverse events (AEs) related to SMT were recorded at each SMT session.

### RESULTS:

One male and 5 female patients took part in the study. The average age was 79.1 years (range, 68-89 years). There was a clinically significant increase in forced expiratory volume in the first second after SMT in 4 of the 6 patients at 2 weeks. This was sustained in only 1 patient at 4 weeks. No clinically significant changes were observed for forced vital capacity at 2 or 4 weeks. One hundred forty-four manually applied spinal manipulations and 72 instrument-assisted spinal manipulations were administered during the intervention period. No major or moderate AEs were reported. Only minor AEs were reported after 29% of the intervention sessions, with 1 AE being reported for each patient. All AEs resolved within 48 hours.

### CONCLUSIONS:

This case series offers preliminary evidence that SMT may have the potential to benefit lung function in patients with COPD who are older than 65 years. (J Manipulative Physiol Ther 2011;34:413-417)

DOI: 10.1016/j.jmpt.2011.05.004 | PMID: 21807266



<https://www.ncbi.nlm.nih.gov/pubmed/21807266>

## Immediate effects on electromyographic activity and pressure pain thresholds after a cervical manipulation in mechanical neck pain: a randomized controlled trial

de Camargo VM, Albuquerque-Sendín F, Bérzin F, Stefanelli VC, de Souza DP, Fernández-de-las-Peñas C.

J Manipulative Physiol Ther. 2011 May;34(4):211-20. doi: 10.1016/j.jmpt.2011.02.002. Epub 2011 Mar 21.

### OBJECTIVE:

The purpose of this study was to identify the immediate effects of a manipulation of C5/C6 level on electromyography (EMG) of the deltoid muscle and in pressure pain thresholds (PPTs) in patients with mechanical neck pain.

### METHODS:

Thirty-seven subjects with mechanical neck pain were randomly divided into 2 groups: manipulative group, which received a cervical spine manipulation targeted to C5/C6 segment, and a control group, which did not receive any procedure. Outcomes were EMG data of the deltoid muscle (rest, isometric contraction for 5 or 30 seconds, and isotonic contraction) and PPT over upper trapezius and deltoid muscles and C5 spinous process. They were assessed before and 5 minutes after treatment by a blinded assessor. A 3-way repeated-measures analysis of variance was used to examine the effects of the manipulation.

### RESULTS:

A significant group time interaction for MF at the beginning of isometric contraction for 30 seconds ( $F = 7.957$ ,  $P = .006$ ) was also found: the manipulative group experienced a greater increase in MF at the beginning of the isometric contraction than did the control group. A significant group time interaction was also found for root mean square during isometric contraction for 30 seconds ( $P = .003$ ); however, changes were small. Patients within the manipulative group experienced an increase on PPT over the deltoid ( $P = .010$ ) and C5 spinous process ( $P = .025$ ), but not over upper trapezius ( $P = .776$ ).

### CONCLUSIONS:

Manipulation at C5/C6 level in the study participants seemed to increase EMG amplitude signal and fatigue resistance in a nonspinal (deltoid) muscle innervated by the same segment in patients with mechanical neck pain. However, these changes were relative small. An increase on PPT over those tissues innervated by the manipulated segment was also found after the manipulative procedure. (J Manipulative Physiol Ther 2011;34:211-220)

DOI: 10.1016/j.jmpt.2011.02.002 | PMID: 21621722

 <https://www.ncbi.nlm.nih.gov/pubmed/21621722>

## Subclinical neck pain and the effects of cervical manipulation on elbow joint position sense

Haavik H, Murphy B.

J Manipulative Physiol Ther. 2011 Feb;34(2):88-97. doi: 10.1016/j.jmpt.2010.12.009.

### OBJECTIVE:

The objectives of this study were to investigate whether elbow joint position sense (JPS) accuracy differs between participants with a history of subclinical neck pain (SCNP) and those with no neck complaints and to determine whether adjusting dysfunctional cervical segments in the SCNP group improves their JPS accuracy.

### METHOD:

Twenty-five SCNP participants and 18 control participants took part in this pre-post experimental study. Elbow JPS was measured using an electrogoniometer (MLTS700, ADInstruments, New Zealand). Participants reproduced a previously presented angle of the elbow joint with their neck in 4 positions: neutral, flexion, rotation, and combined flexion/rotation. The experimental intervention was high-velocity, low-amplitude cervical adjustments, and the control intervention was a 5-minute rest period. Group JPS data were compared, and it was assessed pre and post interventions using 3 parameters: absolute, constant, and variable errors.

### RESULTS:

At baseline, the control group was significantly better at reproducing the elbow target angle. The SCNP group's absolute error significantly improved after the cervical adjustments when the participants' heads were in the neutral and left-rotation positions. They displayed a significant overall decrease in variable error after the cervical adjustments. The control group participants' JPS accuracy was worse after the control intervention, with a significant overall effect in absolute and variable errors. No other significant effects were detected.

### CONCLUSION:

These results suggest that asymptomatic people with a history of SCNP have reduced

elbow JPS accuracy compared to those with no history of any neck complaints. Furthermore, the results suggest that adjusting dysfunctional cervical segments in people with SCNP can improve their upper limb JPS,accuracy. (J Manipulative Physiol Ther 2011;34:88-97)

DOI: 10.1016/j.jmpt.2010.12.009 | PMID: 21334540

 <https://www.ncbi.nlm.nih.gov/pubmed/21334540>

## Cessation of cyclic vomiting in a 7-year-old girl after upper cervical chiropractic care: a case report.

Hubbard TA, Crisp CA.

J Chiropr Med. 2010 Dec;9(4):179-83. doi: 10.1016/j.jcm.2010.07.006. Epub 2010 Oct 8.

### OBJECTIVE:

The purpose of this case report is to describe chiropractic management of a child with cyclic vomiting syndrome.

### CLINICAL FEATURES:

A 7-year-old girl had a history of cyclic vomiting episodes for the past 4 1/2 years. She also had a 2-month history of headaches and stomachache.

### INTERVENTION AND OUTCOME:

The patient received low-force chiropractic spinal manipulation to her upper cervical spine. There was improvement in her symptoms within an hour after the chiropractic manipulation. Her symptoms only returned after direct trauma to her neck. The recurring symptoms again disappeared immediately after treatment.

### CONCLUSION:

This case study suggests that there may be a role for the use of chiropractic spinal manipulative therapy for treating cyclic vomiting syndrome. Controlled studies are necessary to aid our understanding of this finding.

DOI:10.1016/j.jcm.2010.07.006 | PMID: 22027110 PMCID: PMC3206580



<https://www.ncbi.nlm.nih.gov/pubmed/22027110>

## Clinical observation on improvement of motion range of cervical spine of patients with cervical spondylotic radiculopathy treated with rotation-traction manipulation and neck pain particles and cervical neck pain rehabilitation exercises].

Zhen PC, Zhu LG, Gao JH, Yu J, Feng MS, Wei X, Wang SQ.

Zhongguo Gu Shang. 2010 Oct;23(10):750-3.

### OBJECTIVE:

To observe the effects of two different therapies on patients whose cervical function were restricted due to cervical spondylotic radiculopathy.

### METHODS:

From April 2008 to October 2009, 71 cases with cervical spondylotic radiculopathy were divided into group A (36 cases) and group B (35 cases). Among them, 22 cases were male and 49 cases were female, ranging in age from 45 to 65 years with an average of 52.27 years, course of disease was from 3 days to 5 years. The patients in group A were treated with rotation-traction manipulation, neck pain particles and cervical rehabilitation exercises; and the patients in group B were treated with cervical traction, Diclofenac sodium sustained release tablets and wearing neck collar. Therapeutic time was two weeks. The cervical anteflexion, extension, left and right lateral bending, left and right rotative activity were measured by helmet-style activities instrument before and after treatment (at the 1, 3, 5, 7, 9, 11, 13 days and 1 month after treatment respectively).

### RESULTS:

There were no difference between two groups in cervical activity in all directions before treatment ( $P > 0.05$ ). Compared with the beginning, cervical anteflexion and extension showed significant difference at the 5th day after treatment in group A ( $P < 0.01$ ). In group B, cervical anteflexion showed significant difference at the 13th day after treatment ( $P < 0.05$ ), but at the 1 month after treatment, the significant difference disappeared ( $P > 0.05$ ); cervical extension showed significant difference at the 7th day after treatment compared with the beginning ( $P < 0.05$ ). Compared with the beginning, left lateral bending showed significant difference at the 1st day after treatment in group A ( $P < 0.05$ ) and at the 5th day after treatment in group B ( $P < 0.01$ ). Both in group A or B,

right lateral bending, left and right rotative activity showed significant difference at the same time after treatment, either the 3rd day ( $P < 0.05$ ) or the 5th day ( $P < 0.05$ ). Compared between groups, cervical anteflexion, left and right lateral bending, left and right rotative activity showed significant difference at the 1 month after treatment ( $P < 0.05$ ).

## CONCLUSION:

The rotation-traction manipulation and neck pain particles and cervical rehabilitation exercises in treating cervicalspondylotic radiculopathy have quick effect to improve the activities of cervical anteflexion, extension, left lateral bending, and have durable effect to improve the activities of cervical spine in all directions.

Research Areas:Geriatrics & Gerontology; Anatomy & Morphology; Rehabilitation; Integrative & Complementary Medicine; Physics; Neurosciences & Neurology; Physiology; Orthopedics; Surgery (provided by Clarivate Analytics)

PMID: 21137285



<https://www.ncbi.nlm.nih.gov/pubmed/21137285>

## Upper cervical chiropractic care for a 25-year-old woman with myoclonic seizures.

Hubbard TA, Crisp CA, Vowles B.

J Chiropr Med. 2010 Jun;9(2):90-4. doi: 10.1016/j.jcm.2010.03.001.

### OBJECTIVE:

The purpose of this case report is to describe the chiropractic management using upper cervical techniques of a 25-year-old woman diagnosed with juvenile myoclonic epilepsy (JME).

### CLINICAL FEATURES:

A 25-year-old woman had a history of JME, which was diagnosed at the age of 14 years. Her seizure episodes began shortly after trauma to her cervical spine and the onset of menarche.

### INTERVENTION AND OUTCOME:

After case history and physical examination, the patient received high-velocity, low-amplitude chiropractic spinal manipulation to her upper cervical spine using the Blair upper cervical chiropractic technique protocol. There was improvement in her seizure episodes and menstrual cycles following 12 weeks of chiropractic care.

### CONCLUSION:

This case study demonstrated improvement in a young woman with a seizure disorder after she received upper cervical chiropractic manipulation. This case suggests the need for more rigorous research to examine how upper cervical chiropractic techniques may provide therapeutic benefit to patients with seizure disorders.

DOI:10.1016/j.jcm.2010.03.001 | PMID: 21629556 | PMCID: PMC2943656



<https://www.ncbi.nlm.nih.gov/pubmed/21629556>

## The chiropractic care of children with attention-deficit/hyperactivity disorder: a retrospective case series

Alcantara J, Davis J.

Explore (NY). 2010 May-Jun;6(3):173-82. doi: 10.1016/j.explore.2010.02.001.

### BACKGROUND:

Characterized with hyperactivity, inattention and impulsivity, attention-deficit/hyperactivity disorder (ADHD) has a prevalence in children, ranging from 2.6% to 11.4%. The medical approach is multimodal, with combination therapies of behavioral modification and pharmacotherapy. With growing concerns regarding the safety of both short-term and long-term use of psychotropic medications, the need for investigating alternative approaches to the care of children is warranted.

### OBJECTIVE:

The aim of this review was to describe the chiropractic care of children with medically diagnosed ADHD.

### DESIGN:

Retrospective case series were reviewed.

### SETTING:

The review was conducted in a private practice of chiropractic with a solo practitioner.

### PATIENTS/PARTICIPANTS:

Pediatric patients (aged  $\leq$  18 years) attending chiropractic care for a minimum period of five months following a medical diagnosis of ADHD were included in this review.

### INTERVENTION:

The intervention was chiropractic spinal manipulative therapy augmented by nutritional supplements.

## RESULTS:

Our review found four patient files satisfying the inclusion criteria. All patients were males, ranging in age from nine to 13 years (mean age, 10 years), with three patients having a history of medication use and two patients having prescribed medication at the start of chiropractic care. Using a 15-item parent/teacher ADHD questionnaire, the patients' responses to chiropractic care were monitored. Using the Friedman test to compare observations repeated on the same subjects, our findings found improvement in ADHD symptoms (ie, hyperactivity, impulsivity, and inattentiveness, as well as behavioral, social, or emotional difficulties) and provide supporting evidence on the effectiveness of chiropractic in the treatment of children with ADHD.

## CONCLUSION:

A retrospective case series of ADHD patients under chiropractic care is described. This provides supporting evidence on the benefits of chiropractic spinal manipulative therapy. We encourage further research in this area.

DOI: 10.1016/j.explore.2010.02.001 | PMID: 20451152



<https://www.ncbi.nlm.nih.gov/pubmed/20451152>

## Manipulative treatment of vertebral artery type of cervical spondylosis].

Gao H, Ye YJ.

Zhongguo Gu Shang. 2010 Apr;23(4):257-60.

### OBJECTIVE:

To compare the effects of the three manipulative methods in treating vertebral artery type of cervical spondylosis.

### METHODS:

From December 2006 to December 2008, 300 patients (male 138 and female 162, the age from 18 to 76 years with an average of 38.6 years) with vertebral artery type of cervical spondylosis were randomly divided into group A, B, C (100 cases each group). Patients in group A, B were respectively treated with rotation-traction and rotation-turn manual reduction (one time per week, 30 min per time, 4 times a course of treatment; patients in group C were treated with traction (one time per day, 30 min per time, 10 times a course of treatment). Therapeutic time was a course of treatment in all groups. At 6 months after treatment, the clinical effects, cervical curvature, change of blood flow were respectively observed according symptoms, X-ray, transcranial doppler sonography (TCD).

### RESULTS:

All patients were followed up more than 6 months. The improving average of cervical curvature (C2-C7 Cobb angle): group A, B, C was respectively 1.82 +/- 0.88, 0.12 +/- 0.06, 0.56 +/- 0.22; group A was better than group B ( $P < 0.01$ ) and group C ( $P < 0.05$ ). There was no significantly difference between group B and C ( $P > 0.05$ );and there was significantly difference in three groups ( $P < 0.05$ ). TCD detection: LVA, RVA, BA improving significantly in group A than group B ( $P < 0.01$ ) and group C ( $P < 0.05$ ); there was no significantly difference between group B and C ( $P > 0.05$ ) and there was significantly difference among three groups ( $P < 0.05$ ). Clinical effects: in group A, 36 cases obtained curing results, 36 excellent, 20 utility, 8 ineffective, the rate of excellent and good was 92%; in group B: 6 cases obtained curing results, 20 excellent, 10 utility, 64 ineffective, the rate of excellent and good was 36%;in group C,10 cases obtained curing results,

26 excellent, 8 utility, 56 ineffective, the rate of excellent and good was 44%; there was significantly difference in three groups ( $P < 0.05$ ).

## CONCLUSION:

All three methods can significantly relieve headache and vertigo through improving cervical curvature and VA, BA blood flow, but its long-term effect should be observed.

PMID: 20486374

 <https://www.ncbi.nlm.nih.gov/pubmed/20486374>

## Chiropractic management of a 40-year-old female patient with Meniere disease.

Emary PC.

J Chiropr Med. 2010 Mar;9(1):22-7. doi: 10.1016/j.jcm.2009.12.007.

### OBJECTIVE:

The purpose of this case report is to describe the chiropractic management of a patient with Meniere disease.

### CLINICAL FEATURES:

A 40-year-old woman presented with a diagnosis of Meniere disease including a 2-month history of vertigo and a 16-month history of left-sided tinnitus, low-frequency hearing loss, and aural fullness. The patient's other symptoms included left-sided neck pain, temporomandibular joint pain, and headaches. Examination revealed left-sided upper cervical joint dysfunction along with myofascial trigger points in the middle and upper trapezius muscle.

### INTERVENTION AND OUTCOME:

Treatment included primarily high-velocity, low-amplitude spinal manipulation to the upper cervical and thoracic spine, along with soft-tissue trigger-point therapy, and stretching exercises. Within 2 weeks of treatment, the patient's tinnitus had resolved; and all other symptoms (including vertigo) were improved. The patient's headaches, neck pain, and vertigo were subsequently resolved within 3 months of treatment. The patient experienced only 2 minor episodes of self-resolving "light-headedness" over that time. After 2 years of follow-up, any occasional episodes of mild aural fullness and/or light-headedness are either self-resolving or relieved with cervical spinal manipulation and soft-tissue treatment.

### CONCLUSION:

This case report suggests that chiropractic care, including upper cervical spinal manipulation and soft-tissue therapy, may be beneficial in treating some patients with Meniere disease.

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<https://www.ncbi.nlm.nih.gov/pubmed/21629395>

## A comparison of two muscle energy techniques for increasing flexibility of the hamstring muscle group.

Smith M, Fryer G.

J Bodyw Mov Ther. 2008 Oct;12(4):312-7. doi: 10.1016/j.jbmt.2008.06.011. Epub 2008 Aug 6.

### ABSTRACT

Variations in the application of muscle energy technique (MET) for increasing the extensibility of muscles have been advocated, but little evidence exists to support the relative merit of a particular approach. This study investigated two types of muscle energy techniques that have been advocated in the osteopathic literature that differ primarily in the duration of the post-contraction stretch phase. Forty asymptomatic participants (mean age=22.1+/-3.5, male female=1:4) were randomly allocated to one of two groups (Group 1: MET with 30-s post-isometric stretch phase; Group 2: MET with 3-s post-isometric stretch phase). Hamstring length was measured using active knee extension (AKE).

Participants received an initial application of the allocated intervention, and then a second application 1 week later. Analysis with a split-plot ANOVA revealed a significant effect of time ( $F(3,36)=42.30; p<0.01$ ), but no significant time\*group interaction ( $F(3,36)=0.12; p=0.95$ ). Post-hoc analysis revealed that the significant differences over time occurred between pre- and post-measurements at both weeks, and between post-Week 1 and pre-Week 2 measurements. Both techniques appeared to be equally effective in increasing hamstring extensibility, and there appeared to be sustained improvement 1 week following the initial treatment. The findings suggest that altering the duration of the passive stretch component does not have a significant impact on the efficacy of MET for short-term increases in muscle extensibility.

DOI: 10.1016/j.jbmt.2008.06.011 | PMID: 19083689



<https://www.ncbi.nlm.nih.gov/pubmed/19083689>

## Chiropractic treatment of lower extremity conditions: a literature review.

Hoskins W, McHardy A, Pollard H, Windsham R, Onley R.

J Manipulative Physiol Ther. 2006 Oct;29(8):658-71.

### OBJECTIVE:

The purpose of this study was to document the quantity and type of research conducted on the chiropractic management of lower extremity conditions.

### METHODS:

A review of the literature was conducted using the CINAHL, MEDLINE, MANTIS, and Science Direct databases (each from inception to December 15, 2005). Search terms included chiropractic, hip, knee, ankle, foot, with Medical Subject Heading terms for each region. Inclusion criteria included studies with a lower extremity diagnosis, and the treatment was performed by doctors of chiropractic. Articles were excluded if pain was referred from spinal sites and if there was a duplicate publication; articles published in non-peer-reviewed literature and abstracts in conference proceedings were also excluded. Of the articles identified, an analysis was conducted assessing those including peripheral and/or spinal treatment. Clinical trials were assessed for quality using the Physiotherapy Evidence Database scale.

### RESULTS:

There was a total of 1652 citations. Of these, 76 were deemed relevant; 24 were related to the foot, 10 to the ankle, 25 to the knee, and 17 to the hip. Twenty-nine citations included spinal treatment, 47 solely peripheral, and 2 solely spinal. Ten citations were clinical trials and scored on the Physiotherapy Evidence Database scale.

### CONCLUSIONS:

Literature on the chiropractic management of lower extremity conditions has a large number of case studies (level 4 evidence) and a smaller number of higher-level publications (level 1-3 evidence). The management available in the peer-reviewed literature is predominantly multimodal and contains combined spinal and peripheral components. Future chiropractic research should use higher-level research designs, such as random-

mized controlled trials.

DOI: 10.1016/j.jmpt.2006.08.004 | PMID: 17045100

 <https://www.ncbi.nlm.nih.gov/pubmed/17045100>

## Use of osteopathic manipulative treatment for iliotibial band friction syndrome.

Pedowitz RN

J Am Osteopath Assoc. 2005 Dec;105(12):563-7.

### ABSTRACT

Iliotibial band friction syndrome (ITBFS) has long been recognized as one of the most common lower-extremity injuries in athletes, especially in long-distance runners. Conservative therapy, including rest, ice, heat, stretching, and the use of anti-inflammatory medications, has been effective in helping athletes return to full competition, but athletes still miss much time in their sports because of ITBFS. The author presents a case of a 30-year-old distance runner with ITBFS whose symptoms were reduced with the help of osteopathic manipulative treatment, specifically the counterstrain technique. This technique allows for relief of pain at a tender point by moving the affected body part into its position of greatest comfort, aiding in the reduction of proprioceptor activity. In the present case, the tender point was located from 0 to 3 cm (most commonly 2 cm) proximal to the lateral femoral epicondyle. There is no prior documentation of the osteopathic manipulation of this specific tender point. Thus, this case report reflects an initial identification of the distal iliotibial band tender point and a new therapeutic modality for ITBFS.

PMID: 16424466



<https://www.ncbi.nlm.nih.gov/pubmed/16424466>

## Osteopathic manipulative treatment (OMT) effects on mandibular kinetics: kinesiographic study.

Monaco A, Cozzolino V, Cattaneo R, Cutilli T, Spadaro A.

Eur J Paediatr Dent. 2008 Mar;9(1):37-42.

### AIM:

The aim of this study was to evaluate the effects of Osteopathic Manipulative Treatment (OMT) on mandibular kinematics in TMD patients.

### METHODS:

The study was conducted on 28 children with non-specific TMD symptoms, limited mouth opening, history of trauma (delivery trauma, accident trauma). Patients were randomly divided into two groups: an OMT group (study group) and a no-intervention group (control group). All subjects underwent a first kinesiographic recording to evaluate the amplitude and velocity of maximal opening-closing movements. Study group patients underwent a second kinesiographic recording 2 months after OMT. Control group patients were submitted to a control kinesiographic recording six months after the first one. Kinesiographic tracings were acquired using the K7I system.

### RESULTS/STATISTICS:

The kinesiographic data of the study group showed a moderate statistically significant difference ( $p < .07$ ) of maximal mouth opening (MO) parameter and a high statistically significant difference ( $p < .03$ ) of maximal mouth opening velocity (MOV) parameter. No statistically significant difference (null hypothesis confirmed) of kinesiographic parameters in the control group was observed.

### CONCLUSION:

The results of this study suggest that OMT can induce changes in the stomatognathic dynamics, offering a valid support in the clinical approach to TMD. Multifactorial genesis of chronic disorders is also confirmed.

PMID: 18380529



<https://www.ncbi.nlm.nih.gov/pubmed/18380529>

## Treatment of irritable bowel syndrome with osteopathy: results of a randomized controlled pilot study.

Hundscheid HW, Pepels MJ, Engels LG, Loffeld RJ.

J Gastroenterol Hepatol. 2007 Sep;22(9):1394-8.

### BACKGROUND AND AIM:

Effective treatment for irritable bowel syndrome (IBS) is not yet available. Osteopathy is a manual treatment which relies on mobilizing and manipulating procedures in order to relieve complaints. In the present study, a randomized controlled trial was carried out to evaluate the effects of osteopathic treatment for IBS.

### METHODS:

Eligible IBS patients were randomized between osteopathy and standard care. Follow-up was 6 months and validated means of follow-up were used. After 1, 3 and 6 months an overall assessment of symptoms was noted and a symptom score was obtained on a 5-point Likert scale. Quality of life (QOL) was scored with the standardized IBSQOL 2000 questionnaire and the Functional Bowel Disorder Severity Index was used.

### RESULTS:

Twenty patients were randomized into the osteopathy group (OG) and 19 patients were included in the standard care group (SCG). Sixty-eight percent of patients in the OG noted definite overall improvement in symptoms and 27% showed slight improvement. One patient (5%) was free of symptoms at the end of the study. In the SCG, 18% noted definite improvement, 59% showed slight improvement, and in 17% worsening of symptoms was present. The difference in change in overall symptomatic improvement was statistically significant in favor of the osteopathic treatment ( $P < 0.006$ ). Mean Functional Bowel Disorder Severity Index (FBDSI) score in the OG decreased from 174 to 74 at 6 months ( $P < 0.0001$ ). Also, a significant decrease was noted in the SCG from 171 to 119 ( $P < 0.0001$ ). However, the decrease in the OG was significantly higher compared with the standard treatment ( $P = 0.02$ ). Mean symptom score in the OG decreased from 9.1 to 6.8 but this did not reach statistical significance. In the SCG, no change in symptom score occurred (8.7 vs 10). At 6 months, the score in the OG was significantly lower

(6.8 vs 10; P = 0.02). The QOL score increased in the OG at 111 versus 129 (P < 0.009). In the SCG an increase was also noted, but this was not statistically significant (109 vs 121).

## CONCLUSION:

Osteopathic therapy is a promising alternative in the treatment of patients with IBS. Patients treated with osteopathy overall did better, with respect to symptom score and QOL.

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 <https://www.ncbi.nlm.nih.gov/pubmed/17716344>

## A preliminary assessment of the impact of cranial osteopathy for the relief of infantile colic.

Hayden C, Mullinger B.

Complement Ther Clin Pract. 2006 May;12(2):83-90. Epub 2006 Feb 8.

### ABSTRACT

In this open, controlled, prospective study, 28 infants with colic were randomized to either cranial osteopathic manipulation or no treatment; all were seen once weekly for 4 weeks. Treatment was according to individual findings, and administered by the same practitioner. Parents recorded time spent crying, sleeping and being held/rocked on a 24-hour diary. A progressive, highly significant reduction between weeks 1 and 4 in crying (hours/24h) was detected ( $P < 0.001$ ) in treated infants; similarly, there was a significant improvement in time spent sleeping ( $P < 0.002$ ). By contrast, no significant differences were detected in these variables for the control group. Overall decline in crying was 63% and 23%, respectively, for treated and controls; improvement in sleeping was 11% and 2%. Treated infants also required less parental attention than the untreated group. In conclusion, this preliminary study suggests that cranial osteopathic treatment can benefit infants with colic; a larger, double-blind study is warranted.

### REPUBLISHED IN

Reprint of: a preliminary assessment of the impact of cranial osteopathy for the relief of infantile colic. [Complement Ther Clin Pract. 2009]

DOI: 10.1016/j.ctcp.2005.12.005 | PMID: 16648084



<https://www.ncbi.nlm.nih.gov/pubmed/16648084>

## Gross range of motion in the cervical spine: the effects of osteopathic muscle energy technique in asymptomatic subjects.

Burns DK, Wells MR.

J Am Osteopath Assoc. 2006 Mar;106(3):137-42.

### ABSTRACT

Muscle energy technique is an established osteopathic manipulative intervention often used to treat somatic dysfunctions of the spine. There are little objective data to demonstrate its efficacy, however. To determine the efficacy of this osteopathic manipulative technique, the authors compared active cervical range of motion among asymptomatic young and middle-aged adults (n=18) before and after this treatment protocol, comparing those results against matched control subjects (n=14) who received sham manipulative treatment. Range of motion was measured in three planes (flexion/extension, lateral bending, rotation) on all subjects (N=32) using a motion-analysis system. Multiplanar gross cervical motion restrictions were diagnosed in this asymptomatic population. In the treatment group, cervical long restrictor muscles were treated with the muscle energy technique in the sagittal, frontal, and horizontal planes. The control group had relative restrictions addressed by means of a sham manipulative treatment protocol in which the barriers to motion were not challenged therapeutically. The muscle energy technique produced a significant increase in overall regional cervical range of motion in the treatment group (approximately 4 degrees) when compared with control subjects (P<.001). Significant differences were also observed in the magnitude of change in the three planes of movement (rotation, P<.002; lateral bending, P<.01), with flexion/extension being the least affected (P=.2). These data demonstrate that the application of the muscle energy technique can produce acute increases in the active cervical range of motion in asymptomatic subjects.

PMID: 16585381



<https://www.ncbi.nlm.nih.gov/pubmed/16585381>

## Infantile postural asymmetry and osteopathic treatment: a randomized therapeutic trial.

Philippi H, Faldum A, Schleupen A, Pabst B, Jung T, Bergmann H, Bieber I, Kaemmerer C, Dijs P, Reitter B.

Dev Med Child Neurol. 2006 Jan;48(1):5-9; discussion 4.

### ABSTRACT

The aim of this study was to assess the therapeutic efficacy of osteopathic treatment in infants with postural asymmetry. A randomized clinical trial of efficacy with blinded videoscoring was performed. Sixty-one infants with postural asymmetry aged 6 to 12 weeks (mean 9wks) were recruited. Thirty-two infants (18 males, 14 females) with a gestational age of at least 36 weeks were found to be eligible and randomly assigned to the intervention groups, 16 receiving osteopathic treatment and 16 sham therapy. After a treatment period of 4 weeks the outcome was measured using a standardized scale (4-24 points). With sham therapy, five infants improved (at least 3 points), eight infants were unchanged (within 3 points), and three infants deteriorated (not more than -3 points); the mean improvement was 1.2 points (SD 3.5). In the osteopathic group, 13 infants improved and three remained unchanged; the mean improvement was 5.9 points (SD 3.8). The difference was significant ( $p=0.001$ ). We conclude that osteopathic treatment in the first months of life improves the degree of asymmetry in infants with postural asymmetry.

DOI: 10.1017/S001216220600003X | PMID: 16359587



<https://www.ncbi.nlm.nih.gov/pubmed/16359587>

## Hemodynamic effects of osteopathic manipulative treatment immediately after coronary artery bypass graft surgery.

O-Yurvati AH1, Carnes MS, Clearfield MB, Stoll ST, McConathy WJ.

J Am Osteopath Assoc. 2005 Oct;105(10):475-81.

### CONTEXT:

Coronary artery bypass graft (CABG) surgery is a common procedure for patients with coronary artery disease. The physiologic effects of postoperative osteopathic manipulative treatment (OMT) following CABG have not been documented previously.

### OBJECTIVE:

To determine the effects of OMT on cardiac hemodynamics post-CABG surgery.

### DESIGN:

Pilot prospective clinical study (N=29).

### SETTING AND PATIENTS:

Treatment subjects (n=10) undergoing CABG surgery were recruited for postoperative OMT. The primary assessment compared, pre-OMT versus post-OMT, measurements of thoracic impedance, mixed venous oxygen saturation (SvO<sub>2</sub>), and cardiac index. Records of control subjects (n=19) who underwent CABG surgery--but who did not receive OMT--were assessed for SvO<sub>2</sub> and cardiac index at 1 hour and 2 hours postsurgery.

### INTERVENTION:

Immediately following CABG surgery (< or = 2 h), OMT was provided to subjects to alleviate anatomic dysfunction of the rib cage caused by median sternotomy and to improve respiratory function. This adjunctive treatment occurred while subjects were completely anesthetized.

### RESULTS:

A post-OMT increase in thoracic impedance (P < or = .02) in OMT subjects demonstra-

ted that central blood volume was reduced after OMT, suggesting an improved peripheral circulation. Mixed venous oxygen saturation also increased ( $P < \text{or} = .005$ ) after OMT. These increases were accompanied by an improvement in cardiac index ( $P < \text{or} = .01$ ). Comparisons of postoperative measurements in OMT subjects versus those in control subjects revealed statistically significant differences for SvO<sub>2</sub> ( $P < \text{or} = .005$ ) and cardiac index ( $P < \text{or} = .02$ ) between the two groups.

## CONCLUSION:

The observed changes in cardiac function and perfusion indicated that OMT had a beneficial effect on the recovery of patients after CABG surgery. The authors conclude that OMT has immediate, beneficial hemodynamic effects after CABG surgery when administered while the patient is sedated and pharmacologically paralyzed.

PMID: 16314680



<https://www.ncbi.nlm.nih.gov/pubmed/16314680>

## Lymphatic pump treatment enhances the clearance of pneumonia.

Scander A, Hodge L.

Int J Osteopath Med 2013;16:7-8.

### ABSTRACT BACKGROUND:

Osteopathic lymphatic pump treatments (LPT) are thought to aid in the removal of metabolic wastes, toxins, exudates, and cellular debris that occur during infection or oedema. In elderly patients with pneumonia LPT decreased hospital stay, length of intravenous antibiotics, and incidence of death when compared to conventional care. In animals, LPT has been reported to enhance the lymphatic and immune systems and facilitate the clearance pneumonia caused by *Streptococcus pneumoniae*. The purpose of this study was to determine the number of LPT necessary to enhance the clearance of *S. pneumoniae* from the lungs and explore the mechanisms associated with this protection.

### METHODS:

Rats were nasally infected with *S. pneumoniae*. Twenty-four hours after infection, rats were divided into control sham and LPT groups. For four consecutive days, the control group received no treatment or anaesthesia, the sham group received four min of light touch (under anaesthesia), and the LPT group received four min of LPT (under anaesthesia). On days 1, 3 and 4 post-infection, lungs were removed and measured for *S. pneumoniae* bacteria and the number of pulmonary leukocytes. Bronchoalveolar lavage fluid (BALF) was collected at day 4 post-infection and analysed for inflammatory mediators, antibacterial factors and alveolar macrophage function.

### RESULTS:

Three applications of LPT were able to significantly ( $p < 0.05$ ) reduce the numbers of pulmonary bacteria compared to control and sham. There were no significant differences in lung leukocytes between treatment groups at any time point, suggesting LPT does not enhance the concentration of pulmonary leukocytes. There were also no significant differences in the BALF concentrations of IL-1b, C-reactive protein, TNF-a, and MCP-1 between control, sham or LPT groups at day 4. This was not surprising, since

these factors mediate pneumococcal clearance within the first 0e48 h of infection. Of importance, LPT increased the concentration of SP-D, IL-6, IL-17 and IL-12 in the BALF and enhanced the production of NO<sub>2</sub>- and IL-6 by alveolar macrophages compared to sham and control.

## CONCLUSIONS:

We have shown that three daily LPT enhance the clearance of pneumococcal bacteria, and the concentration of SP-D, IL-6, IL-12 and IL-17 in the BALF. During pneumococcal pneumonia, IL-12 and IL-17 enhance the entry of neutrophils into the lungs, SP-D enhances phagocytosis by neutrophils, and IL-6 delays neutrophil apoptosis and enhances neutrophil cytotoxic function. Alveolar macrophages from LPT treated rats produced more nitric oxide and IL-6 in vitro. Therefore, by enhancing the concentration of immune factors, LPT may preserve neutrophil-mediated clearance of pneumococcus. Collectively, our study supports the clinical use of LPT to treat pneumonia.

DOI: <https://doi.org/10.1016/j.ijosm.2013.01.004>



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(13\)00005-9/pdf](https://www.journalofosteopathicmedicine.com/article/S1746-0689(13)00005-9/pdf)

## Osteopathic manipulative treatment for chronic nonspecific neck pain: A systematic review and meta-analysis.

Franke H, Franke J , Fryer G.

Int J Osteopath Med 2015;18: 255-267.

### ABSTRACT OBJECTIVES:

Nonspecific neck pain is common, disabling, and costly. The objective of the current review was to assess the effectiveness of osteopathic manipulative treatment (OMT) in the management of chronic nonspecific neck pain regarding pain, functional status, and adverse events.

### STUDY SELECTION:

A systematic literature search unrestricted by language was performed in March 2014 in several electronic databases and in databases of ongoing trials. A manual search of reference lists and personal communication with experts identified additional studies. Only randomized clinical trials were included, and studies of specific neck pain or single treatment techniques were excluded. Primary outcomes were pain and functional status, and secondary outcome was adverse events.

### DATA EXTRACTION:

Studies were independently reviewed using a standardized data extraction form. Mean difference (MD) or standard mean difference (SMD) with 95% confidence intervals (CIs) and overall effect size were calculated for primary outcomes. GRADE was used to assess quality of the evidence. Data synthesis: Of 299 identified studies, 18 were evaluated and 15 excluded. The suggested a non-significant difference in favour of OMT for functional status (SMD:  $-0.38$ , 95% CI:  $-0.88$  to  $0.11$ ). No serious adverse events were reported. Conclusion: Based on the 3 included studies, the review suggested clinically relevant effects of OMT for reducing pain in patients with chronic nonspecific neck pain. Given the small sample sizes, different comparison groups, and lack of long-term measurements in the few available studies, larger, high-quality randomized controlled trials with robust comparison groups are recommended. 3 reviewed studies had low risk of bias. Moderate-quality evidence suggested OMT had a significant and clinically

relevant effect on pain relief (MD:  $-13.04$ , 95% CI:  $-20.64$  to  $-5.44$ ) in chronic nonspecific neck pain, and moderate-quality evidence

DOI: <https://doi.org/10.1016/j.ijosm.2015.05.003>



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(15\)00049-8/  
fulltext](https://www.journalofosteopathicmedicine.com/article/S1746-0689(15)00049-8/fulltext)

## Osteopathic manipulative treatment for low back pain: a systematic review and meta-analysis of randomized controlled trials.

Licciardone JC, Brimhall AK, King LN.

BMC Musculoskelet Disord. 2005 Aug 4;6:43.

### BACKGROUND:

Osteopathic manipulative treatment (OMT) is a distinctive modality commonly used by osteopathic physicians to complement their conventional treatment of musculoskeletal disorders. Previous reviews and meta-analyses of spinal manipulation for low back pain have not specifically addressed OMT and generally have focused on spinal manipulation as an alternative to conventional treatment. The purpose of this study was to assess the efficacy of OMT as a complementary treatment for low back pain.

### METHODS:

Computerized bibliographic searches of MEDLINE, EMBASE, MANTIS, OSTMED, and the Cochrane Central Register of Controlled Trials were supplemented with additional database and manual searches of the literature. Six trials, involving eight OMT vs control treatment comparisons, were included because they were randomized controlled trials of OMT that involved blinded assessment of low back pain in ambulatory settings. Data on trial methodology, OMT and control treatments, and low back pain outcomes were abstracted by two independent reviewers. Effect sizes were computed using Cohen's d statistic and meta-analysis results were weighted by the inverse variance of individual comparisons. In addition to the overall meta-analysis, stratified meta-analyses were performed according to control treatment, country where the trial was conducted, and duration of follow-up. Sensitivity analyses were performed for both the overall and stratified meta-analyses.

### RESULTS:

Overall, OMT significantly reduced low back pain (effect size, -0.30; 95% confidence interval, -0.47 - -0.13;  $P = .001$ ). Stratified analyses demonstrated significant pain reductions in trials of OMT vs active treatment or placebo control and OMT vs no treatment control. There were significant pain reductions with OMT regardless of whether trials

were performed in the United Kingdom or the United States. Significant pain reductions were also observed during short-, intermediate-, and long-term follow-up.

## CONCLUSION:

OMT significantly reduces low back pain. The level of pain reduction is greater than expected from placebo effects alone and persists for at least three months. Additional research is warranted to elucidate mechanistically how OMT exerts its effects, to determine if OMT benefits are long lasting, and to assess the cost-effectiveness of OMT as a complementary treatment for low back pain.

DOI:10.1016/j.joca.2013.06.009



<https://www.ncbi.nlm.nih.gov/pubmed/16080794>

## Patient education with or without manual therapy compared to a control group in patients with osteoarthritis of the hip. A proof-of-principle three-arm parallel group randomized clinical trial.

Poulsen E, Hartvigsen J, Christensen HW, Roos EM, Vach W, Overgaard S.

Osteoarthritis Cartilage. 2013 Oct;21(10):1494-503. doi: 10.1016/j.joca.2013.06.009. Epub 2013 Jun 21.

### OBJECTIVE:

To investigate the effectiveness of a patient education (PE) program with or without the added effect of manual therapy (MT) compared to a minimal control intervention (MCI).

### METHODS:

In a single-center university hospital setting, a total of 118 patients with clinical and radiographic unilateral hip osteoarthritis (OA) from primary care were randomized into one of three groups: PE, PE plus MT or MCI. The PE was taught by a physiotherapist involving five sessions. The MT was delivered by a chiropractor involving 12 sessions and the MCI included a home stretching program. Primary outcome was self-reported pain severity on an 11-box numeric rating scale (NRS) immediately following a 6-week intervention period. Patients were followed for 1 year.

### RESULTS:

Primary analysis included 111 patients (94%). In the combined group (PE + MT), a clinically relevant reduction in pain severity compared to the MCI of 1.90 points (95% confidence interval (CI) 0.9-2.9) was achieved. Effect size (Cohen's d) for the PE + MT minus the MCI was 0.92 (95% CI 0.41-1.42). Number needed to treat for PE + MT was 3 (95% CI 2-7). No difference was found between the PE and MCI groups, with mean difference 0.0 (95% CI -1.0 to 1.0). At 12 months, not including patients receiving hip surgery the statistically significant difference favoring PE + MT was maintained.

### CONCLUSIONS:

For primary care patients with OA of the hip, a combined intervention of MT and PE was more effective than a MCI. PE alone was not superior to the MCI.

TRIAL REGISTRATION:

clinicaltrials.govNCT01039337.

DOI: 10.1016/j.joca.2013.06.009 | PMID: 23792189



<https://www.ncbi.nlm.nih.gov/pubmed/23792189>

## Diagnosis and management of piriformis syndrome: an osteopathic approach.

Boyajian-O'Neill LA, McClain RL, Coleman MK, Thomas PP.

J Am Osteopath Assoc. 2008 Nov;108(11):657-64.

### ABSTRACT

Piriformis syndrome is a neuromuscular condition characterized by hip and buttock pain. This syndrome is often overlooked in clinical settings because its presentation may be similar to that of lumbar radiculopathy, primary sacral dysfunction, or innominate dysfunction. The ability to recognize piriformis syndrome requires an understanding of the structure and function of the piriformis muscle and its relationship to the sciatic nerve. The authors review the anatomic and clinical features of this condition, summarizing the osteopathic medical approach to diagnosis and management. A holistic approach to diagnosis requires a thorough neurologic history and physical assessment of the patient based on the pathologic characteristics of piriformis syndrome. The authors note that several nonpharmacologic therapies, including osteopathic manipulative treatment, can be used alone or in conjunction with pharmacotherapeutic options in the management of piriformis syndrome.

DOI: 10.7556/jaoa.2008.108.11.657 | PMID: 19011229



<https://www.ncbi.nlm.nih.gov/pubmed/19011229>

## Chiropractic treatment of lower extremity conditions: a literature review.

Hoskins W, McHardy A, Pollard H, Windsham R, Onley R.

J Manipulative Physiol Ther. 2006 Oct;29(8):658-71.

### OBJECTIVE:

The purpose of this study was to document the quantity and type of research conducted on the chiropractic management of lower extremity conditions.

### METHODS:

A review of the literature was conducted using the CINAHL, MEDLINE, MANTIS, and Science Direct databases (each from inception to December 15, 2005). Search terms included chiropractic, hip, knee, ankle, foot, with Medical Subject Heading terms for each region. Inclusion criteria included studies with a lower extremity diagnosis, and the treatment was performed by doctors of chiropractic. Articles were excluded if pain was referred from spinal sites and if there was a duplicate publication; articles published in non-peer-reviewed literature and abstracts in conference proceedings were also excluded. Of the articles identified, an analysis was conducted assessing those including peripheral and/or spinal treatment. Clinical trials were assessed for quality using the Physiotherapy Evidence Database scale.

### RESULTS:

There was a total of 1652 citations. Of these, 76 were deemed relevant; 24 were related to the foot, 10 to the ankle, 25 to the knee, and 17 to the hip. Twenty-nine citations included spinal treatment, 47 solely peripheral, and 2 solely spinal. Ten citations were clinical trials and scored on the Physiotherapy Evidence Database scale.

### CONCLUSIONS:

Literature on the chiropractic management of lower extremity conditions has a large number of case studies (level 4 evidence) and a smaller number of higher-level publications (level 1-3 evidence). The management available in the peer-reviewed literature is predominantly multimodal and contains combined spinal and peripheral components.

Future chiropractic research should use higher-level research designs, such as randomized controlled trials.

DOI: 10.1016/j.jmpt.2006.08.004

PMID: 17045100



<https://www.ncbi.nlm.nih.gov/pubmed/17045100>

## Relief of internal snapping hip syndrome in a marathon runner after chiropractic treatment.

Konczak CR, Ames R.

J Manipulative Physiol Ther. 2005 Jan;28(1):e1-7.

### OBJECTIVE:

To discuss the assessment, diagnosis and chiropractic management of a patient with sacroiliac joint dysfunction (SIJ) complicated by psoas major snapping hip syndrome (coxa saltans interna).

### CLINICAL FEATURES:

A 32-year-old male marathon runner experienced low-back and left hip pain without radiation accompanied by a “popping” in the anterior hip. He ran approximately 100 to 150 km/wk for the prior 3 years. He had stopped running for the previous 3 weeks because of worsening and consistent pain.

### INTERVENTION AND OUTCOME:

Treatment consisted of side posture SIJ “diversified” manipulation and myofascial release to the psoas muscle twice weekly for 2 weeks. The patient was also taught proprioceptive neuromuscular facilitation exercises of the psoas and iliotibial band muscles. He was instructed to substitute swimming instead of running on a daily basis. Reassessment at 3 weeks found the patient without pain in his hip or back and no clicking or popping in his left hip.

### CONCLUSION:

Clinicians should consider that runners who present with coexisting SIJ dysfunction and internal snapping hip syndrome may benefit from the combined management of both conditions.

DOI: 10.1016/j.jmpt.2004.12.001 | PMID: 15726026



<https://www.ncbi.nlm.nih.gov/pubmed/15726026>

## The elephant in the room: does OMT have proved benefit?

Bledsoe BE.

J Am Osteopath Assoc. 2004 Oct;104(10):405-6; author reply 406.

### COMMENT IN

- J Am Osteopath Assoc. 2005 Mar;105(3):126-8.
- J Am Osteopath Assoc. 2005 Mar;105(3):126.
- J Am Osteopath Assoc. 2005 Mar;105(3):129.
- J Am Osteopath Assoc. 2005 Nov;105(11):496-7.

### COMMENT ON

- J Am Osteopath Assoc. 2004 May;104(5):193-202.

PMID: 15537794



<https://www.ncbi.nlm.nih.gov/pubmed/15537794>

## Chiropractic management of hip pain after conservative hip arthroplasty.

Wisdo JJ.

J Manipulative Physiol Ther. 2004 Sep;27(7):e11.

### OBJECTIVES:

To describe a case involving postsurgical hip pain that was successfully treated with a combination of chiropractic manipulation of the lumbar and pelvic region and low-tech rehabilitation 14 months postsurgery.

### CLINICAL FEATURES:

A 45-year-old man had pain and difficulty with walking. He was diagnosed with bilateral avascular necrosis at the femoral heads. He had successful right hip arthroplasty (HA) surgery at the time of the original diagnosis and had 2 previous surgeries to the left hip joint to treat avascular necrosis, with the latter being hip arthroplasty. He had a chief complaint of left hip pain that radiated down the lateral thigh to the knee with a “clicking” of the hip noted at end range abduction and adduction, as well as an altered gait pattern associated with dysfunction of the left hip.

### INTERVENTION AND OUTCOME:

He was treated with chiropractic manipulative therapy of the lumbar and sacroiliac joints and a rehabilitation program that consisted of in-office and home exercise programs. The patient experienced a decrease in the pain and an improvement in the flexibility and strength that led to an improved gait pattern and decreased pain. Outcomes were measured through active range of motion comparisons and use of the Harris Hip Scale Evaluation.

### CONCLUSIONS:

Treatment of hip pain through chiropractic manipulation and rehabilitation is described. The patient had increases in active ranges of motion and Harris Hip scores. Additional studies should be done to evaluate the effects of chiropractic manipulations on patient outcomes following such surgeries.

DOI: 10.1016/j.jmpt.2004.06.008 | PMID: 15389182

 <https://www.ncbi.nlm.nih.gov/pubmed/15389182>

## Chiropractic management of patients with bilateral congenital hip dislocation with chronic low back and leg pain.

Diez F.

J Manipulative Physiol Ther. 2004 May;27(4):E6.

### OBJECTIVE:

To discuss conservative methods for treating patients with chronic low back and leg pain associated with the biomechanical and postural alterations related to bilateral congenital hip dislocation.

### CLINICAL FEATURES:

This report describes the cases of 2 adult female subjects with bilateral congenital hip dislocation without acetabula formation who suffered from chronic low back and leg pain managed conservatively by chiropractic methods. The first subject is a 45-year-old woman with a 9-month history of right buttock pain and radiating right leg pain and paresthesia down to the first 2 toes, with a diagnosis of a herniated L4 intervertebral disk. The second subject is a 53-year-old woman who complained of chronic intermittent low back pain and constant unremitting pain on her right leg for the last 3 years.

### INTERVENTION AND OUTCOME:

Chiropractic manipulation utilizing Logan Basic apex and double notch contacts, as well as sacroiliac manipulation on a drop table with a sacrum contact and with a posterior to anterior and superior to inferior (PA-SI) rocking thrust, together with a spinal stabilization exercise program, were used on these 2 patients. Both patients had significant clinical improvement, with reduction on the Visual Analogue Scale (VAS) of 67% and 84%, Oswestry Disability Index improvement of 73% and 81%, and an improvement on the Harris hip score of 71% and 44%, respectively.

### CONCLUSION:

A conservative management approach, including specific chiropractic manipulation and a spinal stabilization exercise program, can help manage the treatment of adult

patients with chronic low back and leg pain related to bilateral congenital dislocation of the hips.

DOI: 10.1016/j.jmpt.2004.02.008 | PMID: 15148469



<https://www.ncbi.nlm.nih.gov/pubmed/15148469>

## Effects of manual therapy on the diaphragm in asthmatic patients: A randomized pilot study.

Leonés-Macías et al, Torres-Sánchez I, Cabrera-Martos I, Ortiz-Rubio A, López-López L, Valenza MC.

Int J Osteopath Med 2018 ;19:26-31

### BACKGROUND:

Stretching of respiratory muscles is included in what is known as manual therapy techniques. A diaphragm stretching technique has shown beneficial effects on respiratory function and thoracic and spinal mobility in healthy subjects. However, its effects on asthmatic patients have not been evaluated.

### OBJECTIVE:

To evaluate the effects of manual therapy on the diaphragm in allergic and non-allergic asthmatic patients regarding respiratory pressures and chest mobility. Design: Single-blinded randomized pilot study.

### SETTING:

Faculty of Health Sciences of Granada, Spain.

### METHODS:

Thirty-two participants were randomized into two groups: an intervention group in which a diaphragm stretching technique was performed and a placebo group. Respiratory pressures, thoracic and lumbar mobility, and flexibility were evaluated before the technique was performed, immediately afterwards, and at 5 and 20 min.

### PARTICIPANTS:

Allergic and non-allergic asthmatic patients. Results: Our results support the immediate effectiveness of the technique in maximal inspiratory pressure at 5 min of diaphragm stretching ( $p=0.031$ ). Significant results were also shown in mobility and flexibility, with a significant improvement in the subaxillary and abdominal perimeter as well as in the finger-floor test and the Schober test ( $p < 0.05$ ).

## CONCLUSIONS:

The results may show that a diaphragm stretching technique in asthmatic patients leads to an improvement in the following parameters: maximum inspiratory pressures 5 min after the technique; and flexibility and mobility of the rib cage at 5 min, which remains at 20 min. Further work is required to test the reproducibility of these results in a definitive trial.

DOI: <https://doi.org/10.1016/j.ijosm.2018.07.006>



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fulltext](https://www.journalofosteopathicmedicine.com/article/S1746-0689(17)30151-7/fulltext)

## Effects of a diaphragm stretching technique on pulmonary function in healthy participants: A randomized-controlled trial.

Gonzalez-Alvarez FJ, Valenza MC, Cabrera-Martos I, Torres-Sanchez I, Valenza-Demet G

Int J Osteopath Med 2015;18: 5-12..

### BACKGROUND:

Manual therapy has traditionally been included among the therapeutic approaches to respiratory pathologies.

### OBJECTIVE:

The aim of this study was to evaluate the effects of a diaphragm stretching on pulmonary function and respiratory pressures in healthy adults.

### DESIGN:

Randomized placebo-controlled trial using a between-groups design. Setting: The study was conducted at a university laboratory.

### METHODS:

The outcomes were evaluated at baseline and immediately after treatment. Participants' spirometry was assessed at baseline, immediately after the intervention, and also at 5 and 20 min post-treatment.

### PARTICIPANTS:

A final sample of eighty healthy adults was included. Participants were randomized into two groups: experimental or placebo group.

### RESULTS:

The data analysis revealed that all measures significantly ( $p < 0.05$ ) improved from pre- to post-test in the experimental group.

### CONCLUSIONS:

Diaphragm stretching is able to increase maximal respiratory pressures, forced vital capacity and forced expiratory volume in the first second.

DOI: <https://doi.org/10.1016/j.ijosm.2014.08.001>



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(14\)00065-0/  
fulltext](https://www.journalofosteopathicmedicine.com/article/S1746-0689(14)00065-0/fulltext)

## Rehabilitation with osteopathic manipulative treatment after lumbar disc surgery: A randomised, controlled pilot study.

Byungho J. K, JungHoon A , HeeCheol C , DongYun K , TaeYeong K , BumChul Y.

Int J Osteopath Med 2015;18:181-188.

### ABSTRACT BACKGROUND:

Despite growing evidence regarding the role of osteopathic manipulative treatment (OMT) for the management of low back pain, there is little evidence to support the use of OMT as a post-operative rehabilitation to improve the functional outcomes of lumbar disc surgery.

### OBJECTIVE:

To assess the feasibility for a future definitive randomised control trial that would indicate whether OMT improves post-operative outcomes after lumbar microdiscectomy compared to a standard exercise programme.

### DESIGN:

Randomised controlled pilot study.

### SETTING:

Department of Spinal Surgery and Department of Spinal Rehabilitation at a major metropolitan spine surgery hospital, Seoul, South Korea.

### METHODS:

Patients who underwent lumbar microdiscectomy due to low back pain with referred leg pain resulting from a herniated disc were enrolled in the study. Thirty-three patients aged 25-65 years were randomly assigned using a random number table to the OMT (n = 16) group or exercise group (n = 17). Patients received the allocated intervention twice a week for 4 weeks. Each session was 30 min. Primary outcomes were post-surgical functional disability and intensity of low back and leg pain. Outcome measures were assessed at baseline (2-3 weeks after surgery) and post-intervention (7-8 weeks after surgery). Double blinding was not feasible in the study setting.

## RESULTS:

Thirty-three participants were analysed. Both rehabilitation interventions improved all primary and secondary outcomes. Post-surgical physical disability improved more with OMT rehabilitation than the exercise programme (54% vs. 26%,  $P < 0.05$ ). Residual leg pain decreased with OMT (53%) and exercise (17%). Post-operative low back pain decreased by 37% in the OMT group and 10% in the exercise group. Patients in both groups required less frequent use of medication and were highly satisfied with the rehabilitation interventions. No side effects or complications from any intervention were reported.

## CONCLUSION:

The current pilot study shows the feasibility of a future definitive randomised control trial investigating whether rehabilitation with OMT is a viable approach for post-operative management of a lumbar microdiscectomy.

DOI: <https://doi.org/10.1016/j.ijosm.2014.11.003>



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(14\)00120-5/fulltext](https://www.journalofosteopathicmedicine.com/article/S1746-0689(14)00120-5/fulltext)

## Is osteopathic manipulative treatment effective in migraine?

Francesco Cerritelli F. Et col.

Int J Osteopath Med 2013; 16:1-2.

### ABSTRACT BACKGROUND:

Migraine is a common disorder with a prevalence in the population of 6% in men and 18% in women. Recent studies documented controversial results in relation to the benefit of the application of OMT in migraine and those are even more unclear if CAM are considered. The aim of the present study was to determine the efficacy of the OMT on a sample of subjects affected by migraine evaluated using the HIT-6 questionnaire.

### METHODS:

The study was carried out in the Department of Neurology of Ancona's United Hospitals in the period between March and November 2010. All patients admitted in the unit with a diagnosis of migraine, according with International Headache Society criteria, were considered eligible for the study. Patients with secondary forms of headache, chronic illness, psychiatric illness, post-menopausal women, aged under 18 and over 50 years old were excluded from the study. According to the sample size calculation using an effect size of 5 points between groups and 27 within groups with a power of 90% and an alpha equal to 0.05, 105 patients entered in the study and were randomly divided in three groups (N . 35 in each group): OMT only, drugs (triptans) only and sham therapy. All patients were followed up for 6 months. Questionnaires were used to evaluate both the severity of migraine (HIT-6), considered as primary outcome, and the quality of life (SF-36v2), secondary outcome. Socio-demographic data were collected as well. One-way ANOVA was used to test the difference in variance among the three groups having defined a level of significant less than 0.05.

### RESULTS:

At baseline, no differences between the three groups in term of socio-demographic characteristics, severity of migraine and quality of life. At the end of the follow-up ANOVA showed a statistically significant difference on the primary outcome between the three groups  $F(2, 29) . 7.01; p . 0.003$ . Tukey post-hoc comparisons of the three groups

indicate that sham group was not statistically different from drug group (M . \_4.25; 95% CI: \_11.80, 3.30; p . 0.36), whilst OMT group was statistically different from drug group (M . \_11.70; 95% CI: \_19.72, \_3.69; p . 0.003); and from sham group (M . \_7.45; 95% CI: \_14.30, \_0.61; p . 0.03).

## RESULTS:

The present study showed a significant difference between OMT group compared to drug and sham therapy groups, suggesting that OMT can be considered a valid procedure for the management of patients with migraine.

DOI: <https://doi.org/10.1016/j.ijosm.2013.01.001>



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(13\)00002-3/](https://www.journalofosteopathicmedicine.com/article/S1746-0689(13)00002-3/)  
[pdf](#)

## The effect of osteopathic manual therapy on the vascular supply to the lower extremity in individuals with knee osteoarthritis: A randomized trial.

Jardine WM, Gillis C, Derek Rutherford D. I

Int J Osteopath Med 2012;15:125-133.

### ABSTRACT

Osteopathic principles guide treatments, one of which is the rule of the artery is absolute. Objectives of this study were to determine if selected osteopathic techniques (fascial releases along the arterial pathway and balancing of diaphragmatic tensions) were able to influence the vascular supply, dynamic balance, knee range of motion (ROM) and symptoms.

### METHODS:

Thirty subjects with radiographic confirmed knee osteoarthritis were randomly assigned to one of two groups: 1) osteopathic evaluation combined with treatment (treatment group); 2) osteopathic evaluation alone (no treatment group). Outcome measures were recorded before and after each osteopathic session: ultrasound/Doppler recordings of the resistive index (RI) of the superficial femoral artery (SFA), active knee flexion ROM, step test for balance and the visual analog scale (VAS) symptom rating. A two factor mixed model Analysis of Variance (ANOVA) for group (evaluation vs. treatment) with repeated measures (pre versus post test) was employed to test for main effects and all interactions for each dependent variable ( $\alpha = 0.05$ ).

### RESULTS:

The RI reduced significantly ( $p < 0.008$ ) from pre to post test in the treatment group only. Significant pretest/posttest main effects were found for ROM, balance and symptom rating ( $p < 0.05$ ).

### CONCLUSION:

The significant difference in RI provides evidence for the benefits of specificity within osteopathic techniques, and reveal the vascular supply to the leg was affected by the

fascial releases and will possibly influence some of the pathophysiological factors of an arthritic knee.

DOI: <https://doi.org/10.1016/j.ijosm.2012.07.001>



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(12\)00046-6/  
fulltext](https://www.journalofosteopathicmedicine.com/article/S1746-0689(12)00046-6/fulltext)

## A randomized control trial on the effectiveness of osteopathic manipulative treatment in reducing pain and improving quality of life in elderly patients affected by osteoporosis.

Papa L, Mandara A, M. Bottali M , Mosca G, S. Orfei S.

Clin Cases Miner Bone Metab. 2012 Sep;9(3):179-83. Epub 2012 Dec 20.

### INTRODUCTION:

In the elderly population, a decrease in bone mineral density (osteoporosis) is often associated with a decrease in Quality of Life (QOL) and an increase in self reported bodily pain. This pain originates from the musculoskeletal system and potentially can affect different areas of the body.

### AIM:

The aim of this study was to investigate the effect of osteopathic manipulative treatment on self reported pain and quality of life in an elderly population.

### DESIGN:

Randomized placebo controlled trial.

### METHODS:

Fifty six elderly (77.38 $\pm$ 8.25 years) patients were recruited from the Geriatric Department, Bassini Hospital (Milan, Italy). Patients had previously been involved in a population survey conducted by the Geriatric Department and diagnosed to be osteoporotic, therefore no assessment of bone mineral density was conducted for this study. Patients were randomly assigned to either 6 sessions of osteopathic manipulative treatment (OMT; n = 29) or an equivalent number of sham manipulative treatment sessions (SMT; n = 27). The main outcome variables were QOL measured by QUALEFFO and overall bodily pain measured using a visual analog scale (VAS). Data were analysed using a two factor ANOVA (treatment x time) for repeated measures with an alpha level set at 0.05.

### RESULTS:

Overall, OMT significantly decreased disability compared to SMT in this study. This

effect was demonstrated by a significant interaction in the overall disability score (p .0.004) and the Mental wellbeing (p .0.049), Health perception (p .0.029) and Pain (p .0.007) QUALEFFO subscales. There was no significant difference (no interaction) for pain as measured by VAS and for the Daily activities, Walking, Household cleaning and Leisure time activities. QUALEFFO subscales (p > 0.05). No adverse events were recorded during the study.

## DISCUSSION:

This study demonstrated that, in a group of elderly subjects affected by osteoporosis, OMT was able to increase self reported QOL while the effect on bodily pain perception is unclear. This overall improvement in QOL appears to be caused by an improvement in psychological factors (i.e mental wellbeing and health perception) rather than physical factors. In fact, all QUALEFFO subscales related to physical function demonstrated no significant interaction. The effect of OMT on pain perception was less clear. In fact, there was no effect on pain as assessed by VAS while a significant improvement was observed when the QUALEFFO subscale was used. This could be due to the metric properties of the two pain measurement methods; an alternative explanation could be that VAS measures mainly pain quantity while QUALEFFO subscales measures mainly pain quality. The lack of effect of OMT on physical function needs to be confirmed by more direct measures of this variable.

DOI:10.1016/j.ijosm.2010.07.004



<https://www.ncbi.nlm.nih.gov/pubmed/23289034>

## Osteopathic manipulative treatment for chronic neck pain: A randomized placebo controlled trial on the effect on pain and disability.

Mandara A, Ceriani A, Guzzetti G, Gulisano V, Fusaro A, Bado F.

BMC Musculoskelet Disord. 2014 Aug 30;15:286. doi: 10.1186/1471-2474-15-286.

### INTRODUCTION:

Neck pain is a common source of disability in the general population. The etiology of this problem is multi-factorial and many different therapeutic approaches have been published in the literature. Standard anti inflammatory treatment with NSAIDs has a limited effect on pain and disability.

### AIM:

The aim of this study was to investigate the effects of osteopathic manipulative treatment (OMT) plus standard care on self reported pain and disability.

### METHODS:

For this ongoing study twenty eight patients with chronic ( $\geq$  3months) neck pain attending the Orthopaedic Department were recruited. Subjects were randomized to six sessions of OMT plus standard care (n . 13) or six sessions of sham manipulative treatment plus standard care (SMT; n . 15). Pain was assessed using a visual analog scale (VAS) at each visit. Disability was assessed using the Italian version of the Neck Disability Index before the first visit, at visit 3 and at the end of the study. Data were analysed using a two factor ANOVA (treatment x time) for repeated measures with an alpha level set at 0.05. Post hoc analysis was performed using Tukey's test.

### RESULTS:

Overall, OMT significantly decreased disability and pain compared to SMT in this study. For disability there was a significant interaction in the total disability score ( $p < 0.05$ ). Post hoc analysis revealed a significant difference between visit 3 and final assessment. For pain there was a significant interaction in the VAS score ( $p < 0.05$ ). Post hoc analysis revealed a significant difference at visit 4, 5 and 6.

## DISCUSSION:

This study demonstrated that OMT added to standard care was able to significantly reduce neck pain and disability compared to SMT. The effect of the treatment seems to be dependent on the number of manipulative sessions. In fact, there was no difference between the groups in the early stages of the study. On the contrary, in later stages there was a significant difference between OMT and SMT on both pain perception and self reported disability.

DOI:10.1016/j.ijosm.2010.07.005



<https://www.ncbi.nlm.nih.gov/pubmed/25175885>

## Osteopathic treatment of women with primary dysmenorrhoea: A randomised controlled trial.

Pinter-Haas A, Hirte JS, Wirthwein P, Dorothea ,Metcalf D, Florian Schwerla F.

Int J Osteopath Med 2010;13:104–131.

### INTRODUCTION:

Primary dysmenorrhoea is the most common gynaecological problem. By definition the pain starts shortly after menarche or a few years later. It occurs regularly shortly before or with the onset of bleeding and increases in intensity over the course of the following one to two days.

### OBJECTIVE:

To assess the effectiveness whether osteopathic treatments can have an influence on the intensity and duration of pain in women with primary dysmenorrhoea.

### METHODS:

The study was designed as a randomized controlled clinical trial with a classical “waiting-list design”. 60 women (average age 33 years) participated in the study, all of whom had previously been diagnosed by their physicians as having primary dysmenorrhoea. By a process of external randomization the women were divided into two groups: 29 women in the treatment group and 31 women in the control group. In the course of the study seven patients abandoned the treatment (four in the intervention group, three in the control group). Women in the treatment group were treated over a period of four monthly cycles, during which they received treatment approximately every fortnight. Osteopathic dysfunctions in the cranial, visceral and parietal system manifest on the day of treatment were diagnosed and treated individually. The control group received no treatment during the four monthly cycles. The primary outcome measure was the change in dysmenorrhoeal pain in its intensity, measured on the Numeric Rating Scale (NRS), as well as the duration of pain immediately before and during menstruation. Only those days of pain above a threshold value of 5 measured on the NRS were drawn upon for analysis. Secondary outcome parameters included quality of life (measured on the SF-36) and the intake of medication.

## RESULTS:

In the treatment group the intensity of pain on the NRS decreased by an average of 4.6 to 1.9, which corresponds to an amelioration of 59% (95% CI. 1.9 to 3.5;  $p < 0.0005$ ). In the control group a small improvement of 2% was observed in the same period of time. In the direct comparison of the two groups a clear statistical significance (95% CI. -3.6 to -1.7;  $p < 0.0005$ ) in favor of the osteopathic group was able to be demonstrated. In addition the number of days of pain (with NRS > 5) was reduced considerably by an average of 2.2 to 0.2 (an improvement of 86%, 95% CI . 1.3 to 2.6;  $p < 0.0005$ ) in contrast to the control group (an improvement of 17%, 95% CI . -0.2 to 1.0;  $p = 0.216$ ). The secondary outcome parameters such as quality of life and the intake of medication improved considerably too.

## CONCLUSION:

Five to six osteopathic treatments of the women with primary dysmenorrhoea over a period of four monthly cycles had a statistically significant and clinically relevant influence.

DOI:10.1016/j.ijosm.2010.07.027



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(10\)00081-7/fulltext](https://www.journalofosteopathicmedicine.com/article/S1746-0689(10)00081-7/fulltext)

## Osteopathy as a therapy during pregnancy: A randomised controlled trial.

Nistler G, Deutschmann U, Lenz D, Schwerla F.

Int J Osteopath Med 2010;13:104–131.

### OBJECTIVE:

The main objective of this study is to investigate the influence of osteopathic treatments on the length of delivery in the case of first-time pregnancies. Furthermore to assess how the intervention can influence the rate of delivery complications and the newborn baby's general condition.

### METHODS:

78 women, who were pregnant for the first time, participated in the study (average age was 30 years). By a process of external randomization 40 women were randomly allocated to the treatment group and 38 to the control group. Treatment started between the 12th and the 16th week of pregnancy. During the course of the study eight participants dropped out of the control group and five out of the intervention group. The treatment group received three osteopathic treatments - after the first, second and third trimester of the pregnancy. The pregnant women in the control group did not receive osteopathic treatment. The osteopathic dysfunctions in the cranial, visceral and parietal systems found on the day of treatment were diagnosed and individually treated according to the principles of osteopathy. The outcome main parameter was the length of delivery. Secondary parameters were the intensity of pain during delivery, measured with the Numeric Rating Scale (NRS), the mode of delivery, the number and type of delivery complications as well as the injuries during delivery. The baby's condition was documented by means of the Apgar-Score and the umbilical artery pH-value.

### RESULTS:

The length of delivery in the intervention group was a mean of 4.7 hours (SD  $\pm$  3.1), in the control group 7.7 (SD  $\pm$  8.9) hours. This corresponds to a reduction of 3 hours and an improvement of 61% (95% CI. -0.5 to 6.5; p. 0.088). Pain intensity during delivery decreased by 37% in the intervention group (52 percentage points on the NRS, compared to 82 percentage points in the control group; p< 0.005). The number of episiotomies

decreased from 46% in the control group to 31% in the intervention group. The data regarding injuries and complications during delivery were also more positive in the intervention group. 100% of the babies in the intervention group had normal or slightly acidic umbilical artery pH-values, compared to only 83% in the control group.

## CONCLUSION:

Three osteopathic treatments during pregnancy had a relevant impact on the length of delivery. The results were clinically relevant but not statistically significant. Possible reasons could be the fact that there were some drop outs in the control group and that the sample size was not large enough. This outcome is encouraging for further research in this field especially in terms of prevention and whether complications during childbirth can be reduced through specific osteopathic treatment during pregnancy.

DOI:10.1016/j.ijosm.2010.07.028



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(10\)00082-9/abstract](https://www.journalofosteopathicmedicine.com/article/S1746-0689(10)00082-9/abstract)

## A randomised controlled trial on the effectiveness of osteopathic manipulative treatment of chronic low back pain.

Mandara A., Fusaro A., Musicco M, Bado F.

Int J Osteopath Med 2008;11:149-168.

### INTRODUCTION:

Chronic Low Back Pain (CLBP) is a very common complaint in the general population and it is often managed by physicians by conservative means. Osteopathic manipulative treatment (OMT) has been recently been demonstrated to be an effective method to reduce pain in patients suffering with CLBP. The objective of this study was to compare the effects of OMT with sham manipulative treatment (SMT) on patient's self reported pain and disability.

### DESIGN:

This was a randomized controlled investigation

### METHODS:

For this study ninety-four patients were recruited from the Orthopedic Department, Bassini Hospital (Italy) in the period between September 2006 and March 2008. Patients were randomly assigned to either usual care plus OMT (n . 44) or usual care plus SMT (n . 50). The main outcome variables were the Oswestry Disability Index and a 10-cm visual analog scale (VAS) for overall back pain. Data were analyzed using a two-factor ANOVA for repeated measures with an a level set at 0.05.

### RESULTS:

Overall, OMT significantly decreased pain and disability compared to SMT on this study. The change in VAS was -2.8  $\pm$  1.4 for OMT and 0  $\pm$  0.9 for SMT. The change in Oswestry Disability Index -8.4  $\pm$  8.5 for OMT and 0.3  $\pm$  7.2 for SMT). There was a significant interaction (group x time) for both visual analog scale (p <0.01) and for Oswestry Disability Index (p <0.01). No adverse events were recorded during the study.

### DISCUSSION:

Similarly to previous investigation in this area (Licciardone et al 2005) OMT appears to provide benefits over and above usual care for the treatment of CLBP. The improvement in the OMT compared to the SMT demonstrated that placebo effects such as interaction with patients and range of motion activities do not justify per se the results of this study. Future studies should aim to use less subjective outcome measures and focus on the mechanism through which OMT is able to reduce pain and disability in CLBP patients.

DOI:10.1016/j.ijosm.2008.08.011



[https://www.journalofosteopathicmedicine.com/article/S1746-0689\(08\)00102-8/  
abstract](https://www.journalofosteopathicmedicine.com/article/S1746-0689(08)00102-8/abstract)

## Osteopathic manipulative treatment in the emergency department for patients with acute ankle injuries.

Eisenhart AW, Gaeta TJ, Yens DP.

J Am Osteopath Assoc. 2003 Sep;103(9):417-21.

### STUDY OBJECTIVE:

The purpose of this study was to evaluate the efficacy of osteopathic manipulative treatment (OMT) as administered in the emergency department (ED) for the treatment of patients with acute ankle injuries.

### METHODS:

Patients aged 18 years and older with unilateral ankle sprains were randomly assigned either to an OMT study group or a control group. Independent outcome variables included edema, range of motion (ROM), and pain. Both groups received the current standard of care for ankle sprains and were instructed to return for a follow-up examination. Patients in the OMT study group also received one session of OMT from an osteopathic physician.

### RESULTS:

Patients in the OMT study group had a statistically significant ( $F = 5.92$ ,  $P = .02$ ) improvement in edema and pain and a trend toward increased ROM immediately following intervention with OMT. Although at follow-up both study groups demonstrated significant improvement, patients in the OMT study group had a statistically significant improvement in ROM when compared with patients in the control group.

### CONCLUSIONS:

Data clearly demonstrate that a single session of OMT in the ED can have a significant effect in the management of acute ankle injuries.



<https://www.ncbi.nlm.nih.gov/pubmed/14527076#>

## The use of osteopathic manipulative treatment as adjuvant therapy in children with recurrent acute otitis media.

Mills MV, Henley CE, Barnes LL, Carreiro JE, Degenhardt BF.

Arch Pediatr Adolesc Med. 2003 Sep;157(9):861-6.

### OBJECTIVE:

To study effects of osteopathic manipulative treatment as an adjuvant therapy to routine pediatric care in children with recurrent acute otitis media (AOM).

### STUDY DESIGN:

Patients 6 months to 6 years old with 3 episodes of AOM in the previous 6 months, or 4 in the previous year, who were not already surgical candidates were placed randomly into 2 groups: one receiving routine pediatric care, the other receiving routine care plus osteopathic manipulative treatment. Both groups received an equal number of study encounters to monitor behavior and obtain tympanograms. Clinical status was monitored with review of pediatric records. The pediatrician was blinded to patient group and study outcomes, and the osteopathic physician was blinded to patient clinical course.

### MAIN OUTCOME MEASURES:

We monitored frequency of episodes of AOM, antibiotic use, surgical interventions, various behaviors, and tympanometric and audiometric performance. RESULTS: A total of 57 patients, 25 intervention patients and 32 control patients, met criteria and completed the study. Adjusting for the baseline frequency before study entry, intervention patients had fewer episodes of AOM (mean group difference per month, -0.14 [95% confidence interval, -0.27 to 0.00];  $P = .04$ ), fewer surgical procedures (intervention patients, 1; control patients, 8;  $P = .03$ ), and more mean surgery-free months (intervention patients, 6.00; control patients, 5.25;  $P = .01$ ). Baseline and final tympanograms obtained by the audiologist showed an increased frequency of more normal tympanogram types in the intervention group, with an adjusted mean group difference of 0.55 (95% confidence interval, 0.08 to 1.02;  $P = .02$ ). No adverse reactions were reported.

### CONCLUSIONS:

The results of this study suggest a potential benefit of osteopathic manipulative treatment as adjuvant therapy in children with recurrent AOM; it may prevent or decrease surgical intervention or antibiotic overuse.

DOI: 10.1001/archpedi.157.9.861 | PMID: 12963590



<https://www.ncbi.nlm.nih.gov/pubmed/12963590#>

## Improving functional ability in the elderly via the Spencer technique, an osteopathic manipulative treatment: a randomized, controlled trial.

Knebl JA, Shores JH, Gamber RG, Gray WT, Herron KM.

J Am Osteopath Assoc. 2002 Jul;102(7):387-96.

### ABSTRACT:

Twenty-nine elderly patients with preexisting shoulder problems voluntarily enrolled as subjects in this study, which was undertaken to determine the efficacy of osteopathic manipulative treatment (OMT) in an elderly population to increase functional independence, increase range of motion (ROM) of the shoulder, and decrease pain associated with common shoulder problems. Each subject had chronic pain, decreased ROM, and/or decreased functional ability in the shoulder before entering the study. Subjects were randomly assigned to either a treatment (OMT) group or a control group for 14 weeks. Over the course of treatment, both groups had significantly increased ROM ( $P < .01$ ) and decreased perceived pain ( $P < .01$ ). All subjects continued on their preexisting course of therapy for any concurrent medical problems. After treatment, those subjects who had received OMT demonstrated continued improvement in their ROM, while ROM in the placebo group decreased.

PMID: 12138953



<https://www.ncbi.nlm.nih.gov/pubmed/12138953#>

## Benefits of osteopathic manipulative treatment for hospitalized elderly patients with pneumonia.

Noll DR, Shores JH, Gamber RG, Herron KM, Swift J Jr.

J Am Osteopath Assoc. 2000 Dec;100(12):776-82.

### ABSTRACT

While osteopathic manipulative treatment (OMT) is thought to be beneficial for patients with pneumonia, there have been few clinical trials--especially in the elderly. The authors' pilot study suggested that duration of intravenous antibiotic use and length of hospital stay were promising measures of outcome. Therefore, a larger randomized controlled study was conducted. Elderly patients hospitalized with acute pneumonia were recruited and randomly placed into two groups: 28 in the treatment group and 30 in the control group. The treatment group received a standardized OMT protocol, while the control group received a light touch protocol. There was no statistical difference between groups for age, sex, or simplified acute physiology scores. The treatment group had a significantly shorter duration of intravenous antibiotic treatment and a shorter hospital stay.

PMID: 11213665



<https://www.ncbi.nlm.nih.gov/pubmed/11213665#>

## Osteopathic manipulative treatment showed reduction of length of stay and costs in preterm infants. A systematic review and meta-analysis.

Lanaro et al.

Medicine (Baltimore). 2017 Mar; 96(12): e6408.

### BACKGROUND:

Osteopathic medicine is an emerging and complementary method used in neonatology.

### METHODS:

Outcomes were the mean difference in length of stay (LOS) and costs between osteopathy and alternative treatment group. A comprehensive literature search of (quasi)- randomized controlled trials (RCTs), was conducted from journal inception to May, 2015. Eligible studies must have treated preterm infants directly in the crib or bed and Osteopathic Manipulative Treatment (OMT) must have been performed by osteopaths. A rigorous Cochrane-like method was used for study screening and selection, risk of bias assessment and data reporting. Fixed effect meta-analysis was performed to synthesize data.

### RESULTS:

5 trials enrolling 1306 infants met our inclusion criteria. Although the heterogeneity was moderate ( $I^2=61\%$ ,  $P=0.03$ ), meta-analysis of all five studies showed that preterm infants treated with OMT had a significant reduction of LOS by 2.71 days (95% CI  $-3.99$ ,  $-1.43$ ;  $P<0.001$ ). Considering costs, meta-analysis showed reduction in the OMT group ( $-1,545.66\text{€}$ ,  $-1,888.03\text{€}$ ,  $-1,203.29\text{€}$ ,  $P<0.0001$ ). All studies reported no adverse events associated to OMT. Subgroup analysis showed that the benefit of OMT is inversely associated to gestational age.

### CONCLUSIONS:

The present systematic review showed the clinical effectiveness of OMT on the reduction of LOS and costs in a large population of preterm infants.

## ABBREVIATIONS: A

NS = autonomic nervous system, CBA = control before/after, CI = confidence interval, GA = gestational age, ITS = interrupted time series, LOS = length of stay, MD = mean difference, NICU = neonatal intensive care unit, OMT = osteopathic manipulative treatment, RCT = randomized controlled trial, RR = relative risk, SD = somatic dysfunction. Keywords: length of stay, NICU, osteopathic manipulative treatment, preterm infants, systematic review.

DOI: 10.1097/MD.00000000000006408 | PMID: 28328840



<https://insights.ovid.com/crossref?an=00005792-201703240-00043>

## Fibromyalgia with Gabapentin and Osteopathic Manipulative Medicine: A Pilot Study.

Marske C, Bernard N, Palacios A, Wheeler C, Preiss B, Brown M, Bhattacharya S, Klapshtein G.

### OBJECTIVES:

This pilot study compares the safety and efficacy of three treatments in reducing pain and improving fibromyalgia symptoms.

### DESIGN:

This study was an 8-week prospective, single center feasibility study.

### SETTING AND SUBJECTS:

Forty subjects were recruited from Solano, Sonoma, and Contra Costa counties of California in 2006-2009. Subjects were aged 18-65 and met the American College of Rheumatology (ACR) 1990 criteria for fibromyalgia.

### INTERVENTIONS:

This study had three treatment arms: gabapentin only (900 mg/day), osteopathic manipulative medicine (OMM) only, and combined treatment of gabapentin plus OMM. OMM treatment was administered by advanced medical students for 30 min, once a week. The trial lasted for 8 weeks, which included 6 weeks of treatment plus initial and final visits.

### OUTCOME MEASURES:

Key outcome measures included Wong-Baker FACES Pain Rating Scale (WBF), Clinical Global Impression of Health (CGI), Fibromyalgia Impact Questionnaire (FIQ), and number of tender points.

### RESULTS:

Twenty-nine subjects completed the trial; 8 subjects received gabapentin only, 11 patients received OMM only, and 10 patients received gabapentin plus OMM. Subjects

receiving OMM alone and subjects receiving the combined treatment of OMM and gabapentin displayed clinical improvements based on WBF ( $p < 0.01$  and  $p = 0.03$ , respectively), while the change among the gabapentin-only group was nonsignificant. The OMM only group was the only group to experience a significant decline in CGI scale ( $p < 0.01$ ). No statistically significant changes were observed with the FIQ or number of tender points. No differences across groups were statistically significant. This is to be expected in a feasibility study with a small sample size.

## CONCLUSIONS:

This pilot study suggests that OMM treatment and gabapentin are safe and clinically efficacious treatment of pain and other constitutional and somatic symptoms associated with fibromyalgia. A larger trial using the new ACR 2010 Fibromyalgia criteria is needed to confirm these findings.

DOI: 10.1089/acm.2017.0178 | PMID: 29298077



<https://www.ncbi.nlm.nih.gov/pubmed/29298077>

## Impact of osteopathic therapy on proprioceptive balance and quality of life in patients with dizziness.

Papa L, Amodio A, Biffi F, Mandara A.

J Altern Complement Med. 2018 Apr;24(4):395-402. doi: 10.1089/acm.2017.0178. Epub 2018 Jan 3.

### ABSTRACT

The aim of the study was to evaluate the efficacy of osteopathic manipulative treatment (OMT) in patients with Benign-Paroxysmal-Positional Vertigo (BPPV). Thirty-one patients with BPPV were randomly assigned into two groups: 19 patients received osteopathic treatments (TG) and 12 patients received sham therapy (SG), both in four weekly sessions. Before the first and the last treatment, those patients were evaluated using Dizziness Handicap Inventory (DHI) and stabilometric platform to assess lifestyle modification and balance functions. After the treatment session, TG compared to SG showed an improvement in DHI global ( $p = 0.02$ ), functional ( $p = 0.03$ ) and physical ( $p = 0.03$ ) components, as well as a reduction of swinging area ( $p = 0.02$ ). An association between swinging area and lifestyle measures (global [ $r = 0.53$ ;  $p = 0.02$ ]; functional [ $r = 0.50$ ;  $p = 0.03$ ]; physical [ $r = 0.60$ ;  $p = 0.01$ ]) changes were found in TG. These findings suggest that OMT could be a useful approach to reduce imbalance symptoms and to improve the quality of life in patients suffering from dizziness.

DOI: 10.1016/j.jbmt.2017.03.001 | PMID: 29037641



<https://www.ncbi.nlm.nih.gov/pubmed/29037641>

## Preliminary evidence of Regional Interdependent Inhibition, using a 'Diaphragm Release' to specifically induce an immediate hypoalgesic effect in the cervical spine.

McCoss CA, Johnston R, Edwards DJ, Millward C.

J Bodyw Mov Ther. 2017 Apr;21(2):362-374. doi: 10.1016/j.jbmt.2016.08.015. Epub 2016 Sep 9.

### ABSTRACT

In clinical practice, Osteopaths and Manual Therapists commonly direct treatment towards the diaphragm by the use of a 'Diaphragm Release'. Currently, there is paucity within the literature to support the use of this technique, specifically in pain outcomes. This research aims to support a neurophysiological mechanism based upon the osteopathic principle "The body is a unit". Demonstrating that directing treatment to distal tissue which is neurologically related can reduce pain in the originating spinal segments. This study investigated the immediate hypoalgesic effects of a 'Diaphragm Release' on pain pressure thresholds in the cervical spine. A single-blind, randomised, sham-controlled, repeated measures within subject, crossover design was conducted on 17 asymptomatic subjects. Pain pressure thresholds were measured bilaterally in the C4 paraspinal musculature, lateral end of the clavicle and upper third of the tibialis anterior before and after a 'Diaphragm Release'. Results demonstrated a statistically significant hypoalgesic effect was only found in the spinal segment C4 in both the right ( $p = 0.016$ ) and left ( $p = 0.004$ ) sides. Averaging the hypoalgesic effect from both sides equates to a 17.17% change which is considered clinically significant, the effect magnitude was calculated to be small but educationally significant for the right ( $d = 0.26$ ) and left ( $d = 0.40$ ) sides. This study supports a novel neurophysiological mechanism, Regional Interdependent Inhibition, to induce a hypoalgesic state at segmentally related spinal segments, specifically C4. Suggesting that directing treatment towards the diaphragm, using a 'Diaphragm Release', could induce an immediate clinically and statistically significant hypoalgesic effect local to the fourth cervical segment due to its relationship with the phrenic nerve.

DOI: 10.1016/j.jbmt.2016.08.015 | PMID: 28532881



<https://www.ncbi.nlm.nih.gov/pubmed/28532881>

## Osteopathic Manipulative Treatment Improves Heart Surgery Outcomes: A Randomized Controlled Trial.

Racca V, Bordoni B, Castiglioni P, Modica M, Ferratini M.

Ann Thorac Surg. 2017 Jul;104(1):145-152. doi: 10.1016/j.athoracsur.2016.09.110. Epub 2017 Jan 18.

### BACKGROUND:

Controlling sternal pain after heart surgery is important to reduce the risk of postoperative complications, but pain is often undertreated because of contraindications and side effects of analgesic drugs. Recently, osteopathic manipulative treatment (OMT) was demonstrated to reduce pain in different clinical contexts, suggesting its potential utility after cardiac surgery. The aim of this open-label, controlled study is to assess whether OMT contributes to sternal pain relief and improves postoperative outcomes.

### METHODS:

Eighty post-sternotomy adult inpatients were randomly allocated one to one to receive a standardized cardiorespirator rehabilitation program alone (control group) or combined with OMT. Pain intensity and respiratory functional capacity were quantified by the Visual Analogue Scale score and by a standardized breathing test, at the start and end of rehabilitation.

### RESULTS:

At the start of rehabilitation, the control group and the OMT group had similar Visual Analogue Scale median scores (controls 4, interquartile range [IQR]: 2 to 5; OMT 4, IQR: 3 to 5;  $p =$  not significant) and mean inspiratory volumes (controls  $825 \pm 381$  mL; OMT  $744 \pm 291$  mL;  $p =$  not significant). At the end of rehabilitation, the OMT group had a lower Visual Analogue Scale median score (controls 3, IQR: 2 to 4; OMT 1, IQR: 1 to 2;  $p < 0.01$ ) and higher mean inspiratory volume (controls  $1,400 \pm 588$  mL; OMT  $1,781 \pm 633$  mL;  $p < 0.01$ ). The analgesic drug intake was similar in the two groups. The hospitalization was shorter in the OMT group than in the control group ( $19.1 \pm 4.8$  versus  $21.7 \pm 6.3$  days;  $p < 0.05$ ).

## CONCLUSIONS:

The combination of standard care with OMT is effective in inducing pain relief and functional recovery, and significantly improves the management of patients after heart surgery with sternotomy.

DOI: 10.1016/j.athoracsur.2016.09.110 | PMID: 28109570



<https://www.ncbi.nlm.nih.gov/pubmed/28109570>

## Effectiveness of osteopathic manipulative treatment versus osteopathy in the cranial field in temporomandibular disorders - a pilot study.

Gesslbauer C, Vavti N, Keilani M, Mickel M, Crevenna R.

Disabil Rehabil. 2018 Mar;40(6):631-636. doi: 10.1080/09638288.2016.1269368. Epub 2016 Dec 28.

### PURPOSE:

Temporomandibular disorders are a common musculoskeletal condition causing severe pain, physical and psychological disability. The effect and evidence of osteopathic manipulative treatment and osteopathy in the cranial field is scarce and their use are controversial. The purpose of this pilot study was to evaluate the effectiveness of osteopathic manipulative treatment and osteopathy in the cranial field in temporomandibular disorders.

### METHODS:

A randomized clinical trial in patients with temporomandibular disorders was performed. Forty female subjects with long-term temporomandibular disorders (>3 months) were included. At enrollment, subjects were randomly assigned into two groups: osteopathic manipulative treatment group (20 female patients) and (2) osteopathy in the cranial field group (20 female patients). Examination was performed at baseline (E0) and at the end of the last treatment (E1), consisting of subjective pain intensity with the Visual Analog Scale, Helkimo Index and SF-36 Health Survey. Subjects had five treatments, once a week. 36 subjects completed the study ( $33.7 \pm 10.3$  y).

### RESULTS:

Patients in both groups showed significant reduction in Visual Analog Scale score (osteopathic manipulative treatment group:  $p = 0.001$ ; osteopathy in the cranial field group:  $p < 0.001$ ), Helkimo Index (osteopathic manipulative treatment group:  $p = 0.02$ ; osteopathy in the cranial field group:  $p = 0.003$ ) and a significant improvement in the SF-36 Health Survey - subscale "Bodily Pain" (osteopathic manipulative treatment group:  $p = 0.04$ ; osteopathy in the cranial field group:  $p = 0.007$ ) after five treatments (E1). All subjects ( $n = 36$ ) also showed significant improvements in the above named parameters after

five treatments (E1): Visual Analog Scale score ( $p < 0.001$ ), Helkimo Index ( $p < 0.001$ ), SF-36 Health Survey - subscale "Bodily Pain" ( $p = 0.001$ ). The differences between the two groups were not statistically significant for any of the three target parameters.

## CONCLUSION:

Both therapeutic modalities had similar clinical results. The findings of this pilot trial support the use of osteopathic manipulative treatment and osteopathy in the cranial field as an effective treatment modality in patients with temporomandibular disorders. The positive results in both treatment groups should encourage further research on osteopathic manipulative treatment and osteopathy in the cranial field and support the importance of an interdisciplinary collaboration in patients with temporomandibular disorders. Implications for rehabilitation Temporomandibular disorders are the second most prevalent musculoskeletal condition with a negative impact on physical and psychological factors. There are a variety of options to treat temporomandibular disorders. This pilot study demonstrates the reduction of pain, the improvement of temporomandibular joint dysfunction and the positive impact on quality of life after osteopathic manipulative treatment and osteopathy in the cranial field. Our findings support the use of osteopathic manipulative treatment and osteopathy in the cranial field and should encourage further research on osteopathic manipulative treatment and osteopathy in the cranial field in patients with temporomandibular disorders. Rehabilitation experts should consider osteopathic manipulative treatment and osteopathy in the cranial field as a beneficial treatment option for temporomandibular disorders.

DOI: 10.1080/09638288.2016.1269368 | PMID: 28029069



<https://www.ncbi.nlm.nih.gov/pubmed/28029069>

## Efficacy of an Osteopathic Treatment Coupled With Lactation Consultations for Infants' Biomechanical Sucking Difficulties.

Herzhaft-Le Roy J, Xhignesse M, Gaboury I.

J Hum Lact. 2017 Feb;33(1):165-172. doi: 10.1177/0890334416679620. Epub 2016 Dec 27.

### BACKGROUND:

Despite well-known recommendations from national and international bodies including the World Health Organization, few mothers achieve the goal of breastfeeding exclusively for 6 months. Half of mothers stop breastfeeding due to biomechanical issues in the first month, despite increasing support from lactation consultants. Osteopaths worldwide work with these babies, but there is little empirical evidence for this type of treatment. Research aim: This study aimed to determine the efficacy of an osteopathic treatment coupled with usual lactation consultations on infants' ability to latch. Secondary objectives included assessment of nipple pain and mothers' perceptions of the effect of treatment.

### METHODS:

We conducted a single blind, randomized controlled trial at a mother-to-mother support group between January and December 2015. Data were collected at four different times over a 10-day period (T0-T10) from 97 mother-infant dyads using the LATCH assessment tool, a visual analog scale (VAS) to document mothers' nipple pain, and a de novo questionnaire for breastfeeding management and potential treatment side effects.

### RESULTS:

There were consistent statistical and clinical differences in the mean LATCH scores between the treatment and the control groups ( $p < .001$ ). However, no significant differences in the VAS scores were reported over time ( $p = .713$ ). Mothers reported no serious or unexpected side effects during the follow-up period.

### CONCLUSION:

This study is one of the first to bring together lactation consultants and osteopaths to address infants with biomechanical sucking difficulties. Findings support the hypothesis that the addition of osteopathy to regular lactation consultations is beneficial and safe.

DOI: 10.1177/0890334416679620 | PMID: 28027445



<https://www.ncbi.nlm.nih.gov/pubmed/28027445>

## Effect of osteopathic manipulative treatment on length of stay in a population of preterm infants: a randomized controlled trial.

Cerritelli F, Pizzolorusso G, Ciardelli F, La Mola E, Cozzolino V, Renzetti C, D’Incecco C, Fusilli P, Sabatino G, Barlafante G.

BMC Pediatr. 2013 Apr 26;13:65. doi: 10.1186/1471-2431-13-65.

### BACKGROUND:

The use of osteopathic manipulative treatment (OMT) in preterm infants has been documented and results from previous studies suggest the association between OMT and length of stay (LOS) reduction, as well as significant improvements in several clinical outcomes. The aim of the present study is to investigate the effect of OMT on LOS in premature infants.

### METHODS:

A randomized controlled trial was conducted on preterm newborns admitted to a single NICU between 2008-2009. N=110 subjects free of medical complications and with gestational age >28 and < 38 weeks were enrolled and randomized in two groups: study group (N=55) and control group (N=55). All subjects received routine pediatric care and OMT was performed to the study group for the entire period of hospitalization. Endpoints of the study included differences in LOS and daily weight gain.

### RESULTS:

Results showed a significant association between OMT and LOS reduction (mean difference between treated and control group: -5.906; 95% C.I. -7.944, -3.869;  $p < 0.001$ ). OMT was not associated to any change in daily weight gain.

### CONCLUSIONS:

The present study suggests that OMT may have an important role in the management of preterm infants hospitalization.

### TRIAL REGISTRATION:

ClinicalTrials.gov, NCT01544257.

DOI: 10.1186/1471-2431-13-65 | PMCID: PMC3648440 | PMID: 23622070

 <https://www.ncbi.nlm.nih.gov/pubmed/23622070>

## The effect of osteopathic manipulative treatment on postoperative medical and functional recovery of coronary artery bypass graft patients.

Wieting JM, Beal C, Roth GL, Gorbis S, Dillard L, Gilliland D, Rowan J.

J Am Osteopath Assoc. 2013 May;113(5):384-93.

### CONTEXT:

Several studies have investigated the use of osteopathic manipulative treatment (OMT) after coronary artery bypass graft (CABG) operations; however, there is little information regarding the effect of OMT in the postoperative recovery of patients undergoing CABG operations.

### METHODS:

Patients scheduled to undergo a CABG operation were voluntarily enrolled and randomly assigned to receive 1 of 3 treatment protocols after their surgical procedure: standardized daily OMT and conventional postoperative care (the OMT group), daily time-matched placebo OMT and conventional postoperative care (the placebo group), or conventional postoperative care only (the control group). Specific OMT techniques used were thoracic inlet myofascial release, standard rib raising (with paraspinal muscle stretch to the L2 vertebral level), and soft tissue cervical paraspinal muscle stretch (with suboccipital muscle release). Primary outcome measures included time to discharge, time to postoperative bowel movement, and FIM functional assessment scores.

### RESULTS:

Fifty-three patients completed the study protocol: 17 in the OMT group, 18 in the placebo group, and 18 in the control group. After surgical procedures, patients were discharged to home at a mean (standard deviation [SD]) rate of 6.1 (1.4), 6.3 (1.5), and 6.7 (3.0) days for the OMT group, placebo group, and control group, respectively. Patients in the OMT group were discharged 0.55 days earlier than those in the control group and 0.16 days earlier than those in the placebo group. The mean (SD) number of days to first postoperative bowel movement was 3.5 (0.9), 4.0 (0.8), and 4.0 (0.9) for the OMT group, the placebo group, and the control group, respectively. On day 3 after surgery, the mean (SD) total score on the FIM was 19.3 (6.7), 15.4 (7.3), and 18.6 (6.5) for the

OMT, the placebo, and the control group, respectively; total score for the OMT group was 0.81 greater than that of the control group and 3.87 greater than that of the placebo group. None of the differences achieved statistical significance ( $P < .05$ )

## CONCLUSION:

A daily postoperative OMT protocol improved functional recovery of patients who underwent a CABG operation.

PMID: 23667192



<https://www.ncbi.nlm.nih.gov/pubmed/23667192>

## Outcomes of osteopathic manual treatment for chronic low back pain according to baseline pain severity: results from the OSTEOPATHIC Trial.

Licciardone JC, Kearns CM, Minotti DE.

Man Ther. 2013 Dec;18(6):533-40. doi: 10.1016/j.math.2013.05.006. Epub 2013 Jun 10.

### PURPOSE:

To assess response to osteopathic manual treatment (OMT) according to baseline severity of chronic low back pain (LBP).

### METHODS:

The OSTEOPATHIC Trial used a randomized, double-blind, sham-controlled, 2×2 factorial design to study OMT for chronic LBP. A total of 269 (59%) patients reported low baseline pain severity (LBPS) (<50 mm/100 mm), whereas 186 (41%) patients reported high baseline pain severity (HBPS) (≥50 mm/100 mm). Six OMT sessions were provided over eight weeks and outcomes were assessed at week 12. The primary outcome was substantial LBP improvement (≥50% pain reduction). The Roland-Morris Disability Questionnaire (RMDQ) and eight other secondary outcomes were also studied. Response ratios (RRs) and 95% confidence intervals (CIs) were used in conjunction with Cochrane Back Review Group criteria to determine OMT effects.

### RESULTS:

There was a large effect size for OMT in providing substantial LBP improvement in patients with HBPS (RR, 2.04; 95% CI, 1.36-3.05; P<0.001). This was accompanied by clinically important improvement in back-specific functioning on the RMDQ (RR, 1.80; 95% CI, 1.08-3.01; P=0.02). Both RRs were significantly greater than those observed in patients with LBPS. Osteopathic manual treatment was consistently associated with benefits in all other secondary outcomes in patients with HBPS, although the statistical significance and clinical relevance of results varied.

### CONCLUSIONS:

The large effect size for OMT in providing substantial pain reduction in patients with chronic LBP of high severity was associated with clinically important improvement in

back-specific functioning. Thus, OMT may be an attractive option in such patients before proceeding to more invasive and costly treatments.

DOI: 10.1016/j.math.2013.05.006 | PMID: 23759340



<https://www.ncbi.nlm.nih.gov/pubmed/23759340>

## Changes in alpha band activity associated with application of the compression of fourth ventricular (CV-4) osteopathic procedure: a qEEG pilot study.

Miana L, Bastos VH, Machado S, Arias-Carrión O, Nardi AE, Almeida L, Ribeiro P, Machado D, King H, Silva JG.

J Bodyw Mov Ther. 2013 Jul;17(3):291-6. doi: 10.1016/j.jbmt.2012.10.002. Epub 2012 Nov 16.

### ABSTRACT

The compression of the fourth ventricle (CV-4) is one of the more well known procedures in the cranial manipulation curriculum and practice. Cranial manipulation has received criticism because of the subtle, difficult to learn techniques, controversy over whether or not cranial bone structures move, and what if any clinical effects have been shown. The aim of this study was to measure the effects of CV-4 in 10 healthy subjects through quantitative electroencephalography (qEEG), specifically in alpha band. Participants were randomly distributed in control, sham-CV4 and CV4 conditions using a cross-over design. qEEG activity was recorded for each of the 10 subjects in each of the 3 conditions. There was a significant increase in the alpha absolute power between pre and post in the CV-4 condition. There appears to be potential for understanding the effect of the CV-4 if these findings are replicated in further clinical trials.

DOI: 10.1016/j.jbmt.2012.10.002 | PMID: 23768271



<https://www.ncbi.nlm.nih.gov/pubmed/23768271>

## The effect of visceral osteopathic manual therapy applications on pain, quality of life and function in patients with chronic nonspecific low back pain.

Tamer S, Öz M, Ülger Ö.

J Back Musculoskelet Rehabil. 2017;30(3):419-425. doi: 10.3233/BMR-150424.

### BACKGROUND:

The efficacy of osteopathic manual therapy (OMT) applications on chronic nonspecific low back pain (LBP) has been demonstrated. However, visceral applications, which are an important part of OMT techniques, have not been included in those studies.

### OBJECTIVE:

The study's objective was to determine the effect of OMT including visceral applications on the function and quality of life (QoL) in patients with chronic nonspecific LBP.

### DESIGN:

The study was designed with a simple method of block randomization.

### METHODS:

Thirty-nine patients with chronic nonspecific LBP were included in the study. OMT group consisted of 19 patients to whom OMT and exercise methods were applied. The visceral osteopathic manual therapy (vOMT) group consisted of 20 patients to whom visceral applications were applied in addition to the applications carried out in the other group. Ten sessions were performed over a two-week period. Pain (VAS), function (Oswestry Index) and QoL (SF-36) assessments were carried out before the treatment and on the sixth week of treatment.

### RESULTS:

Both of the treatments were found to be effective on pain and function, physical function, pain, general health, social function of the QoL sub-parameter. vOMT was effective on all sub-QoL parameters ( $p < 0.05$ ). Comparing the groups, it was determined that the energy and physical limitations of the QoL scores in vOMT were higher ( $p < 0.05$ ).

## CONCLUSION:

Visceral applications on patients with non-specific LBP gave positive results together with OMT and exercise methods. We believe that visceral fascial limitations, which we think cause limitations and pain in the lumbar segment, should be taken into consideration.

DOI: 10.3233/BMR-150424 | PMID: 27858681



<https://www.ncbi.nlm.nih.gov/pubmed/27858681>

## Osteopathic manipulation as a complementary approach to Parkinson's disease: A controlled pilot study.

DiFrancisco-Donoghue J, Apoznanski T, de Vries K, Jung MK, Mancini J, Yao S.

NeuroRehabilitation. 2017;40(1):145-151. doi: 10.3233/NRE-161400.

### BACKGROUND:

Osteopathic Manipulative Medicine (OMM) is a therapy of manual forces that is directed to improve function and homeostasis. It has been shown to improve balance in individuals with dizziness, and improve gait in Parkinson's disease (PD). This study was designed to determine if our pre-defined OMM protocol would improve motor function and balance in individuals with PD.

### METHODS:

A randomized controlled trial to test OMM on balance and motor function in PD measured by the Mini-BESTest, Sensory Organization Test (SOT), and MDS-UPDRS. 11 Subjects (age 75±16) were randomly assigned to either bi-weekly OMM treatments first for 6 weeks or weekly counseling sessions from a medical provider for 6 weeks as a placebo-control. 9 subjects completed this study.

### RESULTS:

There were no significant changes in SOT or Mini BESTest in either group ( $p < 0.05$ ). There was significant improvement in the OMM group for MDS-UPDRS.

### CONCLUSIONS:

Our pilot data showed OMM treatment bi-weekly for 6 weeks improved motor function. There were no significant changes in balance, however there were clinically relevant improvements after 6 weeks of OMM. Using a predefined protocol, OMM may be a complementary approach to improving balance and motor function in individuals with PD.

DOI: 10.3233/NRE-161400 | PMID: 27814309



<https://www.ncbi.nlm.nih.gov/pubmed/27814309>

## Effect of Osteopathic Cranial Manipulative Medicine on Visual Function.

Sandhouse ME, Shechtman D, Fecho G, Timoshkin EM.

J Am Osteopath Assoc. 2016 Nov 1;116(11):706-714. doi: 10.7556/jaoa.2016.141.

### CONTEXT:

The effects of osteopathic cranial manipulative medicine (OCMM) on visual function have been poorly characterized in the literature. Based on a pilot study conducted by their research group, the authors conducted a study that examined whether OCMM produced a measurable change in visual function in adults with cranial asymmetry.

### STUDY DESIGN:

Randomized, controlled, double-blinded clinical trial. The intervention and control (sham therapy) were applied during 8 weekly visits, and participants in both groups received 8 weekly follow-up visits.

### PARTICIPANTS:

Adult volunteers aged between 18 and 35 years with unremarkable systemic or ocular history were recruited. Inclusion criteria were refractive error between 6 diopters of myopia and 5 diopters of hyperopia, regular astigmatism of any amount, and cranial somatic dysfunction.

### INTERVENTION:

All participants were evaluated for cranial asymmetry and randomly assigned to the treatment or sham therapy group. The treatment group received OCMM to correct cranial dysfunctions, and the sham therapy group received light pressure applied to the cranium.

### OUTCOME MEASURES:

Preintervention and postintervention ophthalmic examinations consisted of distance visual acuity testing, accommodative system testing, local stereoacuity testing, pupillary size measurements, and vergence system testing. A  $\chi^2$  analysis was performed to

determine participant masking. Analysis of variance was performed for all ophthalmic measures.

## RESULTS:

Eighty-nine participants completed the trial, with 47 in the treatment group and 42 in the sham therapy group. A hierarchical analysis of variance revealed statistically significant within-groups effects ( $P < .05$ ) from before the intervention to visit 16 in distance visual acuity of both eyes, local stereoacuity, Donder pushup in both eyes, and near point of convergence break and recovery. For treatment group vs sham therapy group, a statistically significant effect ( $P < .05$ ) was observed from before the intervention to visit 16 in pupillary size under bright light in the left eye and in near point of convergence break.

## CONCLUSION:

Osteopathic cranial manipulative medicine may affect visual function in adults with cranial asymmetry. Active motion testing of the cranium for somatic dysfunction may affect the cranial system to a measurable level and explain interrater reliability issues in cranial studies. (ClinicalTrials.gov number NCT02728713).

DOI: 10.7556/jaoa.2016.141 | PMID: 27802556



<https://www.ncbi.nlm.nih.gov/pubmed/27802556>

## PROMOTE Study: Safety of Osteopathic Manipulative Treatment During the Third Trimester by Labor and Delivery Outcomes.

Hensel KL, Roane BM, Chaphekar AV, Smith-Barbaro P.

J Am Osteopath Assoc. 2016 Nov 1;116(11):698-703. doi: 10.7556/jaoa.2016.140.

### BACKGROUND:

Few quality data exist on the safety of osteopathic manipulative treatment (OMT) during pregnancy. The Pregnancy Research on Osteopathic Manipulation Optimizing Treatment Effects (PROMOTE) study was a randomized controlled clinical trial that studied the application of an OMT protocol to manage pain and dysfunction in pregnant patients during their third trimester.

### OBJECTIVE:

To evaluate the safety of an OMT protocol applied during the third trimester of pregnancy by analyzing incidence of high-risk status and labor and delivery outcomes.

### METHODS:

In the PROMOTE study, 400 pregnant patients were randomly assigned to 1 of 3 study groups: usual care plus OMT (OMT), usual care plus placebo ultrasound treatment (PUT), or usual care only (UCO). The incidence of high-risk status of participants and outcomes of labor and delivery, including length of labor, fever in mother during labor, operative vaginal delivery, conversion to cesarean delivery, need for forceps or vacuum device, need for episiotomy, incidence of perineal laceration, meconium-stained amniotic fluid, and infants' Apgar scores, were analyzed.

### RESULTS:

Data from 380 participants were studied. High-risk status was less likely to develop in participants who received OMT (95% CI, 0.16-0.91;  $P=.03$ ). The OMT protocol also did not increase risk of precipitous labor, operative vaginal delivery, conversion to cesarean delivery, need for forceps or vacuum device, need for episiotomy, incidence of perineal laceration, or meconium-stained amniotic fluid when compared with participants in the other 2 groups ( $P>.05$ ). Of all other maternal outcomes examined, no diffe-

rence was reported among the 3 treatment groups with the exception of incidence of prolonged labor in the OMT group. Participants receiving OMT had longer durations of labor than participants in the other groups (P=.002).

## CONCLUSION:

These results suggest that the OMT protocol given during the third trimester of pregnancy as applied in the PROMOTE study is safe with regard to labor and delivery outcomes. The increased duration in labor in the OMT group needs further study. (ClinicalTrials.gov number NCT00426244).

DOI: 10.7556/jaoa.2016.140 | MID: 27802555



<https://www.ncbi.nlm.nih.gov/pubmed/27802555>

## Repeat-measures longitudinal study evaluating behavioural and gastrointestinal symptoms in children with autism before, during and after visceral osteopathic technique (VOT).

Bramati-Castellarin I, Patel VB(2), Drysdale IP(2).

J Bodyw Mov Ther. 2016 Jul;20(3):461-70. doi: 10.1016/j.jbmt.2016.01.001. Epub 2016 Jan 14.

### ABSTRACT

This study investigated the influence of visceral osteopathic technique (VOT) on the behaviour and gastrointestinal (GI) symptoms of children with autism using a validated questionnaire to measure outcome. METHODS: The 49 recruited autistic children suffered GI symptoms and impaired social interaction and communication, but were otherwise healthy. Thirty minute VOT sessions were applied to the abdomens of the children over a 6 week period whilst their GI and behavioural parameters were recorded. Outcomes were measured using a modified Autism Research Institute Secretin Outcomes Survey Form, the 'S.O.S Form'. Four questionnaires were completed by parents before treatment (control period), four completed during treatment (treatment period) and one completed six weeks after the last treatment (post treatment period). Subjects acted as their own controls.

### RESULTS:

Results from repeat ANOVA demonstrated a positive, overall significant, symptomatic improvement ( $p < 0.05$ ) in 'social behaviour and communication' and 'digestive signs' subscales of the questionnaire comparing before and after VOT. Significant improvement in vomiting ( $p = 0.00029$ ), poor appetite ( $p = 0.039$ ) and eye contact ( $p = 0.035$ ) was also demonstrated after VOT application.

### DISCUSSION AND CONCLUSION:

The experimental hypothesis has been supported indicating a positive effect of VOT on some of the measured GI symptoms and behavioural patterns in this group of children with autism. This data indicates that the application of VOT may be of benefit to children with autism and GI disturbance.

DOI: 10.1016/j.jbmt.2016.01.001 | PMID: 27634066



<https://www.ncbi.nlm.nih.gov/pubmed/27634066>

## Osteopathic Manipulative Treatment in Pediatric and Neonatal Patients and Disorders: Clinical Considerations and Updated Review of the Existing Literature.

Bagagiolo D, Didio A, Sbarbaro M, Priolo CG, Borro T, Farina D.

Am J Perinatol. 2016 Sep;33(11):1050-4. doi: 10.1055/s-0036-1586113. Epub 2016 Sep 7.

### ABSTRACT

Osteopathic medicine is a form of complementary and alternative medicine. Osteopathic practitioners treat patients of all ages: according to the Osteopathic International Alliance's 2012 survey, about one-third of all treated patients are aged between 31 and 50 years and nearly a quarter (23.4%) are pediatric patients, with 8.7% of them being younger than 2 years. In 2013 a systematic review evaluated the effectiveness of osteopathic manipulative treatment (OMT) in pediatric patients with different underlying disorders, but due to the paucity and low methodological quality of the primary studies the results were inconclusive. The aim of this review is therefore to update the evidence concerning OMT in perinatal and pediatric disorders and to assess its clinical impact. Most published studies favor OMT, but the generally small sample sizes in these studies cannot support ultimate conclusions about the efficacy of osteopathic therapy in pediatric age. In turn, clinical trials of OMT in premature infants might represent an important step in the osteopathic research because they can address both cost-effectiveness issues, and an innovative, multidisciplinary approach to the management of specific pediatric diseases cared for by the same, common health care system. The available studies in neonatal settings provide evidence that OMT is effective in reducing the hospital length of stay of the treated infants, therefore, suggesting that robust cost-effectiveness analyses should be included in the future clinical trials' design to establish new possible OMT-shared strategies within the health care services provided to newborns.

DOI: 10.1055/s-0036-1586113 | PMID: 27603533



<https://www.ncbi.nlm.nih.gov/pubmed/27603533>

## **Benefits of Craniosacral Therapy in Patients with Chronic Low Back Pain: A Randomized Controlled Trial.**

Castro-Sánchez AM, Lara-Palomo IC, Matarán-Peñarrocha GA, Saavedra-Hernández M, Pérez-Mármol JM, Aguilar-Ferrándiz ME.

J Altern Complement Med. 2016 Aug;22(8):650-7. doi: 10.1089/acm.2016.0068. Epub 2016 Jun 27.

### **OBJECTIVES:**

To evaluate the effects of craniosacral therapy on disability, pain intensity, quality of life, and mobility in patients with low back pain.

### **DESIGN:**

A single-blinded randomized controlled trial.

### **PATIENTS:**

Sixty-four patients with chronic nonspecific low back pain (mean age  $\pm$  SD, 50  $\pm$  12 years; 66% female) who were referred for physical therapy at a clinical unit of the Health Science School of the University of Almeria (Spain).

### **INTERVENTIONS:**

Participants were randomly assigned to an experimental group (10 sessions of craniosacral therapy) or a control group (10 sessions of classic massage).

### **OUTCOME MEASURES:**

Disability (Roland Morris Disability Questionnaire [RMQ, primary outcome] and Oswestry Disability Index), pain intensity (10-point numeric pain rating scale), kinesiophobia (Tampa Scale of Kinesiophobia), isometric endurance of trunk flexor muscles (McQuade test), lumbar mobility in flexion, hemoglobin oxygen saturation, systolic blood pressure, diastolic blood pressure, hemodynamic measures (cardiac index), and biochemical estimation of interstitial fluid. These outcomes were registered at baseline, after treatment, and 1-month follow-up.

## RESULTS:

No statistically significant differences were seen between groups for the main outcome of the study, the RMQ ( $p = 0.060$ ). However, patients receiving craniosacral therapy experienced greater improvement in pain intensity ( $p \leq 0.008$ ), hemoglobin oxygen saturation ( $p \leq 0.028$ ), and systolic blood pressure ( $p \leq 0.029$ ) at immediate- and medium-term and serum potassium ( $p = 0.023$ ) level and magnesium ( $p = 0.012$ ) at short-term than those receiving classic massage.

## CONCLUSIONS:

Ten sessions of craniosacral therapy resulted in a statistically greater improvement in pain intensity, hemoglobin oxygen saturation, systolic blood pressure, serum potassium, and magnesium level than did 10 sessions of classic massage in patients with low back pain.

DOI: 10.1089/acm.2016.0068 | PMID: 27347698



<https://www.ncbi.nlm.nih.gov/pubmed/27347698>

## Sympathetic and parasympathetic responses to specific diversified adjustments to chiropractic vertebral subluxations of the cervical and thoracic spine.

Welch, Arlene; Boone, Ralph

J Chiropr Med. 2008 Sep;7(3):86-93. doi: 10.1016/j.jcm.2008.04.001.

### OBJECTIVE:

The aims of this study were to investigate the response of the autonomic nervous system based upon the area of the spine adjusted and to determine if a cervical adjustment elicits a parasympathetic response and if a thoracic adjustment elicits a sympathetic response.

### METHODS:

Forty patients (25-55 years old) met inclusion criteria that consisted of normal blood pressure, no history of heart disease, and being asymptomatic. Patients were evaluated pre- and post-chiropractic adjustment for the following autonomic responses: blood pressure and pulse rate. Seven patients were measured for heart rate variability. The subjects received either a diversified cervical segment adjustment or a diversified thoracic segment adjustment.

### RESULTS:

Diastolic pressure (indicating a sympathetic response) dropped significantly postadjustment among those receiving cervical adjustments, accompanied by a moderate clinical effect (0.50). Pulse pressure increased significantly among those receiving cervical adjustments, accompanied by a large effect size (0.82). Although the decrease in pulse pressure for those receiving thoracic adjustments was not statistically significant, the decrease was accompanied by a moderate effect size (0.66).

### CONCLUSION:

It is preliminarily suggested that cervical adjustments may result in parasympathetic responses, whereas thoracic adjustments result in sympathetic responses. Furthermore, it appears that these responses may demonstrate the relationship of autonomic responses in association to the particular segment(s) adjusted.

DOI:10.1016/j.jcm.2008.04.001 | PMID: 19646369 | PMCID: PMC2686395



<https://www.ncbi.nlm.nih.gov/pubmed/19646369>

## Changes in pressure pain thresholds over C5-C6 zygapophyseal joint after a cervicothoracic junction manipulation in healthy subjects

Fernández-de-Las-Peñas C, Alonso-Blanco C, Cleland JA, Rodríguez-Blanco C, Alburquerque-Sendín F.

J Manipulative Physiol Ther. 2008 Jun;31(5):332-7. doi: 10.1016/j.jmpt.2008.04.006.

### OBJECTIVE:

This study examines if C7-T1 manipulation results in changes in pressure pain thresholds (PPT) over bilateral C5-C6 zygapophyseal joints in asymptomatic subjects.

### METHODS:

Thirty subjects, 13 men and 17 women, without a current history of neck, shoulder, or upper extremity pain participated. Participants were randomly divided into 3 groups: experimental dominant group, subjects who received the manipulative thrust directed at the right side of the C7-T1 joint; experimental nondominant group, those who received the thrust on the left side of the C7-T1 joint; and a placebo group, those who received a sham-manual procedure. The outcome measure was the PPT on both right and left C5-C6 zygapophyseal joints, which was assessed at preintervention and 5 minutes postintervention by an assessor blinded to the treatment allocation of the subject. A 3-way repeated measures analysis of covariance was used to evaluate changes in PPT.

### RESULTS:

The analysis of covariance revealed time x group ( $F = 32.3$ ;  $P < .001$ ), time x side ( $F = 4.9$ ;  $P < .05$ ), time x sex ( $F = 7.93$ ;  $P < .01$ ), and time x group x sex ( $F = 7.606$ ;  $P < .001$ ) interactions. Post hoc analyses found that (a) both experimental groups showed greater improvements in PPT than the placebo group ( $P < .05$ ), without significant differences between them ( $P > .6$ ); (b) the right side had greater increases in PPT in both experimental groups ( $P < .05$ ), but not within the placebo group ( $P > .8$ ); (c) men experienced greater increases in PPT levels than women, particularly in the experimental nondominant group ( $P < .01$ ). Within-group effect sizes were large for both experimental groups ( $d > 1$ ), but small for the placebo condition ( $d < 0.2$ ).

## CONCLUSIONS:

These results suggest that a C7-T1 manipulation induced changes in PPT in both right and left C5-C6 zygapophyseal joints in healthy subjects.

DOI: 10.1016/j.jmpt.2008.04.006 | PMID: 18558274



<https://www.ncbi.nlm.nih.gov/pubmed/18558274>

## Predictors for immediate and global responses to chiropractic manipulation of the cervical spine

Thiel HW, Bolton JE.

J Manipulative Physiol Ther. 2008 Mar;31(3):172-83. doi: 10.1016/j.jmpt.2008.02.007.

### OBJECTIVE:

Patients with nonspecific musculoskeletal disorders may vary in their response to treatment. This study set out to identify the predictors for either improvement or worsening in symptoms for which cervical spine manipulation is indicated.

### METHOD:

A large prospective study recorded details on patients, their presenting symptoms, and type of treatment. At the end of the consultation, any immediate improvement or worsening in presenting symptoms was noted. At the follow-up visit, information was collected on the patients' self-reported improvement.

### RESULTS:

Data were collected from 28 807 treatment consultations (in 19 722 patients) and 13 873 follow-up treatments. The presenting symptoms of "neck pain," "shoulder, arm pain," "reduced neck, shoulder, arm movement, stiffness," "headache," "upper, mid back pain," and "none or one presenting symptom" emerged in the final model as significant predictors for an immediate improvement. The presence of any 4 of these predictors raised the probability for an immediate improvement in presenting symptoms after treatment from 70% to similar to 95%. With regard to immediate worsening, "neck pain," "shoulder, arm pain," "headache," "numbness, tingling upper limbs," "upper, mid back pain," and "fainting, dizziness, light-headedness" emerged as predictors; and the presence of any 4 of these raised the probability for immediate worsening from 4.4% to similar to 12%. For global improvement, only 2 predictors were identified; but these did not enhance the postprediction probability.

### CONCLUSIONS:

This study is the first attempt to identify variables that can predict immediate outcomes

in terms of improvement and worsening of presenting symptoms, and global improvement, after cervical spine manipulation. The predictor variables were strongest for immediate improvement.

DOI: 10.1016/j.jmpt.2008.02.007 | PMID: 18394493

 <https://www.ncbi.nlm.nih.gov/pubmed/18394493>

## The immediate effects of upper thoracic translatoric spinal manipulation on cervical pain and range of motion: a randomized clinical trial.

Krauss, John; Creighton, Doug; Ely, Jonathan D; Podlewska-Ely, Joanna

J Man Manip Ther. 2008;16(2):93-9.

### ABSTRACT

This study examined the effect of translatoric spinal manipulation (TSM) on cervical pain and cervical active motion restriction when applied to upper thoracic (T1-T4) segments. Active cervical rotation range of motion was measured re- and post-intervention with a cervical inclinometer (CROM), and cervical pain status was monitored before and after manipulation with a Faces Pain Scale. Study participants included a sample of convenience that included 32 patients referred to physical therapy with complaints of pain in the mid-cervical region and restricted active cervical rotation. Twenty-two patients were randomly assigned to the experimental group and ten were assigned to the control group. Pre- and post-intervention cervical range of motion and pain scale measurements were taken by a physical therapist assistant who was blinded to group assignment. The experimental group received TSM to hypomobile upper thoracic segments. The control group received no intervention. Paired t-tests were used to analyze within-group changes in cervical rotation and pain, and a 2-way repeated-measure ANOVA was used to analyze between-group differences in cervical rotation and pain. Significance was accepted at  $p = 0.05$ . Significant changes that exceeded the MDC(95) were detected for cervical rotation both within group and between groups with the TSM group demonstrating increased mean (SD) in right rotation of 8.23 degrees (7.41 degrees ) and left rotation of 7.09 degrees (5.83 degrees ). Pain levels perceived during post-intervention cervical rotation showed significant improvement during right rotation for patients experiencing pain during bilateral rotation only ( $p=.05$ ). This study supports the hypothesis that spinal manipulation applied to the upper thoracic spine (T1-T4 motion segments) significantly increases cervical rotation ROM and may reduce cervical pain at end range rotation for patients experiencing pain during bilateral cervical rotation.

DOI: 10.1179/106698108790818530



<https://www.ncbi.nlm.nih.gov/pubmed/19119394>

## Chronic mechanical neck pain in adults treated by manual therapy: a systematic review of change scores in randomized controlled trials of a single session.

Vernon, Howard; Humphreys, Barry Kim

J Man Manip Ther. 2008;16(2):E42-52.

### ABSTRACT

We report a systematic analysis of group change scores of subjects with chronic neck pain not due to whiplash and without headache or arm pain, in randomized clinical trials of a single session of manual therapy. A comprehensive literature search of clinical trials of chronic neck pain treated with manual therapies up to December 2006 was conducted. Trials that scored above 60% on the PEDro Scale were included. Change scores were analyzed for absolute, percentage change and effect size (ES) whenever possible. Nine trials were identified: 6 for spinal manipulation, 4 for spinal mobilization or non-manipulative manual therapy (2 overlapping trials), and 1 trial using ischemic compression. No trials were identified for massage therapy or manual traction. Four manipulation trials (five groups) reported mean immediate changes in 100-mm VAS of -18.94 (9.28) mm. ES for these changes ranged from .33 to 2.3. Two mobilization trials reported immediate VAS changes of -11.5 and -4 mm (ES of .36 and .22, respectively); one trial reported no difference in immediate pain scores versus sham mobilization. The ischemic compression study showed statistically significant immediate decreases in 100-mm pain VAS (average = -14.6 mm). There is moderate-to-high quality evidence that immediate clinically important improvements are obtained from a single session of spinal manipulation. The evidence for mobilization is less substantial, with fewer studies reporting smaller immediate changes. There is insufficient evidence for ischemic compression to draw conclusions. There is no evidence for a single session of massage or manual traction for chronic neck pain.

DOI: 10.1179/jmt.2008.16.2.42E



<https://www.ncbi.nlm.nih.gov/pubmed/19119388>

## Immediate effects on pressure pain threshold following a single cervical spine manipulation in healthy subjects

Fernandez-De-Las-Penas C, Perez-De-Heredia M , Brea-Rivero M, Miangolarra-Page JC

Journal of Orthopaedic & Sports Physical Therapy, 2007 Volume:37 Issue:6 Pages:325–329 DOI: 10.2519/jospt.2007.2542

### DESIGN:

A placebo, control, repeated-measures, single-blinded randomized study.

### OBJECTIVES:

To compare the immediate effects on pressure pain threshold (PPT) tested over the lateral elbow region following a single cervical high-velocity low-amplitude (HULA) thrust manipulation, a sham-manual application (placebo), or a control condition; and to analyze if a different effect was evident on the side ipsilateral to, compared to the side contralateral to, the intervention.

### BACKGROUND:

Previous studies investigating the effects of spinal manual therapy used' passive mobilization procedures. There is a lack of studies exploring the effect of cervical manipulative interventions.

### METHODS:

Fifteen asymptomatic volunteers (7 male, 8 female; aged 19-25 years) participated in this study. Each subject attended 3 experimental sessions on 3 separate days, at least 48 hours apart. At each session, subjects received either the manipulation, placebo, or control intervention provided by an experienced therapist. The manipulative intervention was directed at the posterior joint of the C5-6 vertebral level. PPT over the lateral epicondyle of both elbows was assessed preintervention and 5 minutes postintervention by an examiner blinded to the treatment allocation of the subject. A 3-way analysis of covariance (ANCOVA) with intervention, side, and time as factors, and gender as covariate, was used to evaluate changes in PPT

## RESULTS:

The analysis of variance detected a significant effect for intervention ( $F = 31.46, P < .001$ ) and for time ( $F = 33.81, P < .001$ ), but not for side ( $F = 0.303, P > .5$ ). A significant interaction between intervention and time ( $F = 15.74, P < .001$ ) was also found. Gender did not influence the comparative analysis ( $F = 0.252, P > .6$ ). Post hoc analysis revealed that the application of a HVLA thrust manipulation produced a greater increase of PPT in both elbows, as compared to placebo or control interventions ( $P < .001$ ). No significant changes in PPT levels were found after the placebo and control interventions ( $P > .6$ ). Within-group effect sizes were large for PPT levels in both elbows after the manipulative procedure ( $d > 1.0$ ), but small after placebo or control intervention ( $d < 0.1$ ).

## CONCLUSIONS:

The application of a manipulative intervention directed at the posterior joint of the C5-6 vertebral level produced an immediate increase in PPT over the lateral epicondyle of both elbows in healthy subjects. Effect sizes for the HVLA thrust manipulation were large, suggesting a strong effect of unknown clinical importance at this stage, whereas effect sizes for both placebo and control procedures were small, suggesting no significant effect.

DOI: 10.2519/jospt.2007.2542



<https://www.jospt.org/doi/abs/10.2519/jospt.2007.2542>

## Changes in neck pain and active range of motion after a single thoracic spine manipulation in subjects presenting with mechanical neck pain: A case series

Fernández-de-las-Peñas C, Palomeque-del-Cerro L, Rodríguez-Blanco C, Gómez-Cone-sa A, Miangolarra-Page JC.

J Manipulative Physiol Ther. 2007 May;30(4):312-20.

### OBJECTIVE:

Our aim was to report changes in neck pain at rest, active cervical range of motion, and neck pain at end-range of cervical motion after a single thoracic spine manipulation in a case series of patients with mechanical neck pain.

### METHODS:

Seven patients with mechanical neck pain (2 men, 5 women), 20 to 33 years old, were included. All patients received a single thoracic manipulation by an experienced manipulative therapist. The outcome measures of these cases series were neck pain at rest, as measured by a numerical pain rating scale; active cervical range of motion; and neck pain at the end of each neck motion (eg, flexion or extension). These outcomes were assessed pre treatment, 5 minutes post manipulation, and 48 hours after the intervention. A repeated-measures analysis was made with parametric tests. Within-group effect sizes were calculated using Cohen d coefficients.

### RESULTS:

A significant ( $P < .001$ ) decrease, with large within-group effect sizes ( $d > 1$ ), in neck pain at rest were found after the thoracic spinalmanipulation. A trend toward an increase in all cervical motions (flexion, extension, right or left lateral flexion, and right or left rotation) and a trend toward a decrease in neck pain at the end of each cervical motion were also found, although differences did not reach the significance ( $P > .05$ ). Nevertheless, medium to large within-group effect sizes ( $0.5 < d < 1$ ) were found between preintervention data and both postintervention assessments in both active range of motion and neck pain at the end of each neck motion.

## CONCLUSIONS:

The present results demonstrated a clinically significant reduction in pain at rest in subjects with mechanical neck pain immediately and 48 hours following a thoracic manipulation. Although increases in all tested ranges of motion were obtained, none of them reached statistical significance at either posttreatment point. The same was found for pain at the end of range of motion for all tested ranges, with the exception of pain at the end of forward flexion at 48 hours. More than one mechanism likely explains the effects of thoracic spinal manipulation. Future controlled studies comparing spinal manipulation vs spinal mobilization of the thoracic spine are required.

DOI: 10.1016/j.jmpt.2007.03.007 | PMID: 17509440



<https://www.ncbi.nlm.nih.gov/pubmed/17509440>

## Chronic mechanical neck pain in adults treated by manual therapy: A systematic review of change scores in randomized clinical trials

Vernon H, Humphreys K, Hagino C.

J Manipulative Physiol Ther. 2007 Mar-Apr;30(3):215-27.

### OBJECTIVE:

This Study provides a systematic analysis of group change scores in randomized clinical trials of chronic neck pain not due to whiplash and not including headache or arm pain treated with manual therapy.

### METHODS:

A comprehensive literature search of clinical trials of chronic neck pain treated with manual therapies up to December 2005. Only clinical trials scoring above 11.5 (Amsterdam-Maastricht Scale) were included in the analysis.

### RESULTS:

From 1980 citations, 19 publications were selected. Of the 16 trials analyzed (3 were rejected for poor quality), 9 involved spinal manipulation (12 groups), 5 trials (5 groups) were for spinal mobilization or nonmanipulative manual therapy (1 trial overlapped), and 2 trials (2 groups) involved massage therapy. No trials included trigger point therapy or manual traction of the neck. For manipulation studies, the mean effect size (ES) at 6 weeks for 7 trials (10 groups) was 1.63 (95% confidence interval [CI], 1.13-2.13); 1.56 (95% CI, 0.73-2.39) at 12 weeks for 4 trials (5 groups); 1.22 (95% CI, 0.38-2.06) from 52 to 104 weeks for 2 trials (2 groups). For mobilization studies, 1 trial reported an ES of 2.5 at 6 weeks, 2 trials reported full recovery in 63.8% to 71.7% of subjects at 7 to 52 weeks, and 1 trial reported greater than 2/10 point pain score reduction in 78.3% of subjects at 4 weeks. For massage studies, 1 reported an ES of 0.03 at 6 weeks, whereas the other reported mean change scores of 7.89/100 and 14.4/100 at 1 and 12 weeks of, respectively.

### CONCLUSIONS:

There is moderate- to high-quality evidence that subjects with chronic neck pain not

due to whiplash and without arm pain and headaches show clinically important improvements from a course of spinal manipulation or mobilization at 6, 12, and up to 104 weeks posttreatment. The current evidence does not support a similar level of benefit from massage.

DOI: 10.1016/j.jmpt.2007.01.014 | PMID: 17416276



<https://www.ncbi.nlm.nih.gov/pubmed/17416276>

## The effects of thoracic manipulation on heart rate variability: A controlled crossover trial

Budgell B, Polus B.

J Manipulative Physiol Ther. 2006 Oct;29(8):603-10.

### OBJECTIVE:

The objective of this study was to measure the effects of thoracic spinal manipulation on heart rate variability (HRV) in a cohort of healthy young adults.

### METHODS:

A controlled crossover trial that was conducted on 28 healthy young adults (23 men and 5 women; age range, 18-45 years; mean age, 29.7 years) measured HRV before and after a sham procedure and a thoracic spinal manipulation.

### RESULTS:

In healthy young adults, thoracic spinal manipulation was associated with changes in HRV that were not duplicated by the sham procedure. The ratio of the powers of the low-frequency and high-frequency components increased from  $0.9562 \pm 0.9192$  to  $1.304 \pm 1.118$  ( $P = .0030$ , Wilcoxon signed rank test). In subjects undergoing sham spinal manipulation, there was no statistically significant change in the low-frequency or the high-frequency component of the power spectrum; neither was there any in the ratio of the two regardless of whether the comparison was made using the paired t test or the Wilcoxon signed rank test.

### CONCLUSION:

High-velocity and low-amplitude manipulation of the thoracic spine appears to be able to influence autonomic output to the heart in ways that are not duplicated by a sham procedure or by other forms of somatic/physical therapies.

DOI: 10.1016/j.jmpt.2006.08.011 | PMID: 17045093



<https://www.ncbi.nlm.nih.gov/pubmed/17045093>

## Immediate effects on neck pain and active range of motion after a single cervical high-velocity low-amplitude manipulation in subjects presenting with mechanical neck pain: A randomized controlled trial

Martínez-Segura R, Fernández-de-las-Peñas C, Ruiz-Sáez M, López-Jiménez C, Rodríguez-Blanco C.

J Manipulative Physiol Ther. 2006 Sep;29(7):511-7.

### PURPOSE:

The objective of this study is to analyze the immediate effects on neck pain and active cervical range of motion after a single cervical high-velocity low-amplitude (HVLA) manipulation or a control mobilization procedure in mechanical neck pain subjects. In addition, we assessed the possible correlation between neck pain and neck mobility.

### METHODS:

Seventy patients with mechanical neck pain (25 males and 45 females, aged 20-55 years) participated in this study. The lateral gliding test was used to establish the presence of an intervertebral joint dysfunction at the C3 through C4 or C4 through C5 levels. Subjects were divided randomly into either an experimental group, which received an HVLA thrust, or a control group, which received a manual mobilization procedure. The outcome measures were active cervical range of motion and neck pain at rest assessed pretreatment and 5 minutes posttreatment by an assessor blinded to the treatment allocation of the patient. Intragroup and intergroup comparisons were made with parametric tests. Within-group effect sizes were calculated using Cohen's d coefficient.

### RESULTS:

Within-group changes showed a significant improvement in neck pain at rest and mobility after application of the manipulation ( $P < .001$ ). The control group also showed a significant improvement in neck pain at rest ( $P < .01$ ), flexion ( $P < .01$ ), extension ( $P < .05$ ), and both lateral flexions ( $P < .01$ ), but not in rotation. Pre-post effect sizes were large for all the outcomes in the experimental group ( $d > 1$ ), but were small to medium in the control mobilization group ( $0.2 < d < 0.6$ ). The intergroup comparison showed that the experimental group obtained a greater improvement than the control group in all the

outcome measures ( $P < .001$ ). Decreased neck pain and increased range of motion were negatively associated for all cervical motions: the greater the increase in neck mobility, the less the pain at rest.

## CONCLUSIONS:

Our results suggest that a single cervical HVLA manipulation was more effective in reducing neck pain at rest and in increasing active cervical range of motion than a control mobilization procedure in subjects suffering from mechanical neck pain.

DOI: 10.1016/j.jmpt.2006.06.022 | PMID: 16949939

 <https://www.ncbi.nlm.nih.gov/pubmed/16949939>

## Symptomatic outcomes and perceived satisfaction levels of chiropractic patients with a primary diagnosis involving acute neck pain

Haneline MT.

J Manipulative Physiol Ther. 2006 May;29(4):288-96.

### OBJECTIVE:

The aim of this study was to determine the extent to which a group of patients with acute neck pain managed with chiropractic manipulative therapy benefited from chiropractic care and the degree to which they were subsequently satisfied.

### METHODS:

A two-part retrospective survey, each composed of 14 questions. One part was completed by practicing doctors of chiropractic concerning various aspects of their treatment for patients with former acute neck pain. In the second part, these same patients responded to a telephone survey to measure pre- and posttreatment pain levels and their level of satisfaction with the treatment they received. Chiropractic manipulative therapy was the primary independent variable, although other therapies were used, such as physical therapy, nutritional advice, and exercise.

### RESULTS:

A total of 115 patients were contacted, of whom 94 became study participants, resulting in 60 women (64%) and 34 men. The mean age was 39.6 years (SD, 15.7). The mean number of visits was 24.5 (SD, 21.2), Pain levels improved significantly from a mean of 7.6 (median, 8.0) before treatment to 1.9 (median, 2.0) after treatment ( $P < .0001$ ). The overall patient satisfaction rate was 94%.

### CONCLUSION:

Patients with acute neck pain involved in this study seemed to be satisfied with chiropractic treatment and reported reductions in associated pain levels and activity restrictions. However, because of the study's design and limitations, care must be taken before drawing firm conclusions from the data presented.

DOI: 10.1016/j.jmpt.2006.03.013 | PMID: 16690383



<https://www.ncbi.nlm.nih.gov/pubmed/16690383>

## Spinal manipulative therapy reduces inflammatory cytokines but not substance P production in normal subjects

Teodorczyk-Injeyan JA, Injeyan HS, Ruegg R.

J Manipulative Physiol Ther. 2006 Jan;29(1):14-21.

### OBJECTIVE:

To examine the effect of a single spinal manipulation therapy (SMT) on the in vitro production of inflammatory cytokines, tumor necrosis factor alpha, and interleukin (IL) 1 beta, in relation to the systemic (in vivo) levels of neurotransmitter substance P (SP).

### METHODS:

Sixty-four asymptomatic subjects were assigned to SML sham manipulation, or venipuncture control group. SMT subjects received a single adjustment in the thoracic spine. Blood and serum samples were obtained from subjects before and then at 20 minutes and 2 hours after intervention. Whole-blood Culture, were activated with lipopolysaccharide (LPS) for 24 hours. Cytokine production in Culture supernatants and serum SP levels were assessed by specific immunoassays.

### RESULTS:

Over the study period, a significant proportion ( $P \leq .05$ ) of sham and control subjects demonstrated progressive increases in the synthesis of tumor necrosis factor alpha and IL-1 beta. Conversely, in a comparable proportion of cultures from SMT-derived subjects, the production of both cytokines decreased gradually. Normalization of the observed alterations to reflect the changes relative to self-baselines demonstrated that, within 2 hours after intervention, the production of both cytokines increased significantly ( $P < .001$  to  $.05$ ) in both controls. In contrast, a significant ( $P < .001$  to  $.05$ ) reduction of proinflammatory cytokine secretion was observed in Cultures from SMT-receiving subjects. In all study groups, serum levels of SP remained unaltered within 2 hours after intervention.

### CONCLUSIONS:

SMT-treated subjects show a time-dependent attenuation of LPS-induced production

of the inflammatory cytokines unrelated to systemic levels of SP. This suggests SMT-related down-regulation of inflammatory-type responses via a central yet unknown mechanism.

DOI: 10.1016/j.jmpt.2005.10.002 | PMID: 16396725

 <https://www.ncbi.nlm.nih.gov/pubmed/16396725>

## Manual therapy for patients with stable angina pectoris: A nonrandomized open prospective trial

Christensen HW, Vach W, Gichangi A, Manniche C, Haghfelt T, Høilund-Carlsen PF.

J Manipulative Physiol Ther. 2005 Nov-Dec;28(9):654-61.

### OBJECTIVE:

To examine if participants with chest pain originating from the spine would benefit from manual therapy.

### METHODS:

A nonrandomized, open, prospective trial was performed at a tertiary hospital. Patients who were referred for coronary angiography because of known or suspected stable angina pectoris were invited to participate in this study. A total of 275 took part, 50 were diagnosed as cervicothoracic angina (CTA)-positive (chest pain from the cervicothoracic spine) and 225 as CTA-negative. The intervention performed was manual therapy according to chiropractic standards. Patient self reported questionnaires at baseline and 4-week follow-up, including pain measured with an 11-point box scale, Short Form 36 (quality of life), and perceived improvement.

### RESULTS:

Approximately 75% of CTA-positive patients reported improvement of pain and of general health after treatment, compared with 22% to 25% of CTA-negative patients ( $P < .0001$ ). Pain intensity decreased in both groups with consistently larger decreases for all measures of pain among CTA-positive patients. Short Form 36 scores increased in the CTA-positive group in 5 of 8 scales and remained unchanged in the CTA-negative group.

### CONCLUSION:

This study suggested that patients with known or suspected angina pectoris and a diagnosis of CTA may benefit from chiropractic manual therapy. Methodologically, sound randomized clinical trials are needed to corroborate our results.

DOI: 10.1016/j.jmpt.2005.09.018 | PMID: 16326234



<https://www.ncbi.nlm.nih.gov/pubmed/16326234>

## The relationship between spinal dysfunction and reaction time measures

Lersa LB, Stinear CM, Lersa RA.

J Manipulative Physiol Ther. 2005 Sep;28(7):502-7.

### OBJECTIVE:

The objective of this study was to investigate the relationship between the number of sites of spinal dysfunction and a range of measures of cognitive processing.

### METHODS:

This double-blind, randomized, observational pilot study was performed at a chiropractic college clinical training facility. Thirty volunteers with clinical evidence of cervical spinal joint dysfunction participated. Subjects were classified into 2 groups depending on whether they exhibited signs of cervical spinal joint dysfunction at one or more sites. A range of computer-based tasks was used to determine simple reaction time (RT), choice RT, probe RT, and inhibition of a preplanned response.

### RESULTS:

Multiple sites of cervical spinal joint dysfunction were related to impaired cortical processing as revealed by significantly higher loads on central capacity, significantly less accurate response selection, and a trend toward more variable performance of an anticipated response. Multiple sites of cervical spinal joint dysfunction do not appear to be related to the speed of response selection or the ability to inhibit a preplanned response.

### CONCLUSION:

This pilot study provides a context for the improvements in cortical processing observed after cervical spine adjustment. It shows that probe RT may be a useful tool in further studies examining the effects of cervical spine manipulation of joint dysfunction and the associated effect on cognitive function.

DOI: 10.1016/j.jmpt.2005.07.007 | PMID: 16182024



<https://www.ncbi.nlm.nih.gov/pubmed/16182024>

## A case report of manipulation under anesthesia of posttraumatic type II occipital-atlantoaxial rotatory subluxation in a 4-year-old girl

Tsai SW, Chou CS

J Manipulative Physiol Ther. 2005 Jun;28(5):352-5.

### OBJECTIVE:

To discuss a case of occipital-atlantoaxial rotatory subluxation successfully treated with manipulation under general anesthesia.

### CLINICAL FEATURES:

A 4-year-old girl presented to the Taichung Veterans General Hospital with acute torticollis and neck stiffness for 1 week after she had fallen. Although some nonsteroidal anti-inflammatory drugs had been prescribed for her, her neck still tilted to the right side and her chin inclined to the left side. There were no neurological signs, no significant pain if she did not move her neck and head, and no muscular hypertonicity. There was painful guarding in the right sternocleidomastoid muscle when manipulation was attempted. Three-dimensional computer tomography revealed uneven joint space between the C1 anterior arch and odontoid process and confirmed a type II atlantoaxial rotatory subluxation.

### INTERVENTION AND OUTCOME:

Manipulation under anesthesia was performed by a medical doctor trained in manual therapy. The low-velocity, right rotational manipulation applied to the occiput included axial traction. The neck symptoms were relieved immediately after treatment.

### CONCLUSION:

Under general anesthesia, manipulation may be a good method for treating noncomplicated type II atlantoaxial rotatory subluxation. Additional investigations may be necessary to evaluate the treatment effect.

DOI: 10.1016/j.jmpt.2005.04.006 | PMID: 15965411



<https://www.ncbi.nlm.nih.gov/pubmed/15965411>

## Do manual therapy techniques have a positive effect on quality of life in people with tension-type headache? A randomized controlled trial.

Espí-López GV, Rodríguez-Blanco C, Oliva-Pascual-Vaca A, Molina-Martínez F, Falla D.

Eur J Phys Rehabil Med. 2016 Aug;52(4):447-56. Epub 2016 Feb 29.

### BACKGROUND:

Controversy exists regarding the effectiveness of manual therapy for the relief of tension-type headache (TTH). However most studies have addressed the impact of therapy on the frequency and intensity of pain. No studies have evaluated the potentially significant effect on the patient's quality of life. AIM: To assess the quality of life of patients suffering from TTH treated for 4 weeks with different manual therapy techniques.

### DESIGN:

Factorial, randomized, single-blinded, controlled clinical trial.

### SETTING:

Specialized center for the treatment of headache.

### POPULATION:

Seventy-six (62 women) patients aged between 18 and 65 years (age: 39.9±10.9) with either episodic or chronic TTH.

### METHODS:

Patients were divided into four groups: suboccipital inhibitory pressure; suboccipital spinal manipulation; a combination of the two treatments; control. Quality of life was assessed using the SF-12 questionnaire (considering both the overall score and the different dimensions) at the beginning and end of treatment, and after a one month follow-up.

### RESULTS:

Compared to baseline, the suboccipital inhibition treatment group showed a significant

improvement in their overall quality of life at the one month follow-up and also showed specific improvement in the dimensions related to moderate physical activities, and in their emotional role. All the treatment groups, but not the control group, showed improvements in their physical role, bodily pain, and social functioning at the one month follow-up. Post treatment and at the one month follow-up, the combined treatment group showed improved vitality and the two treatment groups that involved manipulation showed improved mental health.

## CONCLUSIONS:

All three treatments were effective at changing different dimensions of quality of life, but the combined treatment showed the most change. The results support the effectiveness of treatments applied to the suboccipital region for patients with TTH.

## CLINICAL REHABILITATION IMPACT:

Manual therapy techniques applied to the suboccipital region, for as little as four weeks, offered a positive improvement in some aspects of quality of life of patient's suffering with TTH.

PMID: 26928164



<https://www.ncbi.nlm.nih.gov/pubmed/26928164>

## Recovery From Chronic Low Back Pain After Osteopathic Manipulative Treatment: A Randomized Controlled Trial.

Licciardone JC, Gatchel RJ, Aryal S.

J Am Osteopath Assoc. 2016 Mar;116(3):144-55. doi: 10.7556/jaoa.2016.031.

### CONTEXT:

Little is known about recovery after spinal manipulation in patients with low back pain (LBP).

### OBJECTIVE:

To assess recovery from chronic LBP after a short regimen of osteopathic manipulative treatment (OMT) in a responder analysis of the OSTEOPATHic Health outcomes In Chronic low back pain (OSTEOPATHIC) Trial.

### METHODS:

A randomized double-blind, sham-controlled trial was conducted to determine the efficacy of 6 OMT sessions over 8 weeks. Recovery was assessed at week 12 using a composite measure of pain recovery (10 mm or less on a 100-mm visual analog scale) and functional recovery (2 or less on the Roland-Morris Disability Questionnaire for back-specific functioning). The RRs and numbers-needed-to-treat (NNTs) for recovery with OMT were measured, and corresponding cumulative distribution functions were plotted according to baseline LBP intensity and back-specific functioning. Multiple logistic regression was used to compute the OR for recovery with OMT while simultaneously controlling for potential confounders. Sensitivity analyses were performed to corroborate the primary results.

### RESULTS:

There were 345 patients who met neither of the recovery criteria at baseline in the primary analyses and 433 patients who met neither or only 1 of these criteria in the sensitivity analyses. There was a large treatment effect for recovery with OMT (RR, 2.36; 95% CI, 1.31-4.24; P=.003), which was associated with a clinically relevant NNT (8.9; 95% CI, 5.4-25.5). This significant finding persisted after adjustment for potential con-

founders (OR, 2.92; 95% CI, 1.43-5.97; P=.003). There was also a significant interaction effect between OMT and comorbid depression (P=.02), indicating that patients without depression were more likely to recover from chronic LBP with OMT (RR, 3.21; 95% CI, 1.59-6.50; P<.001) (NNT, 6.5; 95% CI, 4.2-14.5). The cumulative distribution functions demonstrated optimal RR and NNT responses in patients with moderate to severe levels of LBP intensity and back-specific dysfunction at baseline. Similar results were observed in the sensitivity analyses.

## CONCLUSIONS:

The OMT regimen was associated with significant and clinically relevant measures for recovery from chronic LBP. A trial of OMT may be useful before progressing to other more costly or invasive interventions in the medical management of patients with chronic LBP. (ClinicalTrials.gov number NCT00315120).

DOI: 10.7556/jaoa.2016.031 | PMID: 26927908



<https://www.ncbi.nlm.nih.gov/pubmed/26927908>

## Osteopathic Manipulative Therapy in Women With Postpartum Low Back Pain and Disability: A Pragmatic Randomized Controlled Trial.

Schwerla F, Rother K, Rother D, Ruetz M, Resch KL.

J Am Osteopath Assoc. 2015 Jul;115(7):416-25. doi: 10.7556/jaoa.2015.087.

### CONTEXT:

Persistent low back pain (LBP) is a common complaint among women during and after pregnancy, and its effects on quality of life can be disabling.

### OBJECTIVE:

To evaluate the effectiveness of osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) in women with persistent LBP and functional disability after childbirth.

### METHODS:

A pragmatic randomized controlled trial was conducted among a sample of women with a history of pregnancy-related LBP for at least 3 months after delivery. Participants were identified from the general population in Germany. By means of external randomization, women were allocated to an OMTh group and a waitlist control group. Osteopathic manipulative therapy was provided 4 times at intervals of 2 weeks, with a follow-up after 12 weeks. The OMTh was tailored to each participant and based on osteopathic principles. The participants allocated to the control group did not receive OMTh during the 8-week study; rather, they were put on a waiting list to receive OMTh on completion of the study. Further, they were not allowed to receive any additional treatment (ie, medication, physical therapy, or other sources of pain relief) during the study period. The main outcome measures were pain intensity as measured by a visual analog scale and the effect of LBP on daily activities as assessed by the Oswestry Disability Index (ODI).

### RESULTS:

A total of 80 women aged between 23 and 42 years (mean [SD], 33.6 [4.5] years) were included in the study, with 40 in the OMTh group and 40 in the control group. Pain

intensity decreased in the OMTh group from 7.3 to 2.0 (95% CI, 4.8-5.9;  $P<.001$ ) and in the control group from 7.0 to 6.5 (95% CI, -0.2 to -0.9;  $P=.005$ ). The between-group comparison of changes revealed a statistically significant improvement in pain intensity in the OMTh group (between-group difference of means, 4.8; 95% CI, 4.1-5.4;  $P<.001$ ) and level of disability (between-group difference of means, 10.6; 95% CI, 9.9-13.2;  $P<.005$ ). The follow-up assessment in the OMTh group ( $n=38$ ) showed further improvement.

## CONCLUSION:

During 8 weeks, OMTh applied 4 times led to clinically relevant positive changes in pain intensity and functional disability in women with postpartum LBP. Further studies that include prolonged follow-up periods are warranted. (German Clinical Trials Register: DRKS00006280.).

DOI: 10.7556/jaoa.2015.087 | PMID: 26111129



<https://www.ncbi.nlm.nih.gov/pubmed/26111129>

## A multicenter, randomized, controlled trial of osteopathic manipulative treatment on preterms.

Cerritelli F, Pizzolorusso G, Renzetti C, Cozzolino V, D'Orazio M, Lupacchini M, Marinelli B, Accorsi A, Lucci C, Lancellotti J, Ballabio S, Castelli C, Molteni D, Besana R, Tubaldi L, Perri FP, Fusilli P, D'Incecco C, Barlafante G.

PLoS One. 2015 May 14;10(5):e0127370. doi: 10.1371/journal.pone.0127370. eCollection 2015.

### BACKGROUND:

Despite some preliminary evidence, it is still largely unknown whether osteopathic manipulative treatment improves preterm clinical outcomes.

### MATERIALS AND METHODS:

The present multi-center randomized single blind parallel group clinical trial enrolled newborns who met the criteria for gestational age between 29 and 37 weeks, without any congenital complication from 3 different public neonatal intensive care units. Pre-term infants were randomly assigned to usual prenatal care (control group) or osteopathic manipulative treatment (study group). The primary outcome was the mean difference in length of hospital stay between groups.

### RESULTS:

A total of 695 newborns were randomly assigned to either the study group (n= 352) or the control group (n=343). A statistical significant difference was observed between the two groups for the primary outcome (13.8 and 17.5 days for the study and control group respectively,  $p < 0.001$ , effect size: 0.31). Multivariate analysis showed a reduction of the length of stay of 3.9 days (95% CI -5.5 to -2.3,  $p < 0.001$ ). Furthermore, there were significant reductions with treatment as compared to usual care in cost (difference between study and control group: 1,586.01€; 95% CI 1,087.18 to 6,277.28;  $p < 0.001$ ) but not in daily weight gain. There were no complications associated to the intervention.

### CONCLUSIONS:

Osteopathic treatment reduced significantly the number of days of hospitalization and

is cost-effective on a large cohort of preterm infants.

DOI: 10.1371/journal.pone.0127370 | PMCID: PMC4431716 | PMID: 25974071

 <https://www.ncbi.nlm.nih.gov/pubmed/25974071>

## Application of osteopathic manipulative technique in the treatment of back pain during pregnancy.

Majchrzycki M, Wolski H, Seremak-Mrozikiewicz A, Lipiec J, Marszałek S, Mrozikiewicz PM, Klejewski A, Lisiński P.

Ginekol Pol. 2015 Mar;86(3):224-8.

### ABSTRACT

Changes in body posture, musculoskeletal disorders and somatic dysfunctions are frequently observed during pregnancy especially ligament, joint and myofascial impairment. The aim of the paper is to present the use of osteopathic manipulative treatment (OMT) for back and pelvic pain in pregnancy on the basis of a review of the available literature. MEDLINE and Cochrane Library were searched in January 2014 for relevant reports, randomized controlled trials, clinical and case studies of OMT use in pregnant women. Each eligible source was verified and analyzed by two independent reviewers. OMT procedures appear to be effective and safe for pelvic and spinal pain management in the lumbosacral area in pregnant women.

DOI: 10.17772/gp/2066 | PMID: 25920314



<https://www.ncbi.nlm.nih.gov/pubmed/25920314>

## Clinical effectiveness of osteopathic treatment in chronic migraine: 3-Armed randomized controlled trial.

Cerritelli F, Ginevri L, Messi G, Caprari E, Di Vincenzo M, Renzetti C, Cozzolino V, Barlafante G, Foschi N, Provinciali L.

Complement Ther Med. 2015 Apr;23(2):149-56. doi: 10.1016/j.ctim.2015.01.011. Epub 2015 Jan 21.

### OBJECTIVE:

To assess the effectiveness of OMT on chronic migraineurs using HIT-6 questionnaire, drug consumption, days of migraine, pain intensity and functional disability.

### DESIGN:

3-Armed randomized controlled trial setting: all patients admitted in the Department of Neurology of Ancona's United Hospitals, Italy, with a diagnosis of migraine and without chronic illness, were considered eligible for the study.

### INTERVENTIONS:

Patients were randomly divided into three groups: OMT+medication therapy, (2) sham+medication therapy and (3) medication therapy only. Patients received 8 treatments in a study period of 6 months.

### MAIN OUTCOME MEASURES:

Changing from baseline HIT-6 score.

### RESULTS:

105 subjects were included. At the end of the study, ANOVA showed that OMT significantly reduced HIT-6 score (mean change scores OMT-conventional care: -8.74; 95% confidence interval (CI) -12.96 to -4.52;  $p < 0.001$  and OMT-sham: -6.62; 95% CI -10.85 to -2.41;  $p < 0.001$ ), drug consumption (OMT-sham: RR=0.22, 95% CI 0.11-0.40; OMT-control: RR=0.20, 95% CI 0.10-0.36), days of migraine (OMT-conventional care: M=-21.06; 95% CI -23.19 to -18.92;  $p < 0.001$  and OMT-sham: -17.43; 95% CI -19.57 to -15.29;  $p < 0.001$ ), pain intensity (OMT-sham: RR=0.42, 95% CI 0.24-0.69; OMT-control: RR=0.31, 95% CI

0.19-0.49) and functional disability ( $p < 0.001$ ).

## CONCLUSIONS:

These findings suggest that OMT may be considered a valid procedure for the management of migraineurs.

DOI: 10.1016/j.ctim.2015.01.011 | PMID: 25847552



<https://www.ncbi.nlm.nih.gov/pubmed/25847552>

## Spinal manipulation impacts cervical spine movement and fitts' task performance: a single-blind randomized before-after trial

Passmore SR, Burke JR, Good C, Lyons JL, Dunn AS.

J Manipulative Physiol Ther. 2010 Mar-Apr;33(3):189-92. doi: 10.1016/j.jmpt.2010.01.007.

### OBJECTIVE:

The objective of this study was to determine if active cervical range of motion (ROM) and Fitts' task movement time differences occurred after high-velocity low-amplitude cervical spinal manipulation (SM) across various indexes of difficulty.

### METHODS:

A single-blind randomized before-after trial was performed in a motor performance laboratory. Fifteen volunteers (21-42 years) with asymptomatic palpable intervertebral motion restriction at the C1-C2 level were randomly assigned to an SM group or to a no-intervention (NI) group. A single episode of upper cervical manipulation was performed on the SM group. Active cervical ROM and movement time were measured pre and posttreatment in the SM group and compared to similar measurements in the NI group.

### RESULTS:

In the SM group, active cervical ROM into rotation increased after the intervention (pre, 74.75 degrees +/- 7.63 degrees; post, 78.50 degrees +/- 7.23 degrees;  $t(7) = 3.07$ ;  $P < .02$ ). During the second trial, significant group differences were present in the SM group for movement time in direction congruent conditions ( $F((8,48)) = 2.83$ ;  $P < .02$ ;  $\eta^2(p) = .320$ ) and direction, incongruent conditions ( $F((8,48)) = 2.31$ ;  $P < .05$ ;  $\eta^2(p) = .278$ ) but not for the NI group.

### CONCLUSIONS:

A linear relationship between indexes of difficulty and movement time as predicted by Fitts' law was observed. Significant group effects indicate that SM not only increases cervical active ROM but also facilitates the performance of a cervical spine Fitts' task requiring rotation. This task may be used to quantify motor performance in clinically

symptomatic populations with reduced ROM who are appropriate candidates for SM. (J Manipulative Physiol Ther 2010;33:189-192)

DOI: 10.1016/j.jmpt.2010.01.007 | PMID: 20350671



<https://www.ncbi.nlm.nih.gov/pubmed/20350671>

## Manipulation treatment for the thoracic postjoint disorder accompanied by symptoms of coronary artery disease].

Liu YS, Fan Y, Guo W.

Zhongguo Gu Shang. 2010 Feb;23(2):95-7.

### OBJECTIVE:

To evaluate the curative effect of the Feng's manipulation on patient with thoracic postjoint disorder accompanied by symptoms of coronary artery disease.

### METHODS:

A total of 180 cases with thoracic postjoint disorder accompanied by symptoms of coronary artery disease were retrospective analyzed from Jan. 2005 to June 2008, included 86 males and 94 females, aged from 18 to 82 years with an average of 43.7 years. The disease course was from 1 d to 40 years with the average of 20.6 months. These patients were divided into 2 groups according to the method of manipulation (group A, n=90) and hot herb (group B, n=90). The patients of group A were treated by manipulation for 1 to 2 times per week. The other group was treated by hot herb for 2 times (20 minutes each time) per day for a month. The symptom and signs (chest distress, precordium pain, cardiopalmus, nape pain, spinous tenderness, tuberculum dolorosum) were compared before and after treatment.

### RESULTS:

All 180 cases were followed up for from 4 to 36 months with an average of 12.7 months. After 1 months of treatment, the chi2 test showed that there was a significant differences between the manipulation therapy group and the hot herb therapy group, including chest distress (chi2 = 8.9322, P = 0.0028 < 0.05); precordium pain (chi2 = 20.6527, P < 0.0001); cardiopalmus (chi2 = 24.2804, P < 0.0001); nape pain (chi2 = 23.5917, P < 0.0001); spinous tenderness (chi2 = 12.2062, P = 0.0005 < 0.01) and tuberculum dolorosum (chi2 = 4.0261, P = 0.0440 < 0.05).

### CONCLUSION:

Manipulation is an effective treatment method for the thoracic post joint disorders.

PMID: 20345028



<https://www.ncbi.nlm.nih.gov/pubmed/20345028>

## Observation of curative effect on fixed-point spin reduction of spinal manipulation therapy for cervical vertigo.

Fang J.

Zhongguo Gu Shang. 2010 Feb;23(2):99-101.

### OBJECTIVE:

To explore the role of fixed-point spin reduction of spinal manipulation therapy in the treatment of cervical vertigo and its effect on cervical artery spasm index (RI) and atlantoaxial displacement index (ADI).

### METHODS:

From January 2002 to May 2008, 168 patients with cervical vertigo were randomly divided into treatment group (84 cases) and the control group (84 cases), 22 males and 62 females in treatment group; 24 males and 60 females in control group. The patients of treatment group and control group were respectively treated with fixed-point spin reduction of spinal manipulation therapy and dialectical prescription. The score of symptoms and signs, RI, ADI were observed and compared between two groups.

### RESULTS:

The score of symptoms and signs markedly decreased after treatment, in treatment group: vertigo had (2.75 +/- 1.01) scores, neck-shoulder pain (1.58 +/- 0.36), headache (0.39 +/- 0.09), nausea-vomiting (1.58 +/- 1.30), ear noises (0.48 +/- 0.32), positive neck rotation test (0.59 +/- 0.21); and in control group: vertigo had (5.68 +/- 2.02) scores, neck-shoulder pain (3.12 +/- 1.82), headache (1.86 +/- 0.65), nausea-vomiting (3.25 +/- 0.69), ear noises (1.64 +/- 0.61), positive neck rotation test (1.79 +/- 0.67). Cervical artery spasm index and atlantoaxial displacement index had been significantly improved, cervical artery spasm index was respectively 0.54 +/- 0.07 and 0.52 +/- 0.13, atlantoaxial displacement index was respectively 2.92 +/- 0.82 and 4.50 +/- 1.32 between treatment group and control group.

### CONCLUSION:

Fixed-point spin reduction of spinal manipulation therapy for cervical vertigo can ac-

curately correct single or multiple vertebral body displacement, restore normal spinal position, reduce the oppression and stimulus of the vertebral artery, release ischemia of vestibular labyrinth, eliminate symptoms of vertigo.

PMID: 20345030



<https://www.ncbi.nlm.nih.gov/pubmed/20345030>

## Effects of chiropractic care on dizziness, neck pain, and balance: a single-group, preexperimental, feasibility study.

Strunk RG, Hawk C.

J Chiropr Med. 2009 Dec;8(4):156-64. doi: 10.1016/j.jcm.2009.08.002.

### OBJECTIVE:

This feasibility study was conducted to further the development of a line of investigation into the potential effects of spinal manipulation/manual therapy on cervicogenic dizziness, balance, and neck pain in adults.

### METHODS:

A single-group, preexperimental, feasibility study was conducted at a chiropractic college health center and a senior fitness center with a target sample size of 20 patients (40 years or older). Patients were treated by either a clinician or a chiropractic student intern for 8 weeks. The Dizziness Handicap Inventory was the primary outcome measurement, with the Short Form Berg Balance Scale (SF-BBS) and the Neck Disability Index used as secondary outcome measurements.

### RESULTS:

Twenty-seven patients were recruited over a period of 13 months. Twenty-one patients enrolled in the study; but because of 2 dropouts, 19 patients completed the treatment. A median Dizziness Handicap Inventory change score of +7 points was calculated for those dizziness patients, with 3 patients improving by at least 18 points, indicating a clinically meaningful change. Seven of the 15 patients who performed the SF-BBS attained at least a 4-point improvement with an effect size of 1.2. A median Neck Disability Index change score of +1 was calculated for those patients with neck pain. Twelve minor adverse reactions were reported by 8 patients, with 3 of those reactions lasting longer than 24 hours.

### CONCLUSION:

A large effect size was calculated for the SF-BBS. Most patients demonstrated improved balance, and some showed reduced dizziness and neck pain. Involving interns in

care proved feasible. Further studies with comparison groups and larger samples are needed to explore the promising results of this study before any cause and effect relationship can be determined.

DOI:10.1016/j.jcm.2009.08.002 | PMID: 19948306 | PMCID: PMC2786230



<https://www.ncbi.nlm.nih.gov/pubmed/19948306>

## Effect of spinal manipulative therapy with stretching compared with stretching alone on full-swing performance of golf players: a randomized pilot trial.

Costa SM, Chibana YE, Giavarotti L, Compagnoni DS, Shiono AH, Satie J, Bracher ES.

J Chiropr Med. 2009 Dec;8(4):165-70. doi: 10.1016/j.jcm.2009.06.002.

### OBJECTIVE:

There has been a steady growth of chiropractic treatment using spinal manipulative therapy (SMT) that aims to increase the performance of athletes in various sports. This study evaluates the effect of SMT by chiropractors on the performance of golf players.

### METHODS:

Golfers of 2 golf clubs in Sao Paulo, Brazil, participated in this study. They were randomized to 1 of 2 groups: Group I received a stretch program, and group II received a stretch program in addition to SMT. Participants in both groups performed the same standardized stretching program. Spinal manipulative therapy to dysfunctional spinal segments was performed on group II only. All golfers performed 3 full-swing maneuvers. Ball range was considered as the average distance for the 3 shots. Treatment was performed after the initial measurement, and the same maneuvers were performed afterward. Each participant repeated these procedures for a 4-week period. Student t test, Mann-Whitney nonparametric test, and 1-way analysis of variance for repeated measures with significance level of 5% were used to analyze the study.

### RESULTS:

Forty-three golfers completed the protocol. Twenty participants were allocated to group I and 23 to group II. Average age, handicap, and initial swing were comparable. No improvement of full-swing performance was observed during the 4 sessions on group I (stretch only). An improvement was observed at the fourth session of group II ( $P = .005$ ); when comparing the posttreatment, group II had statistical significance at all phases ( $P = .003$ ).

### CONCLUSIONS:

Chiropractic SMT in association with muscle stretching may be associated with an im-

provement of full-swing performance when compared with muscle stretching alone.

DOI:10.1016/j.jcm.2009.06.002 | PMID: 19948307 | PMCID: PMC2786229



<https://www.ncbi.nlm.nih.gov/pubmed/19948307>

## Clinical Research on Treatment of Vertebroarterial Type of Cervical Spondylosis with 5-step Manipulation and Traction

Huang ZJ, Chen JX, Qi WW.

J Tradit Chin Med. 2009 Dec;29(4):268-70.

### OBJECTIVE:

To observe the therapeutic effect of 5-step manipulation and traction of cervical vertebrae on vertebroarterial type of cervical spondylosis and probe its mechanism. Methods: The 120 patients were randomly divided into a treatment group (manipulation group) and a control group (traction group) with 60 cases in each. The curative effects in the two groups were evaluated after treatment. Results: The curative rate and the total effective rate is 26.7% and 93.4% respectively in the treatment group, and 13.3% and 86.7% respectively in the control group, with statistical significance in the total effective rate of the two groups ( $P < 0.05$ ). Conclusion: Manipulation and traction of cervical vertebrae can effectively improve the clinical symptoms of vertebroarterial type of cervical spondylosis with a good therapeutic effect.

DOI: 10.1016/S0254-6272(09)60079-0 | PMID: 20112485



<https://www.ncbi.nlm.nih.gov/pubmed/20112485>

## Long-term effects of infant colic: a survey comparison of chiropractic treatment and nontreatment groups

Miller JE, Phillips HL.

J Manipulative Physiol Ther. 2009 Oct;32(8):635-8. doi: 10.1016/j.jmpt.2009.08.017.

### OBJECTIVE:

Investigation into the alleviation of long-term effects of infant colic on the toddler is a neglected area of research. The aim of this study was to document any behavioral or sleep disturbances experienced by post-colicky toddlers who were previously treated with chiropractic care vs those who had not experienced this treatment as all infant.

### METHODS:

Two groups of children were sampled from clinic records from a chiropractic clinic and from a child care center in similar regions of England. Patients were classified in the treatment group if they had been treated for infant colic with routine low-force chiropractic manual therapy. The nontreatment group consisted of post-colicky children in the same age group who had received no chiropractic care for their diagnosed colic as infants. A survey of parents of 117 post-colicky toddlers in a treatment group and 111 toddlers in the nontreatment group was performed.

### RESULTS:

Toddlers who were treated with chiropractic care for colic were twice as likely to not experience long-term sequelae of infant colic, such as temper tantrums (relative risk, 2.0; 95% confidence interval, 1.3-3.0) and frequent nocturnal waking (relative risk, 2.0; 95% confidence interval, 1.5-2.8) than those who were not treated with chiropractic care as colicky infants.

### CONCLUSION:

Untreated post-colicky infants demonstrated negative behavioral patterns at 2 to 3 years of age. In this study, parents of infants treated with chiropractic care for excessive crying did not report as many difficult behavioral and sleep patterns of their toddlers. These findings suggest that chiropractic care for infants with colic may have an

effect on long-term sequelae. (J Manipulative Physiol Ther 2009;32:635-638)

DOI: 10.1016/j.jmpt.2009.08.017 | PMID: 19836599

 <https://www.ncbi.nlm.nih.gov/pubmed/19836599>

## The effects of cervical high-velocity low-amplitude thrust manipulation on resting electromyographic activity of the biceps brachii muscle

Dunning J, Rushton A .

Man Ther. 2009 Oct;14(5):508-13. doi: 10.1016/j.math.2008.09.003. Epub 2008 Nov 21.

### ABSTRACT

There is a gap in the literature regarding the effects of spinal manipulation on extremity muscles that are unconnected to the vertebral column by an origin or insertion. This study investigated the effect of a right C5/6 high-velocity low-amplitude thrust (HVLAT) manipulation on testing electromyographic activity of the biceps brachii muscles bilaterally.

A placebo-controlled, single-blind, repeated measures design employed an asymptomatic convenience sample (n = 54) investigating three conditions: HVLAT, sham, and control. HVLAT demonstrated an excitatory effect with increased EMG activity of 94.20% (P = 0.0001) and 80.05% (P = 0.0001) for the right and left biceps respectively. A one-way repeated measures ANOVA revealed a significant difference (P = 0.0001) in the mean percentage change of resting EMG activity, as did post hoc analyses (P = 0.0001) between all three conditions. Subjects not experiencing cavitation post HVLAT demonstrated greater EMG increases for both right (P = 0.0001) and left (P = 0.014) biceps than those experiencing cavitation. The magnitude of mean EMG change for the right biceps was significantly greater than the left (P = 0.011) post HVLAT.

This study demonstrates a single HVLAT to the right C5/6 zygapophyseal joint elicits an immediate increase in resting EMG activity of the biceps bilaterally, irrespective of whether or not cavitation occurs.

DOI: 10.1016/j.math.2008.09.003 | PMID: 19027344



<https://www.ncbi.nlm.nih.gov/pubmed/19027344>

## The use of osteopathic manipulative treatment as adjuvant therapy in patients with peripheral arterial disease

Lombardini R, Marchesi S, Collebrusco L, Vaudo G, Pasqualini L, Ciuffetti G, Brozzetti M, Lupattelli G, Mannarino E.

Man Ther. 2009 Aug;14(4):439-43. doi: 10.1016/j.math.2008.08.002. Epub 2008 Sep 27.

### ABSTRACT

Peripheral arterial disease (PAD) is a manifestation of systemic atherosclerosis associated with impaired endothelial function and intermittent claudication is the hallmark symptom. Hypothesizing that osteopathic manipulative treatment (OMT) may represent a non-pharmacological therapeutic Option in PAD, we examined endothelial function and lifestyle modifications in 15 intermittent claudication patients receiving osteopathic treatment (OMT group) and 15 intermittent claudication patients matched for age, sex and medical treatment (control group). Compared to the control group, the OMT group had a significant increase in brachial flow-mediated vasodilation, ankle/brachial pressure index, treadmill testing and physical health component of life quality (all  $p < 0.05$ ) from the beginning to the end of the Study. At univariate analysis in the OMT group there was a negative correlation between changes in brachial flow-mediated vasodilation and IL-6 levels ( $r = -0.30$ ;  $p = 0.04$ ) and a positive one between claudication pain time and physical function score ( $r = 0.50$ ;  $p = 0.05$ ). In conclusion, despite the relatively few patients in our Study, these results suggest that OMT significantly improves endothelial function and functional performance in intermittent claudication patients along with benefits in quality of life. This novel treatment combined with drug and lifestyle modification might be all effective alternative to traditional training based oil exercise.

DOI: 10.1016/j.math.2008.08.002 | PMID: 18824395

 <https://www.ncbi.nlm.nih.gov/pubmed/18824395>

## Inclusion of thoracic spine thrust manipulation into an electro-therapy/thermal program for the management of patients with acute mechanical neck pain: A randomized clinical trial

González-Iglesias J, Fernández-de-las-Peñas C, Cleland JA, Albuquerque-Sendín F, Palomeque-del-Cerro L, Méndez-Sánchez R.

Man Ther. 2009 Jun;14(3):306-13. doi: 10.1016/j.math.2008.04.006. Epub 2008 Aug 8.

### ABSTRACT

Our aim was to examine the effects of a seated thoracic spine distraction thrust Manipulation included in an electrotherapy/thermal program on pain, disability, and cervical range of motion in patients with acute neck pain. This randomized controlled trial included 45 patients (20 males, 25 females) between 23 and 44 years of age presenting with acute neck pain. Patients were randomly divided into 2 groups: an experimental group which received a thoracic Manipulation, and a control group which did not receive the manipulative procedure. Both groups received an electrotherapy program consisting of 6 sessions of TENS (frequency 100 Hz; 20 min), superficial thermotherapy (15 min) and soft tissue massage. The experimental group also received a thoracic manipulation once a week for 3 consecutive weeks. Outcome Measures included neck pain (numerical pain rate scale: NPRS), level of disability (Northwick Park Neck Pain Questionnaire; NPQ) and neck mobility. These outcomes were assessed at baseline and 1 week after discharge. A 2-way repeated-measures ANOVA with group as between-subject variable and time as within-subject variable was used. Patients receiving thoracic manipulation experienced greater reductions in both neck pain, with between-group difference of 2.3 (95% CI 2-2.7) points on a 11-NPRS, and perceived disability with between-group differences 8.5 (95% CI 7.2-9.8) points. Further, patients receiving thoracic manipulation experienced greater increases in all cervical motions with between-group differences of 10.6 degrees (95% CI 8.8-12.5 degrees) for flexion; 9.9 degrees (95% CI 8.1-11.7 degrees) for extension; 9.5 degrees (95% CI 7.6-11.4 degrees) for right lateral-flexion; 8 degrees (95% CI 6.2-9.8 degrees) for left lateral-flexion 9.6 degrees (95% CI 7.7-11.6 degrees) for right rotation; and 8.4 degrees (95% CI 6.5-10.3 degrees) for left rotation. We found that the inclusion of a thoracic manipulation into an electrotherapy/thermal program was effective in reducing neck pain and disability, and in increasing active cervical mobility in patients with acute neck pain.

DOI: 10.1016/j.math.2008.04.006 | PMID: 18692428



<https://www.ncbi.nlm.nih.gov/pubmed/18692428>

## [Influence of manipulation on arteria vertebralis morphology and blood flow speed of cervical vertigo].

Fan BH, Wang P, Xu QZ.

Zhongguo Gu Shang. 2009 May;22(5):354-6.

### OBJECTIVE:

To discuss the influence of manipulation on cervical vertigo arteria vertebralis morphology and blood flow speed.

### METHODS:

Forty-five patients with cervical vertigo included 27 males and 18 females with an average age of 41.6 years old ranging from 25 to 60. The course of disease was from 2 weeks to 5 years. TCD were applied to test arteria vertebralis blood flow speed and 3D-CTA applied to inspect arteria vertebralis morphology as the observation targets. According to the morphology change different stage localization, the 3-step manipulation were adopt to observe the arteria vertebralis blood flow speed and the morphology influence.

### RESULTS:

After cervical manipulation, the scoring of vertigo symptoms were improved remarkable ( $P < 0.001$ ); Among the patients of blood flow speed reduced and the patients of blood flow speed increased, the Vm before treatment compared with after treatment, there were statistical difference ( $P < 0.01$ ). The arteria vertebralis morphology partial patient had changed.

### CONCLUSION:

The cervical manipulation exceptionally has the bidirectional control action to arteria vertebralis morphology change and blood flow speed in the cervical vertigo, and can cause the partial blood tubular-shaped condition to have the reversal changed.

PMID: 19522394



<https://www.ncbi.nlm.nih.gov/pubmed/19522394>

## Immediate effects of atlanto-occipital joint manipulation on active mouth opening and pressure pain sensitivity in women with mechanical neck pain

Mansilla-Ferragut P, Fernández-de-Las Peñas C, Albuquerque-Sendín F, Cleland JA, Boscá-Gandía JJ.

J Manipulative Physiol Ther. 2009 Feb;32(2):101-6. doi: 10.1016/j.jmpt.2008.12.003.

### OBJECTIVE:

The purpose of this study was to investigate the effects of a spinal thrust manipulation directed to the upper cervical segments (atlanto-occipital joint) on active mouth opening and pressure pain sensitivity in a trigeminal nerve innervated region (sphenoid bone) in women with mechanical neck pain.

### METHODS:

Thirty-seven women, ages 21 to 50 years old (mean age, 35 +/- 8 years) with mechanical neck pain were recruited for this study. Participants were randomly assigned into 1 of 2 groups as follows: an experimental group that received a spinal manipulation of the atlanto-occipital joint and a control group that received a manual contact placebo intervention. Outcomes collected were assessed pretreatment and 5 minutes posttreatment by an assessor blinded to the treatment allocation and included active mouth opening and pressure pain thresholds (PPTs) over both sides of the sphenoid bone. A 2-way repeated measures analysis of variance (ANOVA) with time (pre-post) as the within subjects variable and group (control, experimental) as the between subjects variable was used to examine the effects of the intervention. The hypothesis of interest was group-time interaction.

### RESULTS:

The ANOVA showed a significant effect for time ( $F = 23.1$ ;  $P < .001$ ) and an interaction between group and time ( $F = 37.7$ ,  $P < .001$ ) for active mouth opening as follows: the experimental group showed a greater improvement when compared to the control group. A large positive within-group effect size ( $d > 1.5$ ) for the experimental group, whereas a negative medium within-group effect size ( $d = 0.5$ ) for the control group were identified. The ANOVA showed a significant interaction between group and time ( $F = 14.4$ ;

P<.001) for PPT levels at the sphenoid bone as follows: the experimental group showed a greater improvement when compared to the control group. A medium positive within-group effect size ( $d = -0.5$ ) for the experimental group, whereas a negative medium within-group effect size ( $d = -0.5$ ) for the control group was found.

## CONCLUSIONS:

Our findings suggest that the application of an atlantoaxial joint thrust manipulation resulted in an increase in active mouth opening and PPT over a trigeminal nerve distribution area (sphenoid bone) in women with mechanical neck pain. (J Manipulative Physiol Ther 2009 32:101-106)

DOI: 10.1016/j.jmpt.2008.12.003 | PMID: 19243721



<https://www.ncbi.nlm.nih.gov/pubmed/19243721>

## Comanagement and collaborative care of a 20-year-old female with acute viral torticollis

Kaufman R.

J Manipulative Physiol Ther. 2009 Feb;32(2):160-5. doi: 10.1016/j.jmpt.2008.12.008.

### OBJECTIVE:

This case study describes a patient diagnosed with acute viral torticollis and illustrates the relevant aspects of differential diagnosis and the collaborative efforts between the chiropractic and allopathic disciplines in establishing an Optimum treatment protocol provided by comanagement of the case.

### CLINICAL FEATURES:

A 20-year-old female student experienced a sudden onset of neck pain and inability to move her neck in conjunction with an antalgic attitude of her cervical spine in lateral flexion and rotation. Physical examination revealed an elevated temperature indicating the possibility of infection. Associated symptoms included headache, nausea, vomiting, and malaise.

### INTERVENTION AND OUTCOME:

The patient was initially assessed in a teaching clinic of a university medical health center for acute meningitis. A consultation was requested by the senior attending physician for an opinion by the chiropractic services of the university health center to assess the patient for nuchal rigidity and to provide treatment of the torticollis. After an evaluation of the status of the patient, a diagnosis of acute viral torticollis was established, and chiropractic manual therapy was initiated with a significant improvement in the ability of the patient to execute cervical ranges of motion without undue limitation and pain. Follow-up chiropractic care resulted in resolution of the torticollis without residual symptoms.

### CONCLUSION:

Acute viral torticollis occurring in a young adult with associated symptoms of fever, headache, nausea, and vomiting presents a diagnostic challenge in excluding the pos-

sibility of meningitis. Appropriate clinical and physical examination procedures are essential to exclude the latter while providing the clinician with the confidence to proceed with conservative management of the patient. Comanagement and collaborative care between the medical and chiropractic disciplines offered the patient a treatment plan with prompt resolution of symptoms. (J Manipulative Physiol Ther 2009;32: 160-165)

DOI: 10.1016/j.jmpt.2008.12.008 | PMID: 19243729



<https://www.ncbi.nlm.nih.gov/pubmed/19243729>

## The effectiveness of thoracic spine manipulation for the management of musculoskeletal conditions: a systematic review and meta-analysis of randomized clinical trials.

Walser RF, Meserve BB, Boucher TR.

J Man Manip Ther. 2009;17(4):237-46.

### ABSTRACT

Thoracic spine manipulation (TSM) is an intervention practiced by different professions, and recently an incursion of research using TSM has been published. The purpose of this review was to examine the effectiveness of TSM for the management of musculoskeletal conditions and the quality of trials that included TSM techniques. A comprehensive search of online databases was performed, and first authors of studies identified were contacted. Thirteen randomized clinical trials were included in the final review. The methodological quality of all studies was assessed using the 10-point PEDro scale. Seven of the 13 studies were of high quality. Three studies looked at TSM for treatment of shoulder conditions; however, there is limited evidence to support the use of TSM for shoulder conditions. Nine studies used TSM for the management of neck conditions. The meta-analysis identified a subset of homogeneous studies evaluating neck pain. The value of the pooled estimator (1.33) was statistically significant for the treatment effect of TSM in the studies with researcher effect removed (95 % confidence interval: 1.15, 1.52). This analysis suggests there is sufficient evidence to support the use of TSM for specific subgroups of patients with neck conditions. This review also identifies the need for further studies to examine the effectiveness of TSM to treat shoulder conditions and the effectiveness of TSM on neck conditions with long-term follow-up studies.

DOI: 10.1179/106698109791352085 | PMID: 20140155 | PMCID: PMC2813505



<https://www.ncbi.nlm.nih.gov/pubmed/20140155>

## Thoracic Spine Manipulation for the Management of Patients With Neck Pain: A Randomized Clinical Trial

González-Iglesias J, Fernández-de-las-Peñas C, Cleland JA, Gutiérrez-Vega Mdel R.

J Orthop Sports Phys Ther. 2009 Jan;39(1):20-7.

### OBJECTIVES:

To investigate if patients with mechanical neck pain receiving thoracic spine thrust manipulation would experience superior outcomes compared to a group not receiving thrust manipulation.

### BACKGROUND:

Evidence has begun to emerge in support of thoracic thrust manipulation as an intervention in the management of mechanical neck pain. However, to make a strong recommendation for a clinical technique it is necessary to have multiple studies with convergent findings.

### METHODS AND MEASURES:

Forty-five patients (21 females) were randomly assigned to 1 of 2 groups: a control group, which received electro/thermal therapy for 5 treatment sessions, and the experimental group, which received the same electro/thermal therapy program in addition to a thoracic spine thrust manipulation once a week for 3 consecutive weeks. Mixed-model analyses of variance (ANOVAs) were used to examine the effects of treatment on pain (100-mm visual analogue scale), disability (100-point disability scale), and cervical range of motion, with group as the between-subjects variable and time as the within-subjects variable. The primary analysis was the group-by-time interaction for pain.

### RESULTS:

The group-by-time interaction effects for the ANOVA models were statistically significant for pain, mobility, and disability ( $P < .05$ ), indicating greater improvements in the manipulation group for all the outcome measures. Patients receiving thoracic manipulation experienced greater improvements in pain at the fifth (final) treatment ses-

sion and at the 2-week and 4-week follow-up periods ( $P<.001$ ), with pain improvement scores in the manipulation group of 16.8 mm and 26.5 mm greater than those in the comparison group at the 2- and 4-week follow-up periods, respectively. The experimental group also experienced significantly greater improvements in disability with a between-group difference of 8.8 points (95% confidence interval [CI]: 7.5, 10.1;  $P<.001$ ) at the fifth visit and 8.0 points (95% CI: 5.8, 10.2;  $P<.001$ ) at the 2-week follow-up.

## CONCLUSIONS:

The results of our study suggest that thoracic spine thrust manipulation results in superior clinical benefits that persist beyond the 1-month follow-up period for patients with acute neck pain. Future studies should continue to investigate the effects of thoracic spine thrust manipulation, as compared to other physical therapy interventions, in a population with mechanical neck pain.

DOI: 10.2519/jospt.2009.2914 | PMID: 19209478



<https://www.ncbi.nlm.nih.gov/pubmed/19209478>

## Immediate hypoalgesic and motor effects after a single cervical spine manipulation in subjects with lateral epicondylalgia

Fernández-Carnero J, Fernández-de-las-Peñas C, Cleland JA.

J Manipulative Physiol Ther. 2008 Nov-Dec;31(9):675-81. doi: 10.1016/j.jmpt.2008.10.005.

### OBJECTIVE:

The purpose of this study is to investigate the immediate effects of a single cervical spine manipulation and a manual contact intervention (MCI) on pressure pain thresholds (PPTs) and thermal pain thresholds over the elbow region and pain-free grip (PFG) force in patients with lateral epicondylalgia (LE).

### METHODS:

A repeated measures, crossover, single-blinded randomized study was done. Ten patients with LE (5 female) aged from 30 to 49 years (mean, 42; SD, 6 years) participated in this Study. Subjects attended 2 experimental sessions on 2 separate days at least 48 hours apart. At each session, participants received either a manipulative intervention or MCI assigned in a random fashion. Pressure pain threshold and hot and cold pain thresholds (HPT and CPT, respectively) over the lateral epicondyle of both elbows was assessed preintervention and 5 minutes postintervention by an examiner blinded to the treatment allocation of the patients. In addition, PFG on the affected arm and maximum grip force on the unaffected side were also assessed. A 3-way analysis of variance (ANOVA) with time (pre-post) and side (ipsilateral, contralateral to the intervention) as within-subjects variable and intervention (manipulation or MCI) as between-subjects variable was used to evaluate changes in PPT, HPT, CPT, or PFG.

### RESULTS:

The ANOVA detected a significant effect for time ( $F = 37.2$ ,  $P < .001$ ) and a significant interaction between intervention and time ( $F = 25.1$ ,  $P < .001$ ) for PPT levels. Post hoc revealed that the manipulative intervention produced a greater increase of PPT in both sides when compared with MCI ( $P < .001$ ). The ANOVA did not detect significant effects for time ( $F = 2.7$ ,  $P > .2$ ), intervention ( $F = 2.8$ ,  $P > .2$ ), or side ( $F = 0.9$ ,  $P > .4$ ) for HPT. Again, no significant effects for time ( $F = 0.8$ ,  $P > .4$ ), side ( $F = 0.6$ ,  $P > .4$ ) or intervention ( $F =$

0.8,  $P > .5$ ) was found for CPT. Finally, a significant interaction between intervention and time ( $F = 9.4$ ,  $P = .004$ ) and between time \* side \* intervention ( $F = 18.2$ ,  $P < .001$ ) was found for grip force. Post hoc analysis revealed that the cervical manipulation produced an increase of PFG on the affected side as compared with the MCI ( $P < .001$ ).

## CONCLUSIONS:

The application of a manipulation at the cervical spine produced an immediate bilateral increase in PPT in patients with LE. No significant changes for HPT and CPT were found. Finally, cervical manipulation increased PFG on the affected side, but not the maximum grip force on the unaffected arm. Future studies with larger sample sizes are required to examine the effects of thrust manipulation on PPT, HPT, CPT, or PFG (J Manipulative Physiol Ther 2008;3 1:675-681).

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## Effectiveness of osteopathic manipulative treatment for carpal tunnel syndrome: a pilot project.

Burnham T, Higgins DC, Burnham RS, Heath DM.

J Am Osteopath Assoc. 2015 Mar;115(3):138-48. doi: 10.7556/jaoa.2015.027.

### CONTEXT:

Osteopathic manipulative treatment (OMT) has been recognized as a management option for carpal tunnel syndrome (CTS), although limited research exists to substantiate its effectiveness.

### OBJECTIVE:

To evaluate the effectiveness of OMT in the management of CTS.

### METHODS:

This single-blinded quasi-controlled trial was conducted at an academic institution. Participants with CTS underwent weekly OMT sessions for 6 consecutive weeks. The main outcome measures were the Boston Carpal Tunnel Syndrome Questionnaire (BCTQ), a sensory symptom diagram (SSD), patient estimate of overall change, electrophysiologic testing of the median nerve (trans-carpal tunnel motor and sensory nerve conduction velocity and amplitude ratio), and carpal tunnel ultrasound imaging of the cross-sectional area of the median nerve and transverse carpal ligament length and bowing. All outcome measures were administered to participants before the first OMT session. Immediately after the first session, electrophysiologic testing of the median nerve and ultrasound imaging of the carpal tunnel were repeated. After 6 weeks of OMT, all outcome measures were readministered.

### RESULTS:

Results of the BCTQ revealed statistically significant improvements in symptoms and function after 6 weeks of OMT ( $F=11.0$ ;  $P=.004$ ), and the improvements tended to be more pronounced on the treated side. The drop in SSD scores after 6 weeks of treatment was statistically significant ( $F=4.19$ ;  $P=.0002$ ). Patient estimate of overall improvement of symptoms was statistically significant for the treated side. No statistically

significant changes in electrophysiologic function of the median nerve, cross-sectional area of the median nerve, or transverse carpal ligament bowing were observed. After treatment, the increase in transverse carpal ligament length was statistically significant, but no side-to-side difference was detected.

## CONCLUSION:

Osteopathic manipulative treatment resulted in patient-perceived improvement in symptoms and function associated with CTS. However, median nerve function and morphology at the carpal tunnel did not change, possibly indicating a different mechanism by which OMT acted, such as central nervous system processes.

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<https://www.ncbi.nlm.nih.gov/pubmed/25722360>

## Osteopathic manipulative treatment for self-reported fatigue, stress, and depression in first-year osteopathic medical students.

Wiegand S, Bianchi W, Quinn TA, Best M, Fotopoulos T.

J Am Osteopath Assoc. 2015 Feb;115(2):84-93. doi: 10.7556/jaoa.2015.019.

### CONTEXT:

During medical education, many students experience psychological distress, including symptoms such as fatigue, stress, and depression.

### OBJECTIVE:

To evaluate the effect of osteopathic manipulative treatment (OMT) on self-perceived fatigue, stress, and depression in first-year osteopathic medical students.

### METHODS:

This randomized controlled pilot study with repeated measures was conducted at the Lake Erie College of Osteopathic Medicine-Bradenton in Florida during the fall 2012 semester. First-year osteopathic medical students voluntarily enrolled in the study and were randomly assigned to directed OMT (D-OMT), nondirected OMT (ND-OMT), or control groups. The D-OMT and ND-OMT groups received treatment by osteopathic physicians weekly for 4 weeks. The control group received no treatment. All groups completed the Epworth Sleepiness Scale (ESS), the Self-Perceived Stress Scale (SPSS), and the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire 9 (PHQ-9) depression scale before treatment (pretest), after 2 treatments (midtest), and after 4 treatments (posttest).

### RESULTS:

All participants self-reported as white and single, with both sexes equally represented, and had an mean age of 24 years. Analysis of ESS scores revealed a statistically significant decrease in the D-OMT group from pretest and posttest scores and a statistically significant increase in the ND-OMT group from pretest to midtest but not from pretest to posttest scores. No statistically significant differences were noted in the control group scores on this measure. No statistically significant differences were seen in the

SPSS or PHQ-9 scores from pretest to midtest or pretest to posttest in any of the 3 groups.

## CONCLUSION:

The D-OMT regimen used in the current study produced a statistically significant decrease in self-perceived fatigue in first-year osteopathic medical students. Osteopathic manipulative treatment represents a potential modality to reduce self-perceived distress in medical students. Further research is warranted.

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<https://www.ncbi.nlm.nih.gov/pubmed/25637614>

## Osteopathy decreases the severity of IBS-like symptoms associated with Crohn's disease in patients in remission.

Piche T, Pishvaie D, Tirouvaziam D, Filippi J, Dainese R, Tonohouhan M, DeGalleani L, Nébot-Vivinus MH, Payrouse JL, Hébuterne X.

Eur J Gastroenterol Hepatol. 2014 Dec;26(12):1392-8. doi: 10.1097/MEG.0000000000000219.

### BACKGROUND:

Osteopathy may decrease the severity of irritable bowel syndrome (IBS). About 35% of patients with quiescent Crohn's disease (CD) continue to suffer from IBS-like symptoms with impaired quality of life (QoL). We aimed to evaluate the effect of osteopathy on the severity of IBS-like symptoms in quiescent CD patients.

### METHODS:

We prospectively included 38 patients with CD on remission over 12 months while receiving infliximab every 8 weeks. Patients were randomized 2/1 to receive three sessions of standardized osteopathy (n=25) at 15, 30, and 45 days after the last infusion of infliximab or simple follow-up. The severity of IBS-like symptoms, psychological factors, and its impact on QoL were assessed using questionnaires.

### MAIN RESULTS:

Compared with baseline, the severity of IBS-like symptoms was significantly reduced in patients receiving osteopathy. The decrease was significantly more pronounced in patients receiving osteopathy at day 30 [-38.4 (-76.1 to 10.2) vs. 32.2 (-16.6 to 41.6), P=0.01], day 45 [-36.7 (-74.4 to 25.3) vs. 32.2 (-16.6 to 41.6), P=0.04], and day 60 [-39.5 (-60.9 to -9.2) vs. 6.1 (-38.7 to 28.5), P=0.05] with a concomitant increase in QoL (P=0.09 at day 30, P=0.02 at day 45, P=0.3 at day 60). Compared with baseline, the severity of fatigue was significantly reduced in patients receiving osteopathy, whereas depression and anxiety remained unchanged.

### CONCLUSION:

Three sessions of osteopathy reduced the severity of IBS-like symptoms associated

with CD in remission. Osteopathy should be viewed as a helpful therapeutic option to reduce the severity of abdominal pain and discomfort in patients with CD but in remission with IBS-like symptoms.

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<https://www.ncbi.nlm.nih.gov/pubmed/25357218>

## Immediate changes after manual therapy in resting-state functional connectivity as measured by functional magnetic resonance imaging in participants with induced low back pain.

Gay CW, Robinson ME, George SZ, Perlstein WM, Bishop MD.

J Manipulative Physiol Ther. 2014 Nov-Dec;37(9):614-27. doi: 10.1016/j.jmpt.2014.09.001. Epub 2014 Oct 3.

### OBJECTIVE:

The purposes of this study were to use functional magnetic resonance imaging to investigate the immediate changes in functional connectivity (FC) between brain regions that process and modulate the pain experience after 3 different types of manual therapies (MT) and to identify reductions in experimentally induced myalgia and changes in local and remote pressure pain sensitivity.

### METHODS:

Twenty-four participants (17 men; mean age  $\pm$  SD, 21.6  $\pm$  4.2 years) who completed an exercise-injury protocol to induce low back pain were randomized into 3 groups: chiropractic spinal manipulation (n = 6), spinal mobilization (n = 8), or therapeutic touch (n = 10). The primary outcome was the immediate change in FC as measured on functional magnetic resonance imaging between the following brain regions: somatosensory cortex, secondary somatosensory cortex, thalamus, anterior and posterior cingulate cortices, anterior and poster insula, and periaqueductal gray. Secondary outcomes were immediate changes in pain intensity, measured with a 101-point numeric rating scale, and pain sensitivity, measured with a handheld dynamometer. Repeated-measures analysis of variance models and correlation analyses were conducted to examine treatment effects and the relationship between within-person changes across outcome measures.

### RESULTS:

Changes in FC were found between several brain regions that were common to all 3 MT interventions. Treatment-dependent changes in FC were also observed between several brain regions. Improvement was seen in pain intensity after all interventions (P

< .05) with no difference between groups ( $P > .05$ ). There were no observed changes in pain sensitivity, or an association between primary and secondary outcome measures.

## CONCLUSION:

These results suggest that MTs (chiropractic spinal manipulation, spinal mobilization, and therapeutic touch) have an immediate effect on the FC between brain regions involved in processing and modulating the pain experience. This suggests that neurophysiologic changes after MT may be an underlying mechanism of pain relief.

DOI: 10.1016/j.jmpt.2014.09.001 | PMCID: PMC4248017 | PMID: 25284739



<https://www.ncbi.nlm.nih.gov/pubmed/25284739>

## Osteopathic manipulative treatment for nonspecific low back pain: a systematic review and meta-analysis.

Franke H, Franke JD, Fryer G.

BMC Musculoskelet Disord. 2014 Aug 30;15:286. doi: 10.1186/1471-2474-15-286.

### BACKGROUND:

Nonspecific back pain is common, disabling, and costly. Therefore, we assessed effectiveness of osteopathic manipulative treatment (OMT) in the management of nonspecific low back pain (LBP) regarding pain and functional status.

### METHODS:

A systematic literature search unrestricted by language was performed in October 2013 in electronic and ongoing trials databases. Searches of reference lists and personal communications identified additional studies. Only randomized clinical trials were included; specific back pain or single treatment techniques studies were excluded. Outcomes were pain and functional status. Studies were independently reviewed using a standardized form. The mean difference (MD) or standard mean difference (SMD) with 95% confidence intervals (CIs) and overall effect size were calculated at 3 months post-treatment. GRADE was used to assess quality of evidence.

### RESULTS:

We identified 307 studies. Thirty-one were evaluated and 16 excluded. Of the 15 studies reviewed, 10 investigated effectiveness of OMT for nonspecific LBP, 3 effect of OMT for LBP in pregnant women, and 2 effect of OMT for LBP in postpartum women. Twelve had a low risk of bias. Moderate-quality evidence suggested OMT had a significant effect on pain relief (MD, -12.91; 95% CI, -20.00 to -5.82) and functional status (SMD, -0.36; 95% CI, -0.58 to -0.14) in acute and chronic nonspecific LBP. In chronic nonspecific LBP, moderate-quality evidence suggested a significant difference in favour of OMT regarding pain (MD, -14.93; 95% CI, -25.18 to -4.68) and functional status (SMD, -0.32; 95% CI, -0.58 to -0.07). For nonspecific LBP in pregnancy, low-quality evidence suggested a significant difference in favour of OMT for pain (MD, -23.01; 95% CI, -44.13 to -1.88) and functional status (SMD, -0.80; 95% CI, -1.36 to -0.23), whereas modera-

te-quality evidence suggested a significant difference in favour of OMT for pain (MD, -41.85; 95% CI, -49.43 to -34.27) and functional status (SMD, -1.78; 95% CI, -2.21 to -1.35) in nonspecific LBP postpartum.

## CONCLUSION:

Clinically relevant effects of OMT were found for reducing pain and improving functional status in patients with acute and chronic nonspecific LBP and for LBP in pregnant and postpartum women at 3 months posttreatment. However, larger, high-quality randomized controlled trials with robust comparison groups are recommended.

DOI: 10.1186/1471-2474-15-286 | PMCID: PMC4159549 | PMID: 25175885



<https://www.ncbi.nlm.nih.gov/pubmed/25175885>

## Pilot trial of osteopathic manipulative therapy for patients with frequent episodic tension-type headache.

Rolle G, Tremolizzo L, Somalvico F, Ferrarese C, Bressan LC.

J Am Osteopath Assoc. 2014 Sep;114(9):678-85. doi: 10.7556/jaoa.2014.136.

### CONTEXT:

Osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) may be used for managing headache pain and related disability, but there is a need for high-quality randomized controlled trials to assess the effectiveness of this intervention.

### OBJECTIVE:

To explore the efficacy of OMTh for pain management in frequent episodic tension-type headache (TTH).

### DESIGN:

Single-blind randomized placebo-controlled pilot study.

### SETTING:

Patients were recruited from 5 primary care settings.

### PATIENTS:

Forty-four patients who were affected by frequent episodic TTH and not taking any drugs for prophylactic management of episodic TTH were recruited.

### INTERVENTIONS:

Patients were randomly allocated to an experimental or control group. The experimental group received corrective OMTh techniques, tailored for each patient; the control group received assessment of the cranial rhythmic impulse (sham therapy). The study included a 1-month baseline period, a 1-month treatment period, and a 3-month follow-up period.

## MAIN OUTCOME MEASURES:

The primary outcome was the change in patient-reported headache frequency, and secondary outcomes included changes in headache pain intensity (discrete score, 1 [lowest perceived pain] to 5 [worst perceived pain]), over-the-counter medication use, and Headache Disability Inventory score.

## RESULTS:

Forty patients completed the study (OMTh, n=21; control, n=19). The OMTh group had a significant reduction in headache frequency over time that persisted 1 month (approximate reduction, 40%;  $P<.001$ ) and 3 months (approximate reduction, 50%;  $P<.001$ ) after the end of treatment. Moreover, there was an absolute difference between the 2 treatment groups at the end of the study, with a 33% lower frequency of headache in the OMTh group ( $P<.001$ ).

## CONCLUSION:

This feasibility study demonstrated the efficacy of OMTh in the management of frequent episodic TTH, compared with sham therapy in a control group. Osteopathic manipulative therapy may be preferred over other treatment modalities and may benefit patients who have adverse effects to medications or who have difficulty complying with pharmacologic regimens. This protocol may serve as a model for future studies.

DOI: 10.7556/jaoa.2014.136 | PMID: 25170037



<https://www.ncbi.nlm.nih.gov/pubmed/25170037>

## Pregnancy Research on Osteopathic Manipulation Optimizing Treatment Effects: the PROMOTE study.

Hensel KL, Buchanan S, Brown SK, Rodriguez M, Cruser dA.

Am J Obstet Gynecol. 2015 Jan;212(1):108.e1-9. doi: 10.1016/j.ajog.2014.07.043. Epub 2014 Jul 25.

### OBJECTIVE:

The purpose of this study was to evaluate the efficacy of osteopathic manipulative treatment (OMT) to reduce low back pain and improve functioning during the third trimester in pregnancy and to improve selected outcomes of labor and delivery.

### STUDY DESIGN:

Pregnancy research on osteopathic manipulation optimizing treatment effects was a randomized, placebo-controlled trial of 400 women in their third trimester. Women were assigned randomly to usual care only (UCO), usual care plus OMT (OMT), or usual care plus placebo ultrasound treatment (PUT). The study included 7 treatments over 9 weeks. The OMT protocol included specific techniques that were administered by board-certified OMT specialists. Outcomes were assessed with the use of self-report measures for pain and back-related functioning and medical records for delivery outcomes.

### RESULTS:

There were 136 women in the OMT group: 131 women in the PUT group and 133 women in the UCO group. Characteristics at baseline were similar across groups. Findings indicate significant treatment effects for pain and back-related functioning ( $P < .001$  for both groups), with outcomes for the OMT group similar to that of the PUT group; however, both groups were significantly improved compared with the UCO group. For secondary outcome of meconium-stained amniotic fluid, there were no differences among the groups.

### CONCLUSION:

OMT was effective for mitigating pain and functional deterioration compared with UCO;

however, OMT did not differ significantly from PUT. This may be attributed to PUT being a more active treatment than intended. There was no higher likelihood of conversion to high-risk status based on treatment group. Therefore, OMT is a safe, effective adjunctive modality to improve pain and functioning during the third trimester.

DOI: 10.1016/j.ajog.2014.07.043 | PMID: 25068560



<https://www.ncbi.nlm.nih.gov/pubmed/25068560>

## Clinical response and relapse in patients with chronic low back pain following osteopathic manual treatment: results from the OSTEOPATHIC Trial.

Licciardone JC, Aryal S(2).

Man Ther. 2014 Dec;19(6):541-8. doi: 10.1016/j.math.2014.05.012. Epub 2014 Jun 5.

### ABSTRACT

Clinical response and relapse following a regimen of osteopathic manual treatment (OMT) were assessed in patients with chronic low back pain (LBP) within the OSTEOPATHIC Trial, a randomized, double-blind, sham-controlled study. Initial clinical response and subsequent stability of response, including final response and relapse status at week 12, were determined in 186 patients with high baseline pain severity ( $\geq 50$  mm on a 100-mm visual analogue scale). Substantial improvement in LBP, defined as 50% or greater pain reduction relative to baseline, was used to assess clinical response at weeks 1, 2, 4, 6, 8, and 12. Sixty-two (65%) patients in the OMT group attained an initial clinical response vs. 41 (45%) patients in the sham OMT group (risk ratio [RR], 1.45; 95% confidence interval [CI], 1.11-1.90). The median time to initial clinical response to OMT in these patients was 4 weeks. Among patients with an initial clinical response prior to week 12, 13 (24%) patients in the OMT group vs. 18 (51%) patients in the sham OMT group relapsed (RR, 0.47; 95% CI, 0.26-0.83). Overall, 49 (52%) patients in the OMT group attained or maintained a clinical response at week 12 vs. 23 (25%) patients in the sham OMT group (RR, 2.04; 95% CI, 1.36-3.05). The large effect size for short-term efficacy of OMT was driven by stable responders who did not relapse.

DOI: 10.1016/j.math.2014.05.012 | PMID: 24965494



<https://www.ncbi.nlm.nih.gov/pubmed/24965494>

## Effect of osteopathic manipulative treatment on middle ear effusion following acute otitis media in young children: a pilot study.

Steele KM, Carreiro JE, Viola JH, Conte JA, Ridpath LC.

J Am Osteopath Assoc. 2014 Jun;114(6):436-47. doi: 10.7556/jaoa.2014.094.

### CONTEXT:

Childhood acute otitis media (AOM) is highly prevalent. Its usual sequela of middle ear effusion (MEE) can lead to conductive hearing loss, for which surgery is commonly used.

### OBJECTIVE:

To evaluate the efficacy of an osteopathic manipulative treatment (OMT) protocol on MEE resolution following an episode of AOM. The authors hypothesized that OMT provided adjunctively to standard care for young children with AOM would reduce the duration of MEE following the onset of AOM.

### METHODS:

We compared standard care only (SCO) and standard care plus OMT (SC+OMT) for the duration of MEE following AOM. Patients were aged 6 months to 2 years. The SC+OMT group received OMT during 3 weekly visits. Weekly tympanometric and acoustic reflectometer (AR) readings were obtained from all patients.

### RESULTS:

There were 52 patients enrolled, with 43 completing the study and 9 dropping out. No demographic differences were noted. Only ears from each patient with abnormal tympanograms at entry were included. There were 76 ears in the tympanogram analysis (38 from SCO; 38 from SC+OMT) and 61 ears in the AR data analysis (31 from SCO; 30 from SC+OMT). Dependence of bilateral ear disease noted in AR readings was accounted for in statistical analysis. Tympanogram data demonstrated a statistically significant improvement in MEE at visit 3 in patients in the SC+OMT group (odds ratio, 2.98; 95% confidence interval, 1.16, 7.62;  $\chi^2$  test for independence,  $P=.02$ ). The AR data analysis showed statistically significant improvement at visit 3 for the SC+OMT group ( $z=2.05$ ;  $P=.02$ ). There was no statistically significant change in MEE before or immediately after

the OMT protocol.

## CONCLUSION:

A standardized OMT protocol administered adjunctively with standard care for patients with AOM may result in faster resolution of MEE following AOM than standard treatment alone. (ClinicalTrials.gov number NCT00520039.).

DOI: 10.7556/jaoa.2014.094 | PMID: 24917631



<https://www.ncbi.nlm.nih.gov/pubmed/24917631>

## Osteopathic manipulative treatment as a useful adjunctive tool for pneumonia.

Yao S, Hassani J, Gagne M, George G, Gilliar W.

J Vis Exp. 2014 May 6;(87). doi: 10.3791/50687.

### ABSTRACT

Pneumonia, the inflammatory state of lung tissue primarily due to microbial infection, claimed 52,306 lives in the United States in 2007 and resulted in the hospitalization of 1.1 million patients (2). With an average length of in-patient hospital stay of five days (2), pneumonia and influenza comprise significant financial burden costing the United States \$40.2 billion in 2005 (3). Under the current Infectious Disease Society of America/American Thoracic Society guidelines, standard-of-care recommendations include the rapid administration of an appropriate antibiotic regimen, fluid replacement, and ventilation (if necessary). Non-standard therapies include the use of corticosteroids and statins; however, these therapies lack conclusive supporting evidence (4). (Figure 1) Osteopathic Manipulative Treatment (OMT) is a cost-effective adjunctive treatment of pneumonia that has been shown to reduce patients' length of hospital stay, duration of intravenous antibiotics, and incidence of respiratory failure or death when compared to subjects who received conventional care alone (5). The use of manual manipulation techniques for pneumonia was first recorded as early as the Spanish influenza pandemic of 1918, when patients treated with standard medical care had an estimated mortality rate of 33%, compared to a 10% mortality rate in patients treated by osteopathic physicians (6). When applied to the management of pneumonia, manual manipulation techniques bolster lymphatic flow, respiratory function, and immunological defense by targeting anatomical structures involved in these systems(7,8, 9, 10). The objective of this review video-article is three-fold: a) summarize the findings of randomized controlled studies on the efficacy of OMT in adult patients with diagnosed pneumonia, b) demonstrate established protocols utilized by osteopathic physicians treating pneumonia, c) elucidate the physiological mechanisms behind manual manipulation of the respiratory and lymphatic systems. Specifically, we will discuss and demonstrate four routine techniques that address autonomics, lymph drainage, and rib cage mobility: Rib Raising, (2) Thoracic Pump, (3) Doming of the Thoracic Diaphragm, and (4) Muscle Energy for Rib 1.

DOI: 10.3791/50687 | PMCID: PMC4173698 | PMID: 24836893



<https://www.ncbi.nlm.nih.gov/pubmed/24836893>

## Effect of osteopathic manipulative therapy in the attentive performance of children with attention-deficit/hyperactivity disorder.

Accorsi A, Lucci C, Di Mattia L, Granchelli C, Barlafante G, Fini F, Pizzolorusso G, Cerritelli F, Pincherle M.

J Am Osteopath Assoc. 2014 May;114(5):374-81. doi: 10.7556/jaoa.2014.074.

### CONTEXT:

Attention-deficit/hyperactivity disorder (ADHD) is a neurobehavioral disorder most commonly affecting children and teenagers. It is characterized by the coexistence of attention problems and impulsivity and hyperactivity. Although several studies have been conducted on the efficacy of conventional and alternative therapies in children with ADHD, few studies have specifically investigated the efficacy of osteopathic manipulative therapy (OMTh).

### OBJECTIVE:

To evaluate the efficacy of OMTh in the treatment of children with ADHD.

### METHODS:

Children aged 5 to 15 years with a primary diagnosis of ADHD who were admitted to a single neuropsychiatry unit from November 2008 to September 2009 were randomly assigned to an intervention group (OMTh + conventional care) or a control group (conventional care only). Biancardi-Stroppa Modified Bell Cancellation Test accuracy and rapidity scores were recorded for both groups at baseline and after 10 weeks. Statistical analyses included univariate tests and multivariate linear regressions.

### RESULTS:

A total of 28 participants were included in the study: 14 in the OMTh group and 14 in the control group. Univariate statistical analysis showed no statistically significant differences between the intervention and control groups in terms of characteristics measured at baseline, except for psychosocial intervention ( $P=.05$ ). Multivariate linear regression showed that OMTh was positively associated with changes in the Biancardi-Stroppa Test accuracy ( $\beta=7.948$  points;  $P=.04$ ) and rapidity ( $\beta=9.089$  points;  $P=.03$ ) scores.

## CONCLUSION:

Participants who received OMTh had greater improvement in Biancardi-Stroppa Test scores than participants who received conventional care only, suggesting that OMTh can potentially increase performances of selective and sustained attention in children with ADHD. To confirm these findings, studies of larger and more diverse populations are warranted.

DOI: 10.7556/jaoa.2014.074 | PMID: 24778002



<https://www.ncbi.nlm.nih.gov/pubmed/24778002>

## Effectiveness of myofascial release in the management of chronic low back pain in nursing professionals.

Ajimsha MS, Daniel B, Chithra S.

J Bodyw Mov Ther. 2014 Apr;18(2):273-81. doi: 10.1016/j.jbmt.2013.05.007. Epub 2013 Jun 5.

### OBJECTIVE:

To investigate whether Myofascial release (MFR) when used as an adjunct to specific back exercises (SBE) reduces pain and disability in chronic low back pain (CLBP) in comparison with a control group receiving a sham Myofascial release (SMFR) and specific back exercises (SBE) among nursing professionals.

### DESIGN:

Randomized, controlled, single blinded trial.

### SETTING:

Nonprofit research foundation clinic in Kerala, India.

### PARTICIPANTS:

Nursing professionals (N = 80) with chronic low back pain (CLBP).

### INTERVENTIONS:

MFR group or control group. The techniques were administered by physiotherapists certified in MFR and consisted of 24 sessions per client over 8 weeks.

### MAIN OUTCOME MEASURE:

The McGill Pain Questionnaire (MPQ) was used to assess subjective pain experience and Quebec Back Pain Disability Scale (QBPDS) was used to assess the disability associated with CLBP. The primary outcome measure was the difference in MPQ and QBPDS scores between week 1 (pretest score), week 8 (posttest score), and follow-up at week 12 after randomization.

## RESULTS:

The simple main effects analysis showed that the MFR group performed better than the control group in weeks 8 and 12 ( $P < 0.005$ ). The patients in the MFR group reported a 53.3% reduction in their pain and 29.7% reduction in functional disability as shown in the MPQ and QBPDS scores in week 8, whereas patients in the control group reported a 26.1% and 9.8% reduction in their MPQ and QBPDS scores in week 8, which persisted as a 43.6% reduction of pain and 22.7% reduction of functional disability in the follow-up at week 12 in the MFR group compared to the baseline. The proportion of responders, defined as participants who had at least a 50% reduction in pain between weeks 1 and 8, was 73% in the MFR group and 0% in the control group, which was 0% for functional disability in the MFR and control group.

## CONCLUSIONS:

This study provides evidence that MFR when used as an adjunct to SBE is more effective than a control intervention for CLBP in nursing professionals.

DOI: 10.1016/j.jbmt.2013.05.007 | PMID: 24725797



<https://www.ncbi.nlm.nih.gov/pubmed/24725797>

## Changes in biomechanical dysfunction and low back pain reduction with osteopathic manual treatment: results from the OSTEOPATHIC Trial.

Licciardone JC, Kearns CM, Crow WT.

Man Ther. 2014 Aug;19(4):324-30. doi: 10.1016/j.math.2014.03.004. Epub 2014 Mar 18.

### ABSTRACT

The purpose of this study was to measure changes in biomechanical dysfunction following osteopathic manual treatment (OMT) and to assess how such changes predict subsequent low back pain (LBP) outcomes. Secondary analyses were performed with data collected during the OSTEOPATHIC Trial wherein a randomized, double-blind, sham-controlled, 2 × 2 factorial design was used to study OMT for chronic LBP. At baseline, prevalence rates of non-neutral lumbar dysfunction, pubic shear, innominate shear, restricted sacral nutation, and psoas syndrome were determined in 230 patients who received OMT. Five OMT sessions were provided at weeks 0, 1, 2, 4, and 6, and the prevalence of each biomechanical dysfunction was again measured at week 8 immediately before the final OMT session. Moderate pain improvement ( $\geq 30\%$  reduction on a 100-mm visual analogue scale) at week 12 defined a successful LBP response to treatment. Prevalence rates at baseline were: non-neutral lumbar dysfunction, 124 (54%); pubic shear, 191 (83%); innominate shear, 69 (30%); restricted sacral nutation, 87 (38%), and psoas syndrome, 117 (51%). Significant improvements in each biomechanical dysfunction were observed with OMT; however, only psoas syndrome remission occurred more frequently in LBP responders than non-responders ( $P$  for interaction = 0.002).

Remission of psoas syndrome was the only change in biomechanical dysfunction that predicted subsequent LBP response after controlling for the other biomechanical dysfunctions and potential confounders (odds ratio, 5.11; 95% confidence interval, 1.54-16.96). These findings suggest that remission of psoas syndrome may be an important and previously unrecognized mechanism explaining clinical improvement in patients with chronic LBP following OMT.

DOI: 10.1016/j.math.2014.03.004 | PMID: 24704126



<https://www.ncbi.nlm.nih.gov/pubmed/24704126>

## Preventive osteopathic manipulative treatment and stress fracture incidence among collegiate cross-country athletes.

Brumm LF, Janiski C, Balawender JL, Feinstein A.

J Am Osteopath Assoc. 2013 Dec;113(12):882-90. doi: 10.7556/jaoa.2013.066.

### CONTEXT:

Stress fractures are common among athletes, particularly distance runners, with many theories regarding the etiologic process of stress fractures and various studies identifying risk factors or suggesting preventive techniques. To our knowledge, no previous studies have discussed the possible causative effects of somatic dysfunction or the preventive capabilities of osteopathic manipulative treatment (OMT).

### OBJECTIVE:

To apply a preventive OMT protocol for cross-country athletes to reduce the incidence of stress fractures.

### DESIGN:

Cohort study.

### METHODS:

Examinations of cross-country athletes at an NCAA (National Collegiate Athletic Association) Division I university were performed by supervising physician-examiners and first- and second-year osteopathic medical students during several consecutive academic years. Athletes re-enrolled in the study each year they continued to be eligible. The intervention included osteopathic structural examination and OMT that focused on somatic dysfunction identified in the pelvis, sacrum, and lower extremities.

### RESULTS:

More than 1800 participant examinations were performed on 124 male and female participants by 3 supervising physician-examiners and 141 osteopathic medical students over the course of 5 consecutive academic years (2004-2005 to 2008-2009). Data

from these academic years were compared with data from the previous 8 academic years (1996-1997 to 2003-2004). An average of 20 new participants enrolled yearly. The number of annual stress fractures per team ranged from 0 to 6 for male participants and 1 to 6 for female participants. The cumulative annual incidence of stress fractures for male participants demonstrated a statistically significant decrease from 13.9% (20 of 144) before intervention to 1.0% (1 of 105) after intervention, resulting in a 98.7% relative reduction in stress-fracture diagnosis ( $P=.019$ ). The cumulative annual incidence for female participants showed a minimal decrease from 12.9% (23 of 178) before intervention to 12.0% (17 of 142) after intervention, an 8.5% relative reduction in stress-fracture diagnosis ( $P=.671$ ). The cumulative annual incidence of all participants decreased from 13.4% (43 of 322) before intervention to 7.3% (18 of 247) after intervention, a 45% relative reduction in stress-fracture diagnosis ( $P=.156$ ).

## CONCLUSION:

There was a statistically significant decrease in the cumulative annual incidence of stress fractures in male, but not female, cross-country athletes after receiving OMT.

DOI: 10.7556/jaoa.2013.066 | PMID: 24285030



<https://www.ncbi.nlm.nih.gov/pubmed/24285030>

## Acute improvement in hemodynamic control after osteopathic manipulative treatment in the third trimester of pregnancy.

Hensel KL, Pacchia CF, Smith ML.

Complement Ther Med. 2013 Dec;21(6):618-26. doi: 10.1016/j.ctim.2013.08.008. Epub 2013 Aug 30.

### OBJECTIVES:

The physiological changes that occur during pregnancy, including increased blood volume and cardiac output, can affect hemodynamic control, most profoundly with positional changes that affect venous return to the heart. By using Osteopathic Manipulative Treatment (OMT), a body-based modality theorized to affect somatic structures related to nervous and circulatory systems, we hypothesized that OMT acutely improves both autonomic and hemodynamic control during head-up tilt and heel raise in women at 30 weeks gestation.

### DESIGN:

One hundred subjects were recruited at 30 weeks gestation.

### SETTING:

The obstetric clinics of UNTHHealth in Fort Worth, TX.

### INTERVENTION:

Subjects were randomized into one of three treatment groups: OMT, placebo ultrasound, or time control. Ninety subjects had complete data (N=25, 31 and 34 in each group respectively).

### MAIN OUTCOME MEASURES:

Blood pressure and heart rate were recorded during 5 min of head-up tilt followed by 4 min of intermittent heel raising.

### RESULTS:

No significant differences in blood pressure, heart rate or heart rate variability were observed between groups with tilt before or after treatment ( $p>0.36$ ), and heart rate variability was not different between treatment groups ( $p>0.55$ ). However, blood pressure increased significantly ( $p=0.02$ ) and heart rate decreased ( $p<0.01$ ) during heel raise after OMT compared to placebo or time control.

## CONCLUSIONS:

These data suggest that OMT can acutely improve hemodynamic control during engagement of the skeletal muscle pump and this was most likely due to improvement of structural restrictions to venous return.

DOI: 10.1016/j.ctim.2013.08.008 | PMID: 24280470



<https://www.ncbi.nlm.nih.gov/pubmed/24280470>

## Treatment of refractory irritable bowel syndrome with visceral osteopathy: short-term and long-term results of a randomized trial.

Attali TV, Bouchoucha M, Benamouzig R.

J Dig Dis. 2013 Dec;14(12):654-61. doi: 10.1111/1751-2980.12098.

### OBJECTIVE:

In light of the low efficiency of available drugs in treating irritable bowel syndrome (IBS), there has been a growing interest in its alternative therapies. The aim of this study was to evaluate the effectiveness of visceral osteopathy for IBS.

### METHODS:

In total, 31 consecutive refractory IBS patients were prospectively included in a randomized, crossover placebo-controlled study. Qualitative evaluation of depression and four symptoms including constipation, diarrhea, abdominal distension and abdominal pain before and after each phase of the study were conducted using visual analog scales, measures of rectal sensitivity and colonic transit time. One year after the study, the assessment of symptoms was performed again in all patients.

### RESULTS:

Visceral osteopathy was associated with a significant amelioration of self-reported diarrhea, abdominal distension and abdominal pain, while constipation did not change significantly after this therapy. It was also associated with decreased rectal sensitivity, presenting as an increase in threshold volume, constant sensation volume and maximum tolerable volume ( $P < 0.001$ ). However, no significant evolution of rectal sensitivity was observed when patients underwent placebo manipulations. Modifications of depression and total or segmental colonic transit time were not observed. One year after the end of this trial, symptom scores of diarrhea, abdominal distension and abdominal pain were significantly lower than those at enrollment ( $P < 0.05$ ).

### CONCLUSION:

This study suggests that visceral osteopathy improves short-term and long-term abdominal distension and pain, and also decreases rectal sensitivity in IBS patients.

DOI: 10.1111/1751-2980.12098 | PMID: 23981319



<https://www.ncbi.nlm.nih.gov/pubmed/23981319>

## Musculoskeletal Therapies: Osteopathic Manipulative Treatment.

Jonas C1.

FP Essent. 2018 Jul;470:11-15.

### ABSTRACT

Osteopathic manipulative treatment (OMT) is being used increasingly in the United States. OMT techniques can be categorized as direct, using an activating force to move tissue through range-of-motion barriers; indirect, disengaging dysfunctional body parts away from restrictive barriers; and combined techniques. Evidence supports the effectiveness of this therapy in management of musculoskeletal conditions, particularly for low back pain, but is limited for many other conditions. Physician opinion, patient reporting, and student attitudes about OMT primarily are positive, but rates of OMT use vary across different US regions. Adverse effects are rare but include cauda equina syndrome, lumbar disk herniation, fracture, and hematoma or hemorrhagic cyst. Contraindications to OMT primarily involve conditions that increase bleeding risk or compromise bone, tendon, ligament, or joint integrity. National organizations have issued recommendations and guidelines recommending OMT as a first-line noninvasive therapy for low back pain after self-care. OMT is covered by many health insurance companies and training is available for allopathic physicians. Patient referrals should be made to appropriately credentialed physicians after consideration of supporting evidence and patient interest.

PMID: 29963843



<https://www.ncbi.nlm.nih.gov/pubmed/29963843>

## Spinal mobilization of postpartum low back and pelvic girdle pain: an evidence-based clinical rule for predicting responders and nonresponders.

Al-Sayegh NA, George SE, Boninger ML, Rogers JC, Whitney SL, Delitto A.

PM R. 2010 Nov;2(11):995-1005. doi: 10.1016/j.pmrj.2010.07.481.

### OBJECTIVE:

To develop a clinical prediction rule (CPR) for identifying postpartum women with low back pain (LBP) and/or pelvic girdle pain (PGP) whose functional disability scores improve with a high-velocity thrust technique (HVTT) conducted by a physical therapist.

### DESIGN:

Prospective cohort.

### SETTING:

Outpatient physical therapy departments.

### PARTICIPANTS:

Sixty-nine postpartum women referred to physical therapy with the complaint of LBP and/or PGP.

### METHODS:

Subjects underwent a physical examination and a HVTT to the lumbopelvic region.

### MAIN OUTCOME MEASURES:

Success with treatment was determined by the use of percent changes in disability scores and served as the reference standard for determining accuracy of the examination variables. Variables with univariate prediction of success and nonsuccess were combined into multivariate CPRs.

### RESULTS:

Fifty-five subjects (80%) had success with the HVTT. A CPR for success with 4 criteria

was identified. The presence of 2 of 4 criteria (positive likelihood ratio=3.05) increased the probability of success from 80% to 92%. A CPR for treatment failure with 3 criteria was identified. The presence of 2 of 3 criteria (positive likelihood ratio=11.79) increased the probability of treatment failure from 20% to 75%.

## CONCLUSIONS:

The pretest probability of success (80%) is sufficient to reassure the clinician about the decision to use a HVTT to the lumbopelvic region in postpartum women with LBP and/or PGP. If 2 of 3 criteria for treatment failure are met in the CPR, an alternative approach is warranted. An intervention such as the HVTT is compelling, given the need to minimize pharmaceutical remedies in women who are potentially breast-feeding post partum.

DOI: 10.1016/j.pmrj.2010.07.481 | PMID: 21093835



<https://www.ncbi.nlm.nih.gov/pubmed/21093835>

## Manual therapy for osteoarthritis of the hip or knee - a systematic review.

French HP, Brennan A, White B, Cusack T.

Man Ther. 2011 Apr;16(2):109-17. doi: 10.1016/j.math.2010.10.011. Epub 2010 Dec 13.

### ABSTRACT

The aim of this systematic review was to determine if manual therapy improves pain and/or physical function in people with hip or knee OA. Eight databases were searched for randomised controlled trials (RCTs). Data were extracted and risk of bias assessed by independent reviewers. Four RCTs were eligible for inclusion (280 subjects), three of which studied people with knee OA and one studied those with hip OA. One study compared manual therapy to no treatment, one compared to placebo intervention, whilst two compared to alternative interventions. Meta-analysis was not possible due to clinical heterogeneity of the studies. One study had a low risk of bias and three had high risk of bias. All studies reported short-term effects, and long-term effects were measured in one study. There is silver level evidence that manual therapy is more effective than exercise for those with hip OA in the short and long-term. Due to the small number of RCTs and patients, this evidence could be considered to be inconclusive regarding the benefit of manual therapy on pain and function for knee or hip OA.

DOI: 10.1016/j.math.2010.10.011 | PMID: 21146444



<https://www.ncbi.nlm.nih.gov/pubmed/21146444>

## The Clinical Effects of Manipulative Therapy in People with Chronic Obstructive Pulmonary Disease.

Galletti J, Mcheileh G, Hahne A, Lee AL.

J Altern Complement Med. 2018 Jul;24(7):677-683. doi: 10.1089/acm.2017.0390. Epub 2018 Mar 29.

### OBJECTIVES:

This study aimed to determine the effects of manipulative therapies (MT), including spinal manipulation, and diaphragmatic release techniques on lung function, exercise capacity, symptoms, and health-related quality of life (HRQOL) in people with chronic obstructive pulmonary disease (COPD).

### DESIGN:

Systematic review.

### PARTICIPANTS:

People diagnosed with COPD.

### INTERVENTION:

Randomized controlled trials of MT (either with or without pulmonary rehabilitation [PR]) compared to other treatments (soft tissue [ST] therapy or sham therapy) applied in people with COPD were identified following the search of seven databases. Two reviewers independently assessed study quality and extracted data.

### OUTCOME MEASURES:

Lung function, exercise capacity, symptoms, and HRQOL.

### RESULTS:

Four studies were included, with a total of 68 participants. The heterogeneity between treatments prevented meta-analysis. There was no beneficial effect on spirometry measures of lung function with MT. MT combined with PR improved exercise capacity by

48-49 m more than ST therapy plus PR. Less dyspnea was reported with MT and ST therapy compared to ST therapy alone ( $p = 0.01$ ), but there was no effect on HRQOL, or symptoms of anxiety or depression.

## CONCLUSIONS:

In people with COPD, MT (either with or without PR) improved functional exercise capacity, but had no effect on lung function, or HRQOL. Further research is required to determine the underlying mechanism of this treatment approach and its relationship to exercise capacity.

DOI: 10.1089/acm.2017.0390 | PMID: 29595991



<https://www.ncbi.nlm.nih.gov/pubmed/29595991>

## American Osteopathic Association guidelines for osteopathic manipulative treatment (OMT) for patients with low back pain.

Clinical Guideline Subcommittee on Low Back Pain, American Osteopathic Association

J Am Osteopath Assoc. 2010 Nov;110(11):653-66..

### BACKGROUND:

Osteopathic manipulative treatment (OMT) is a distinctive modality commonly used by osteopathic physicians to complement conventional treatment of musculoskeletal disorders, including those that cause low back pain. Osteopathic manipulative treatment is defined in the Glossary of Osteopathic Terminology as: "The therapeutic application of manually guided forces by an osteopathic physician (US Usage) to improve physiologic function and/or support homeostasis that has been altered by somatic dysfunction. OMT employs a variety of techniques." Somatic dysfunction is defined as: "Impaired or altered function of related components of the somatic (body framework) system: skeletal, arthrodiarthral and myofascial structures, and their related vascular, lymphatic, and neural elements. Somatic dysfunction is treatable using osteopathic manipulative treatment." Previous published guidelines have been based on literature reviews and meta-analyses of spinal manipulation for low back pain. They have not specifically addressed OMT and generally have focused on spinal manipulation as an alternative to conventional treatment. The purpose of this study was to assess the efficacy of OMT for somatic dysfunction associated with low back pain by osteopathic physicians and osteopathic practitioners trained in osteopathic palpatory diagnosis and manipulative treatment.

### METHODS:

Computerized bibliographic searches of MEDLINE, OLDMEDLINE, EMBASE, AMED, MANTIS, OSTMED (OSTMED.DR), and the Cochrane Central Register of Controlled Trials were supplemented with additional database and manual searches of the literature. Six trials, involving eight OMT vs control treatment comparisons, were included because they were randomized controlled trials of OMT that involved blinded assessment of low back pain in ambulatory settings. Data on trial methodology, OMT and control treatments, and low back pain outcomes were abstracted by two independent reviewers. Effect sizes were computed using Cohen d statistic, and meta-analysis results were wei-

ghted by the inverse variance of individual comparisons. In addition to the overall meta-analysis, subgroup meta-analyses were performed according to control treatment, country where the trial was conducted, and duration of follow-up. Sensitivity analyses were performed for both the overall and subgroup meta-analyses.

## RESULTS:

Osteopathic manipulative treatment significantly reduced low back pain (effect size, -0.30; 95% confidence interval, -0.47 to -0.13; P=.001). Subgroup analyses demonstrated significant pain reductions in trials of OMT vs active treatment or placebo control and OMT vs no treatment control. There were significant pain reductions with OMT regardless of whether trials were performed in the United Kingdom or the United States. Significant pain reductions were also observed during short-, inter mediate-, and long-term follow-up.

## CONCLUSIONS:

Osteopathic manipulative treatment significantly reduces low back pain. The level of pain reduction is clinically important, greater than expected from placebo effects alone, and may persist through the first year of treatment. Additional research is warranted to elucidate mechanistically how OMT exerts its effects, to determine if OMT benefits extend beyond the first year of treatment, and to assess the cost-effectiveness of OMT as a complementary treatment for low back pain.

PMID: 21135197



<https://www.ncbi.nlm.nih.gov/pubmed/21135197>

## Manipulative therapy for lower extremity conditions: expansion of literature review.

Brantingham JW, Globe G, Pollard H, Hicks M, Korporaal C, Hoskins W.

J Manipulative Physiol Ther. 2009 Jan;32(1):53-71. doi: 10.1016/j.jmpt.2008.09.013.

### OBJECTIVE:

The purpose of this study was to conduct a systematic review on manipulative therapy for lower extremity conditions and expand on a previously published literature review.

### METHODS:

The Scientific Commission of the Council on Chiropractic Guidelines and Practice Parameters (CCGPP) was charged with developing literature syntheses, organized by anatomical region, to evaluate and report on the evidence base for chiropractic care. This article is the outcome of this charge. As part of the CCGPP process, preliminary drafts of these articles were posted on the CCGPP Web site [www.ccgpp.org](http://www.ccgpp.org) (2006-8) to allow for an open process and the broadest possible mechanism for stakeholder input. The Cumulative Index to Nursing and Allied Health Literature; PubMed; Manual, Alternative, and Natural Therapy Index System; Science Direct; and Index to Chiropractic Literature were searched from December 2006 to February 2008. Search terms included chiropractic, osteopathic, orthopedic, or physical therapy and MeSH terms for each region. Inclusion criteria required a diagnosis and manipulative therapy (mobilization and manipulation grades I-V) with or without adjunctive care. Exclusion criteria were pain referred from spinal sites (without diagnosis), referral for surgery, and conditions contraindicated for manipulative therapy. Clinical trials were assessed using a modified Scottish Intercollegiate Guidelines Network ranking system.

### RESULTS:

Of the total 389 citations captured, 39 were determined to be relevant. There is a level of C or limited evidence for manipulative therapy combined with multimodal or exercise therapy for hip osteoarthritis. There is a level of B or fair evidence for manipulative therapy of the knee and/or full kinetic chain, and of the ankle and/or foot, combined with multimodal or exercise therapy for knee osteoarthritis, patellofemoral pain sy-

ndrome, and ankle inversion sprain. There is also a level of C or limited evidence for manipulative therapy of the ankle and/or foot combined with multimodal or exercise therapy for plantar fasciitis, metatarsalgia, and hallux limitus/rigidus. There is also a level of I or insufficient evidence for manipulative therapy of the ankle and/or foot combined with multimodal or exercise therapy for hallux abducto valgus.

## CONCLUSIONS:

There are a growing number of peer-reviewed studies of manipulative therapy for lower extremity disorders.

DOI: 10.1016/j.jmpt.2008.09.013 | PMID: 19121464



<https://www.ncbi.nlm.nih.gov/pubmed/19121464>

## Manual therapy with or without physical medicine modalities for neck pain: a systematic review.

D'Sylva J, Miller J, Gross A, Burnie SJ, Goldsmith CH, Graham N, et al.

Man Ther. 2010 Oct;15(5):415-33. doi: 10.1016/j.math.2010.04.003. Epub 2010 Jun 9.

### ABSTRACT

Manual therapy interventions are often used with or without physical medicine modalities to treat neck pain. This review assessed the effect of 1) manipulation and mobilisation, 2) manipulation, mobilisation and soft tissue work, and 3) manual therapy with physical medicine modalities on pain, function, patient satisfaction, quality of life (QoL), and global perceived effect (GPE) in adults with neck pain. A computerised search for randomised trials was performed up to July 2009. Two or more authors independently selected studies, abstracted data, and assessed methodological quality. Pooled relative risk (RR) and standardised mean differences (SMD) were calculated when possible. We included 19 trials, 37% of which had a low risk of bias. Moderate quality evidence (1 trial, 221 participants) suggested mobilisation, manipulation and soft tissue techniques decrease pain and improved satisfaction when compared to short wave diathermy, and that this treatment combination paired with advice and exercise produces greater improvements in GPE and satisfaction than advice and exercise alone for acute neck pain. Low quality evidence suggests a clinically important benefit favouring mobilisation and manipulation in pain relief [1 meta-analysis, 112 participants: SMD -0.34(95% CI: -0.71, 0.03), improved function and GPE (1 trial, 94 participants) for participants with chronic cervicogenic headache when compared to a control at intermediate and long term follow-up; but no difference when used with various physical medicine modalities.

DOI: 10.1016/j.math.2010.04.003 | PMID: 20538501



<https://www.ncbi.nlm.nih.gov/pubmed/20538501>

## Evidence-based review of manual therapy efficacy in treatment of chronic musculoskeletal pain.

Bokarius AV, Bokarius V.

Pain Pract. 2010 Sep-Oct;10(5):451-8. doi: 10.1111/j.1533-2500.2010.00377.x.

### ABSTRACT

Chronic musculoskeletal pain contributes greatly to the community's disability and morbidity. Although many interventions are employed for treating chronic musculoskeletal pain, few have been proven in randomized controlled trials. Manual therapy is a widely used method for managing such conditions, but to date, its efficacy has not been established. This evidence-based review aims to assess the efficacy of manual therapy interventions for chronic musculoskeletal pain. MEDLINE, CINAHL, EBM Reviews (Cochrane DSR, ACP Journal Club, DARE, and CCTR), Ovid Healthstar, and PsycINFO databases were searched from 1961 to March 2009 using keywords of interest. Potential studies for inclusion were reviewed independently by two reviewers. Methodological quality was assessed based on the Physiotherapy Evidence Database scale. Trials were quantitatively categorized according to the Modified Oxford Centre for Evidence-based Medicine Levels of Evidence. Meta-analysis was not possible due to heterogeneity of outcome measures. Evidence supports some manual therapy techniques in chronic low back and knee pain.

DOI: 10.1111/j.1533-2500.2010.00377.x | PMID: 20412502



<https://www.ncbi.nlm.nih.gov/pubmed/20412502>

## The effectiveness of sub-group specific manual therapy for low back pain: a systematic review.

Slater SL, Ford JJ, Richards MC, Taylor NF, Surkitt LD, Hahne AJ.

Man Ther. 2012 Jun;17(3):201-12. doi: 10.1016/j.math.2012.01.006. Epub 2012 Mar 3.

### BACKGROUND:

Manual therapy is frequently used to treat low back pain (LBP), but evidence of its effectiveness is limited. One explanation may be sample heterogeneity and inadequate sub-grouping of participants in randomized controlled trials (RCTs) where manual therapy has not been targeted toward those likely to respond.

### OBJECTIVES:

To determine the effectiveness of specific manual therapy provided to sub-groups of participants identified as likely to respond to manual therapy.

### DATA SOURCES:

A systematic search of electronic databases of MEDLINE, EMBASE, CINAHL, and the Cochrane Central Register of Controlled trials (CENTRAL). TRIAL ELIGIBILITY CRITERIA: RCTs on manual therapy for participants identified as belonging to a sub-group of LBP likely to respond to manual therapy were included. TRIAL APPRAISAL AND SYNTHESIS METHODS: Identified trials were assessed for eligibility. Data from included trials were extracted by two authors independently. Risk of bias in each trial was assessed using the PEDro scale and the overall quality of evidence rated according to the GRADE domains. Treatment effect sizes and 95% confidence intervals were calculated for pain and activity.

### RESULTS:

Seven RCTs were included in the review. Clinical and statistical heterogeneity precluded meta-analysis. Significant treatment effects were found favouring sub-group specific manual therapy over a number of comparison treatments for pain and activity at short and intermediate follow-up. However, the overall GRADE quality of evidence was very low.

## CONCLUSIONS:

This review found preliminary evidence supporting the effectiveness of sub-group specific manual therapy. Further high quality research on LBP sub-groups is required.

DOI: 10.1016/j.math.2012.01.006 | PMID: 22386046



<https://www.ncbi.nlm.nih.gov/pubmed/22386046>

## Manipulative therapy for pregnancy and related conditions: a systematic review.

Khorsan R, Hawk C, Lisi AJ, Kizhakkeveettil A.

Obstet Gynecol Surv. 2009 Jun;64(6):416-27. doi: 10.1097/OGX.0b013e31819f9ddf.

### OBJECTIVE:

The objective of this review is to evaluate the evidence on the effects of Spinal Manipulative Therapy (SMT) on back pain and other related symptoms during pregnancy.

### DATA SOURCES:

A literature search was conducted using Pubmed, Manual, Alternative and Natural Therapy Index System, Cumulated Index to Nursing and Allied Health, Index to Chiropractic Literature, the Cochrane Library, and Google Scholar. In addition hand searches and reference tracking were also performed, and the citation list was assessed for comprehensiveness by content experts.

### METHODS OF STUDY SELECTION:

This review was limited to peer-reviewed manuscripts published in English from 1966 until September 2008. The initial search strategy yielded 140 citations of which 12 studies were reviewed for quality.

### TABULATION, INTEGRATION, AND RESULTS:

The methodological quality of the included studies was assessed independently using quality checklists of the Scottish Intercollegiate Guidelines Network and Council on Chiropractic Guidelines and Practice Parameters. The review indicates that the use of SMT during pregnancy to reduce back pain and other related symptoms is supported by limited evidence.

### CONCLUSION:

Overall, this body of evidence is best described as emergent. However, since effective treatments for pregnancy-related back pain are limited, clinicians may want to consider SMT as a treatment option, if no contraindications are present.

DOI: 10.1097/OGX.0b013e31819f9ddf | PMID: 19445815



<https://www.ncbi.nlm.nih.gov/pubmed/19445815>

## Manual therapy for childhood respiratory disease: a systematic review.

Pepino VC, Ribeiro JD, Ribeiro MA, de Noronha M, Mezzacappa MA, Schivinski CI.

J Manipulative Physiol Ther. 2013 Jan;36(1):57-65. doi: 10.1016/j.jmpt.2012.12.004.

### OBJECTIVE:

This study reviewed the scientific evidence available on the effects of manipulative techniques on children with respiratory diseases.

### METHOD:

Three databases (SciELO, PEDro, and MEDLINE) were searched for clinical trials on the effects of manual therapy techniques on children and adolescents with respiratory diseases. The relevant studies were chosen by 2 independent researchers who assessed their abstracts and selected the studies that met the criteria for a complete and structured review.

### RESULTS:

Of the 1147 relevant titles, 103 titles were selected for abstract assessment, and of these, 24 were selected for a full-text review. After critical analysis, 8 studies were included in the review and 16 were excluded for the following reasons: 1 covered only conventional therapy, 7 were not about the studied theme, and 8 included adults. Of the 8 studies included in the present review, 5 consisted of asthmatic children and the others of children with the following conditions: cystic fibrosis, bronchiolitis, recurrent respiratory infections, among others. Only 2 studies did not identify positive results with the use of manual therapy. The other 6 studies found some benefit, specifically in spirometric parameters, immunologic tests, anxiety questionnaire, or level of salivary cortisol.

### CONCLUSION:

The use of manual techniques on children with respiratory diseases seems to be beneficial. Chiropractic, osteopathic medicine, and massage are the most common interventions. The lack of standardized procedures and limited variety of methods used evidenced the need for more studies on the subject.

DOI: 10.1016/j.jmpt.2012.12.004 | PMID: 23380215



<https://www.ncbi.nlm.nih.gov/pubmed/23380215>

## Manual therapy and exercise for neck pain: a systematic review.

Miller J, Gross A, D'Sylva J, Burnie SJ, Goldsmith CH, Graham N, et al.

Man Ther. 2010 Aug;15(4):334-54.

### ABSTRACT

Manual therapy is often used with exercise to treat neck pain. This cervical overview group systematic review update assesses if manual therapy, including manipulation or mobilisation, combined with exercise improves pain, function/disability, quality of life, global perceived effect, and patient satisfaction for adults with neck pain with or without cervicogenic headache or radiculopathy. Computerized searches were performed to July 2009. Two or more authors independently selected studies, abstracted data, and assessed methodological quality. Pooled relative risk (pRR) and standardized mean differences (pSMD) were calculated. Of 17 randomized controlled trials included, 29% had a low risk of bias. Low quality evidence suggests clinically important long-term improvements in pain (pSMD-0.87(95% CI: -1.69, -0.06)), function/disability, and global perceived effect when manual therapy and exercise are compared to no treatment. High quality evidence suggests greater short-term pain relief [pSMD-0.50(95% CI: -0.76, -0.24)] than exercise alone, but no long-term differences across multiple outcomes for (sub)acute/chronic neck pain with or without cervicogenic headache. Moderate quality evidence supports this treatment combination for pain reduction and improved quality of life over manual therapy alone for chronic neck pain; and suggests greater short-term pain reduction when compared to traditional care for acute whiplash. Evidence regarding radiculopathy was sparse. Specific research recommendations are made.

PMID: 20593537

 <https://www.ncbi.nlm.nih.gov/pubmed/20593537>

## Prevention of progressive back-specific dysfunction during pregnancy: an assessment of osteopathic manual treatment based on Cochrane Back Review Group criteria.

Licciardone JC, Aryal S.

J Am Osteopath Assoc. 2013 Oct;113(10):728-36. doi: 10.7556/jaoa.2013.043.

### CONTEXT:

Back pain during pregnancy may be associated with deficits in physical functioning and disability. Research indicates that osteopathic manual treatment (OMT) slows the deterioration of back-specific functioning during pregnancy.

### OBJECTIVE:

To measure the treatment effects of OMT in preventing progressive back-specific dysfunction during the third trimester of pregnancy using criteria established by the Cochrane Back Review Group.

### DESIGN:

A randomized sham-controlled trial including 3 parallel treatment arms: usual obstetric care and OMT (UOBC+OMT), usual obstetric care and sham ultrasound therapy (UOBC+SUT), and usual obstetric care (UOBC).

### SETTING:

The Osteopathic Research Center within the University of North Texas Health Science Center in Fort Worth.

### PARTICIPANTS:

A total of 144 patients were randomly assigned and included in intention-to-treat analyses.

### MAIN OUTCOME MEASURES:

Progressive back-specific dysfunction was defined as a 2-point or greater increase in

the Roland-Morris Disability Questionnaire (RMDQ) score during the third trimester of pregnancy. Risk ratios (RRs) and 95% confidence intervals (CIs) were used to compare progressive back-specific dysfunction in patients assigned to UOBC+OMT relative to patients assigned to UOBC+SUT or UOBC. Numbers needed to treat (NNTs) and 95% CIs were also used to assess UOBC+OMT vs each comparator. Subgroup analyses were performed using median splits of baseline scores on a numerical rating scale for back pain and the RMDQ.

## RESULTS:

Overall, 68 patients (47%) experienced progressive back-specific dysfunction during the third trimester of pregnancy. Patients who received UOBC+OMT were significantly less likely to experience progressive back-specific dysfunction (RR, 0.6; 95% CI, 0.3-1.0;  $P=.046$  vs UOBC+SUT; and RR, 0.4; 95% CI, 0.2-0.7;  $P<.0001$  vs UOBC). The effect sizes for UOBC+OMT vs UOBC+SUT and for UOBC+OMT vs UOBC were classified as medium and large, respectively. The corresponding NNTs for UOBC+OMT were 5.1 (95% CI, 2.7-282.2) vs UOBC+SUT; and 2.5 (95% CI, 1.8-4.9) vs UOBC. There was no statistically significant interaction between subgroups in response to OMT.

## CONCLUSION:

Osteopathic manual treatment has medium to large treatment effects in preventing progressive back-specific dysfunction during the third trimester of pregnancy. The findings are potentially important with respect to direct health care expenditures and indirect costs of work disability during pregnancy.

DOI: 10.7556/jaoa.2013.043 | PMID: 24084800

 <https://www.ncbi.nlm.nih.gov/pubmed/24084800>

## Manipulation or mobilisation for neck pain: a Cochrane Review.

Gross A, Miller J, D'Sylva J, Burnie SJ, Goldsmith CH, Graham N, et al.

Man Ther. 2010 Aug;15(4):315-33. doi: 10.1016/j.math.2010.04.002. Epub 2010 May 26.

### ABSTRACT

Manipulation and mobilisation are often used, either alone or combined with other treatment approaches, to treat neck pain. This review assesses if manipulation or mobilisation improves pain, function/disability, patient satisfaction, quality of life (QoL), and global perceived effect (GPE) in adults experiencing neck pain with or without cervicogenic headache or radicular findings. A computerised search was performed in July 2009. Randomised trials investigating manipulation or mobilisation for neck pain were included. Two or more authors independently selected studies, abstracted data, and assessed methodological quality. Pooled relative risk (pRR) and standardised mean differences (pSMD) were calculated. 33% of 27 trials had a low risk of bias. Moderate quality evidence showed cervical manipulation and mobilisation produced similar effects on pain, function and patient satisfaction at intermediate-term follow-up. Low quality evidence suggested cervical manipulation may provide greater short-term pain relief than a control (pSMD -0.90 (95%CI: -1.78 to -0.02)). Low quality evidence also supported thoracic manipulation for pain reduction (NNT 7; 46.6% treatment advantage) and increased function (NNT 5; 40.6% treatment advantage) in acute pain and immediate pain reduction in chronic neck pain (NNT 5; 29% treatment advantage). Optimal technique and dose need to be determined.

DOI: 10.1016/j.math.2010.04.002 | PMID: 20510644



<https://www.ncbi.nlm.nih.gov/pubmed/20510644>

## Interventions for preventing and treating low-back and pelvic pain during pregnancy.

Liddle SD, Pennick V.

Cochrane Database Syst Rev. 2015 Sep 30;(9):CD001139. doi: 10.1002/14651858.CD001139.pub4.

### BACKGROUND:

More than two-thirds of pregnant women experience low-back pain and almost one-fifth experience pelvic pain. The two conditions may occur separately or together (low-back and pelvic pain) and typically increase with advancing pregnancy, interfering with work, daily activities and sleep.

### OBJECTIVES:

To update the evidence assessing the effects of any intervention used to prevent and treat low-back pain, pelvic pain or both during pregnancy.

### SEARCH METHODS:

We searched the Cochrane Pregnancy and Childbirth (to 19 January 2015), and the Cochrane Back Review Groups' (to 19 January 2015) Trials Registers, identified relevant studies and reviews and checked their reference lists. S

### ELECTION CRITERIA:

Randomised controlled trials (RCTs) of any treatment, or combination of treatments, to prevent or reduce the incidence or severity of low-back pain, pelvic pain or both, related functional disability, sick leave and adverse effects during pregnancy.

### DATA COLLECTION AND ANALYSIS:

Two review authors independently assessed trials for inclusion and risk of bias, extracted data and checked them for accuracy.

## MAIN RESULTS:

We included 34 RCTs examining 5121 pregnant women, aged 16 to 45 years and, when reported, from 12 to 38 weeks' gestation. Fifteen RCTs examined women with low-back pain (participants = 1847); six examined pelvic pain (participants = 889); and 13 examined women with both low-back and pelvic pain (participants = 2385). Two studies also investigated low-back pain prevention and four, low-back and pelvic pain prevention. Diagnoses ranged from self-reported symptoms to clinicians' interpretation of specific tests. All interventions were added to usual prenatal care and, unless noted, were compared with usual prenatal care. The quality of the evidence ranged from moderate to low, raising concerns about the confidence we could put in the estimates of effect.

For low-back pain Results from meta-analyses provided low-quality evidence (study design limitations, inconsistency) that any land-based exercise significantly reduced pain (standardised mean difference (SMD) -0.64; 95% confidence interval (CI) -1.03 to -0.25; participants = 645; studies = seven) and functional disability (SMD -0.56; 95% CI -0.89 to -0.23; participants = 146; studies = two). Low-quality evidence (study design limitations, imprecision) also suggested no significant differences in the number of women reporting low-back pain between group exercise, added to information about managing pain, versus usual prenatal care (risk ratio (RR) 0.97; 95% CI 0.80 to 1.17; participants = 374; studies = two). For pelvic pain Results from a meta-analysis provided low-quality evidence (study design limitations, imprecision) of no significant difference in the number of women reporting pelvic pain between group exercise, added to information about managing pain, and usual prenatal care (RR 0.97; 95% CI 0.77 to 1.23; participants = 374; studies = two). For low-back and pelvic pain Results from meta-analyses provided moderate-quality evidence (study design limitations) that: an eight- to 12-week exercise program reduced the number of women who reported low-back and pelvic pain (RR 0.66; 95% CI 0.45 to 0.97; participants = 1176; studies = four); land-based exercise, in a variety of formats, significantly reduced low-back and pelvic pain-related sick leave (RR 0.76; 95% CI 0.62 to 0.94; participants = 1062; studies = two). The results from a number of individual studies, incorporating various other interventions, could not be pooled due to clinical heterogeneity. There was moderate-quality evidence (study design limitations or imprecision) from individual studies suggesting that osteomanipulative therapy significantly reduced low-back pain and functional disability, and acupuncture or craniosacral therapy improved pelvic pain more than usual prenatal care. Evidence from individual studies was largely of low quality (study design limitations, imprecision), and suggested that pain and functional disability, but not sick leave, were signi-

ificantly reduced following a multi-modal intervention (manual therapy, exercise and education) for low-back and pelvic pain. When reported, adverse effects were minor and transient.

### AUTHORS' CONCLUSIONS:

There is low-quality evidence that exercise (any exercise on land or in water), may reduce pregnancy-related low-back pain and moderate- to low-quality evidence suggesting that any exercise improves functional disability and reduces sick leave more than usual prenatal care. Evidence from single studies suggests that acupuncture or craniosacral therapy improves pregnancy-related pelvic pain, and osteomanipulative therapy or a multi-modal intervention (manual therapy, exercise and education) may also be of benefit. Clinical heterogeneity precluded pooling of results in many cases. Statistical heterogeneity was substantial in all but three meta-analyses, which did not improve following sensitivity analyses. Publication bias and selective reporting cannot be ruled out. Further evidence is very likely to have an important impact on our confidence in the estimates of effect and change the estimates. Studies would benefit from the introduction of an agreed classification system that can be used to categorise women according to their presenting symptoms, so that treatment can be tailored accordingly.

DOI: 10.1002/14651858.CD001139.pub4 | PMID: 26422811



<https://www.ncbi.nlm.nih.gov/pubmed/26422811>

## Preliminary findings on the use of osteopathic manipulative treatment: outcomes during the formation of the practice-based research network, DO-Touch.NET.

Degenhardt BF, Johnson JC, Gross SR, Hagan C, Lund G, Curry WJ.

J Am Osteopath Assoc. 2014 Mar;114(3):154-70. doi: 10.7556/jaoa.2014.033.

### CONTEXT:

Few studies have assessed the use of osteopathic manipulative treatment (OMT) and subsequent patient-reported outcomes.

### OBJECTIVE:

To assess the current use of OMT and associated patient-reported outcomes.

### DESIGN:

A retrospective medical record review and a prospective observational study.

### SETTING:

Two university-based sites and their clinics associated with the practice-based research network DO-Touch.NET.

### PARTICIPANTS:

Patients aged 18 years or older who received OMT.

### MAIN OUTCOME MEASURES:

Medical records from 2007 were retrospectively reviewed to identify conditions being managed with OMT. From 2008 to 2010, patients were recruited before seeing their physicians. Questionnaires were distributed to patients and physicians, and information including demographics, chief complaints, symptom severity, current and past treatments, interference of symptoms with quality of life, physical examination findings, diagnoses, OMT performed, and immediate patient response to OMT was collected. A subset of patients provided data on symptom severity and frequency and

other treatments daily for the 7 days after OMT. On day 7, symptom interference with quality of life was reassessed.

## RESULTS:

Retrospective data were collected from 2569 office visits, and prospective data were collected from 299 office visits (patient age range, 18-93 years). In the medical record review, 17 of the top 25 diagnoses (68%) were related to musculoskeletal conditions. In the prospective study, 18 of the top 24 medical diagnoses (75%) were related to musculoskeletal conditions. Immediately after OMT, patients at 271 of 296 office visits (92%) felt better or much better; those at 5 (<2%) felt worse. After 7 days, patients at 126 of 175 office visits (72%) felt better or much better, and those at 10 (6%) felt worse. Average and worst symptom severity decreased until post-OMT days 4 and 5, respectively, when severity leveled off. There was decreased interference of symptoms with quality of life from before OMT to 7 days after OMT in usual/general activities, sleep, mood, and relationships (all  $P \leq .05$ ).

## CONCLUSION:

These preliminary results suggest that for adults, OMT is predominantly used for managing musculoskeletal pain conditions and is effective for short-term symptom relief. Continued surveillance of DO-Touch.NET member practice outcomes may help identify priorities for osteopathic research and define evidence-based standards for OMT practice and training.

DOI: 10.7556/jaoa.2014.033 | PMID: 24567269

 <https://www.ncbi.nlm.nih.gov/pubmed/24567269>

## Osteopathic manipulative treatment (OMT) for lower urinary tract symptoms (LUTS) in women.

Franke H, Hoesele K.

J Bodyw Mov Ther. 2013 Jan;17(1):11-8. doi: 10.1016/j.jbmt.2012.05.001. Epub 2012 Jun 17.

### BACKGROUND:

Because of its prevalence and impact on women's well-being, and its high financial costs, female LUTS is an important health problem that requires serious attention from health professionals.

### OBJECTIVE:

The objective of this review was to determine the clinical effects of osteopathic treatment on female lower urinary tract disorders.

### DATA SOURCES:

A systematic literature search was performed in May 2011 in the electronic databases Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, PEDro, OSTMED-DR, OSTEOPATHIC WEBRESEARCH and databases of ongoing trials. A manual search in reference lists and a personal communication with experts in the field of osteopathy was also conducted to identify additional studies.

### STUDY SELECTION:

Only randomized clinical studies (RCT) or controlled clinical studies (CCT) were included. Inclusion criteria of the participants were female, at least 18 years old and a diagnosed female urinary tract disorder. Exclusion criteria were neurologic disorders, tumors, urinary tract infections or antibiotic treatment, and pregnancy.

### DATA EXTRACTION:

Two review authors independently extracted the data of the studies using a standardized data extraction form. The updated Cochrane Risk of bias tool from 2011 was used to assess the methodological quality.

## RESULTS:

The quantitative analysis shows a statistically significant and clinically relevant improvement when the osteopathic intervention was compared to an untreated group. Two studies which compare OMT with the pelvic floor muscle training as a reference treatment document almost the same therapeutic effect.

## CONCLUSION:

The findings of this systematic review and meta-analysis are promising and encouraging to conduct larger, rigorous osteopathic intervention studies for female urination disorders. Future studies should compare the osteopathic treatment with established standard procedures in the control group.

DOI: 10.1016/j.jbmt.2012.05.001 | PMID: 23294678



<https://www.ncbi.nlm.nih.gov/pubmed/23294678>

## A randomized controlled trial of the effectiveness of osteopathy-based manual physical therapy in treating pediatric dysfunctional voiding.

Nemett DR, Fivush BA, Mathews R, Camirand N, Eldridge MA, Finney K, Gerson AC

J Pediatr Urol. 2008 Apr;4(2):100-6. doi: 10.1016/j.jpuro.2007.11.006. Epub 2008 Jan 11.

### OBJECTIVE:

Pediatric dysfunctional voiding (DV) presents physical and emotional challenges as well as risk of progression to renal disease. Manual physical therapy and osteopathic treatment have been successfully used to treat DV in adult women; a pediatric trial of manual physical therapy based on an osteopathic approach (MPT-OA) has not been reported. The aim of this study was to determine whether MPT-OA added to standard treatment (ST) improves DV more effectively than ST alone.

### METHODS:

Twenty-one children (aged 4-11 years) with DV were randomly assigned to receive MPT-OA plus standard treatment (treatment group) or standard treatment alone (control group). Pre-treatment and post-treatment evaluations of DV symptoms, MPT-OA evaluations and inter-rater reliability of DV symptom resolution were completed.

### RESULTS:

The treatment group exhibited greater improvement in DV symptoms than did the control group ( $Z=-2.63$ ,  $p=0.008$ , Mann-Whitney U-test). Improved or resolution of vesicoureteral reflux and elimination of post-void urine residuals were more prominent in the treatment group.

**CONCLUSIONS:** Results suggest that MPT-OA treatment can improve short-term outcomes in children with DV, beyond improvements observed with standard treatments, and is well liked by children and parents. Based on these results, a multi-center randomized clinical trial of MPT-OA in children with vesicoureteral reflux and/or post-void urinary retention is warranted.

DOI: 10.1016/j.jpuro.2007.11.006 | PMID: 18631903



<https://www.ncbi.nlm.nih.gov/pubmed/18631903>

## Study of the influence of osteopathy on obstructive sleep apnea syndrome.

Dahlke J.

Osteopathische medizin, 2013, 14(1), 4-8 | added to CENTRAL: 31 January 2014 | 2014 Issue 1

### ABSTRACT

The following pilot study that was executed as a controlled, randomized clinical intervention study in open-box design with a control group and follow-up examined whether osteopathy can reduce daytime sleepiness. After only two osteopathic treatments the total number of hypopnoeas during total sleep time as well as the number of hypopnoeas during the deep sleep phase without eye movement was significantly different. This was confirmed during follow-up six weeks after the 3rd reading. This showed that osteopathy can reduce the number of nightly apnoeas and hypopnoeas and thus on the obstructive sleep apnoea syndrome.



[https://www.cochranelibrary.com/central/doi/10.1002/central/CN-00908563/full?highlightAbstract=osteopa\\*](https://www.cochranelibrary.com/central/doi/10.1002/central/CN-00908563/full?highlightAbstract=osteopa*)

## Neonatology-osteopathy (NE-O) study: RCT on the effect of osteopathic manipulative treatment on LOS.

Accorsi A, Lucci C, Pizzolorusso G, Tubaldi L, Cerritelli F, Perri FP. A277-A278.

Archives of disease in childhood, 2012, 97, A277-A278 | added to CENTRAL: 31 October 2014 | 2014 Issue 10

### ABSTRACT

**Background and Aims:** The use of osteopathic manipulative treatment (OMT) in pre-term infants has been documented and results from previous studies suggest the association between OMT and length of stay (LOS) reduction, as well as significant improvement in several clinical outcomes. The aim of the present study is to show the effect of OMT on LOS in a sample of premature infants. **Methods:** A double blinded randomized controlled trial was conducted on preterm newborns admitted in a single NICU between 2010-2011. N=51 subjects free of medical complications and with gestational age >28 and < 38 weeks were enrolled and randomized in two groups: study group (N=21) and control group (N=30). All subjects received routine pediatric care and OMT was performed to the study group for the entire period of hospitalization. **Endpoints of the study** included differences in LOS and daily weight gain. **Results:** Results showed a significant association between OMT and LOS reduction (mean difference between treated and control group: -1.787; 95% c.i. -3.555, -0.0015; p<0.05). OMT was not associated to any change in daily weight gain. **Conclusions:** The present study confirms that OMT could play an important role in the management of preterm infants hospitalization.



[https://www.cochranelibrary.com/central/doi/10.1002/central/CN-01007715/full?highlightAbstract=osteopa\\*](https://www.cochranelibrary.com/central/doi/10.1002/central/CN-01007715/full?highlightAbstract=osteopa*)

## Somatic dysfunction and effect of OMT on pulmonary function in healthy adult male subjects.

Kochhar K, Hines P, Heinking K, Henderson K.

The FASEB Journal Published Online: 1. Apr 2014. Abstract Number: 871.7

### ABSTRACT

The effects of osteopathic manipulative treatment (OMT) on pulmonary function have been equivocal. Our long-term goal is to design hypothesis driven research to determine the efficacy of OMT. We hypothesize that treatment of somatic dysfunction with OMT will increase chest compliance and vital capacity. IRB approval was obtained and healthy adult males were randomly divided into a control group (n=17) or OMT group (n=20). Pulmonary function was measured at baseline, ~10min post-OMT or quiet reading (control), and repeated at 24hrs. Somatic dysfunction was assessed and treated with OMT. There were no statistical differences between the control and OMT groups at baseline, or changes in pulmonary function in controls acutely or 24hrs. Of the OMT group, 75% of the subjects had somatic dysfunction in the C2-C7, T5-T9, ribs, and L1-L5 regions. After OMT, upper thoracic excursion increased from 5.7±0.5 to 6.3±0.5cm (p = 0.03), and forced vital capacity (FVC) increased from 5.13±0.20 to 5.24±0.19L (p = 0.02) at 24hrs. Of note, OMT treatment of subjects with rib dysfunction significantly improved FVC at 24hrs (p = 0.02). Our data demonstrate significant somatic dysfunction in otherwise healthy adult males and suggest OMT can increase upper thoracic excursion and lung volumes. These data support the possibility that OMT can improve pulmonary function in patients with extrinsic restrictive lung disease.



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## Visceral massage reduces postoperative ileus in a rat model.

Chapelle SL, Bove GM.

J Bodyw Mov Ther. 2013 Jan;17(1):83-8. doi: 10.1016/j.jbmt.2012.05.004. Epub 2012 Aug 12.

### OBJECTIVE:

Abdominal surgery invariably causes a temporary reduction of normal intestinal motility, called postoperative ileus. Postoperative ileus extends hospital stays, increases the costs of hospitalization, and may contribute to the formation of postoperative adhesions. We designed experiments to determine if visceral massage affects postoperative ileus in a rat model.

### MATERIAL AND METHODS:

Forty female Long Evans rats were assigned to 4 groups in a 2 (surgery) × 2 (treatment) factorial design. Twenty rats were subjected to a small intestinal manipulation designed to emulate "running of the bowel." Transabdominal massage was performed upon 10 operated and 10 control rats in the first 12 h following surgery. Ileus was assayed after 24 h using fecal pellet discharge and gastrointestinal transit. Intraperitoneal inflammation was assayed using total intraperitoneal protein and inflammatory cell concentrations.

### RESULTS:

The surgery consistently caused ileus. Compared to the operated group with no treatment, the operated with treatment group showed increased gastrointestinal transit and reduced time to first fecal pellet discharge. Similar group comparisons revealed that the treatment decreased total intraperitoneal protein and numbers of intraperitoneal inflammatory cells.

### CONCLUSIONS:

In this rat model, visceral massage reduced experimental postoperative ileus. The data suggest that the effect was through the attenuation of inflammation. A similar study could be designed and performed in a hospital setting to assess the potential role of

visceral massage as part of the integrated care for postoperative ileus.

DOI: 10.1016/j.jbmt.2012.05.004 | PMID: 23294688



<https://www.ncbi.nlm.nih.gov/pubmed/23294688>

## Spinal manipulation and exercise for low back pain in adolescents: a randomized trial.

Evans R, Haas M, Schulz C, Leininger B, Hanson L, Bronfort G.

Pain. 2018 Jul;159(7):1297-1307. doi: 10.1097/j.pain.0000000000001211.

### ABSTRACT

Low back pain (LBP) is common in adolescence, but there is a paucity of high-quality research to inform care. We conducted a multicenter randomized trial comparing 12 weeks of spinal manipulative therapy (SMT) combined with exercise therapy (ET) to ET alone. Participants were 185 adolescents aged 12 to 18 years with chronic LBP. The primary outcome was LBP severity at 12, 26, and 52 weeks. Secondary outcomes included disability, quality of life, medication use, patient- and caregiver-rated improvement, and satisfaction. Outcomes were analyzed using longitudinal linear mixed effect models. An omnibus test assessing differences in individual outcomes over the entire year controlled for multiplicity. Of the 185 enrolled patients, 179 (97%) provided data at 12 weeks and 174 (94%) at 26 and 52 weeks. Adding SMT to ET resulted in a larger reduction in LBP severity over the course of 1 year ( $P = 0.007$ ). The group difference in LBP severity (0-10 scale) was small at the end of treatment (mean difference = 0.5;  $P = 0.08$ ) but was larger at weeks 26 (mean difference = 1.1;  $P = 0.001$ ) and 52 (mean difference = 0.8;  $P = 0.009$ ). At 26 weeks, SMT with ET performed better than ET alone for disability ( $P = 0.04$ ) and improvement ( $P = 0.02$ ). The SMT with ET group reported significantly greater satisfaction with care at all time points ( $P \leq 0.02$ ).

### CONCLUSIONS:

There were no serious treatment-related adverse events. For adolescents with chronic LBP, spinal manipulation combined with exercise was more effective than exercise alone over a 1-year period, with the largest differences occurring at 6 months. These findings warrant replication and evaluation of cost effectiveness.

DOI: 10.1097/j.pain.0000000000001211 | PMID: 29596158 | PMCID: PMC6205160



<https://www.ncbi.nlm.nih.gov/pubmed/29596158>

## Visceral mobilization can lyse and prevent peritoneal adhesions in a rat model.

Bove GM, Chapelle SL.

J Bodyw Mov Ther. 2012 Jan;16(1):76-82. doi: 10.1016/j.jbmt.2011.02.004. Epub 2011 Apr 9.

### OBJECTIVE:

Peritoneal adhesions are almost ubiquitous following surgery. Peritoneal adhesions can lead to bowel obstruction, digestive problems, infertility, and pain, resulting in many hospital readmissions. Many approaches have been used to prevent or treat adhesions, but none offer reliable results. A method that consistently prevented or treated adhesions would benefit many patients. We hypothesized that an anatomically-based visceral mobilization, designed to promote normal mobility of the abdominal contents, could manually lyse and prevent surgically-induced adhesions.

### MATERIAL AND METHODS:

Cecal and abdominal wall abrasion was used to induce adhesions in 3 groups of 10 rats (Control, Lysis, and Preventive). All rats were evaluated 7 days following surgery. On postoperative day 7, unsedated rats in the Lysis group were treated using visceral mobilization, consisting of digital palpation, efforts to manually lyse restrictions, and mobilization of their abdominal walls and viscera. This was followed by immediate post-mortem adhesion evaluation. The rats in the Preventive group were treated daily in a similar fashion, starting the day after surgery. Adhesions in the Control rats were evaluated 7 days after surgery without any visceral mobilization.

### RESULTS:

The therapist could palpate adhesions between the cecum and other viscera or the abdominal wall. Adhesion severity and number of adhesions were significantly lower in the Preventive group compared to other groups. In the Lysis and Preventive groups there were clear signs of disrupted adhesions.

### CONCLUSIONS:

These initial observations support visceral mobilization may have a role in the preven-

tion and treatment of post-operative adhesions.

DOI: 10.1016/j.jbmt.2011.02.004 | PMID: 22196431

 <https://www.ncbi.nlm.nih.gov/pubmed/22196431>

## Effect of Continuous Touch on Brain Functional Connectivity Is Modified by the Operator's Tactile Attention.

Cerritelli F, Chiacchiaretta P, Gambi F, Ferretti A.

Front Hum Neurosci. 2017 Jul 20;11:368. doi: 10.3389/fnhum.2017.00368. eCollection 2017.

### ABSTRACT

Touch has been always regarded as a powerful communication channel playing a key role in governing our emotional wellbeing and possibly perception of self. Several studies demonstrated that the stimulation of C-tactile afferent fibers, essential neuroanatomical elements of affective touch, activates specific brain areas and the activation pattern is influenced by subject's attention. However, no research has investigated how the cognitive status of who is administering the touch produces changes in brain functional connectivity of touched subjects. In this functional magnetic resonance imaging (fMRI) study, we investigated brain connectivity while subjects were receiving a static touch by an operator engaged in either a tactile attention or auditory attention task. This randomized-controlled single-blinded study enrolled 40 healthy right-handed adults and randomly assigned to either the operator tactile attention (OTA) or the operator auditory attention (OAA) group. During the five fMRI resting-state runs, the touch was delivered while the operator focused his attention either: (i) on the tactile perception from his hands (OTA group); or (ii) on a repeated auditory stimulus (OAA group). Functional connectivity analysis revealed that prolonged sustained static touch applied by an operator engaged with focused tactile attention produced a significant increase of anticorrelation between posterior cingulate cortex (PCC-seed) and right insula (INS) as well as right inferior-frontal gyrus but these functional connectivity changes are markedly different only after 15 min of touching across the OTA and OAA conditions. Interestingly, data also showed anticorrelation between PCC and left INS with a distinct pattern over time. Indeed, the PCC-left INS anticorrelation is showed to start and end earlier compared to that of PCC-right INS. Taken together, the results of this study showed that if a particular cognitive status of the operator is sustained over time, it is able to elicit significant effects on the subjects' functional connectivity patterns involving cortical areas processing the interoceptive and attentional value of touch.

DOI: 10.3389/fnhum.2017.00368 | PMID: 28775685 | PMCID: PMC5517483



<https://www.ncbi.nlm.nih.gov/pubmed/28775685>

## Acute effects of osteopathic manipulative treatment in heart rate variability of patients with heart failure: a cross-over study.

Fellipe Amatuzzi FA, Queiroz R, Barreira I, Lissa H, Castelo Branco A, Oliveira APX et al.

European journal of heart failure. 2014; 16: 284-285.

### PURPOSE:

The sympathetic hyper stimulation in Autonomic Nervous System (ANS) plays an important role in limiting symptoms of heart failure (HF). There is evidence that vagal stimulation and the decrease of sympatheticotonia provides a potential clinical benefit for these patients. Osteopathic Manipulative Treatment (OMT) has the ability to regulate the ANS in health individuals, but the effects of OMT techniques in patients with HF have not been established.

### METHODS:

Eleven cardiac patients (EF<40%) were evaluated with the Heart Rate Variability (RR interval, LF, HF, LF%, HF%, LF/HF, SD1 and SD2) with a RS800CX polar in supine and standing positions before and after OMT and sham. The procedures were randomized, the patients crossed with a one week wash-out. The OMT's high velocity low amplitude (HVLA) manipulation was made on a cervical spine (C3 to C7) and thoracic spine (T1 to T4).

### RESULTS:

The response of HRV variables in the cardiac patients after OMT technique were: increase SDNN (DELTA%=10,8, p%=0.01) in supine position and increase the RR interval (DELTA%=29,00 ms, p%=0.03) and HF norm (DELTA%=6%, p%=0.04) in standing position. Conclusion: These results indicate a parasympathetic stimulation after OMT's HVLA manipulation in patients with HF. These patients may have clinical benefits with OMT including more exercise tolerance due to the tendency to increase the parasympathetic tone in supine and standing due to inhibition of sympathetic stimulation. (Table Presented).



<https://www.cochranelibrary.com>

## Effectiveness of physical therapist administered spinal manipulation for the treatment of low back pain: a systematic review of the literature.

Kuczynski JJ, Schwieterman B, Columber K, Knupp D, Shaub L, Cook CE.

Int J Sports Phys Ther. 2012 Dec;7(6):647-62.

### BACKGROUND CONTEXT:

Low back pain (LBP) is a prevalent disorder in society that has been associated with increased loss of work time and medical expenses. A common intervention for LBP is spinal manipulation, a technique that is not specific to one scope of practice or profession.

### PURPOSE:

The purpose of this systematic review was to examine the effectiveness of physical therapy spinal manipulations for the treatment of patients with low back pain.

### METHODS:

A search of the current literature was conducted using PubMed, CINAHL, SPORTDiscus, Pro Quest Nursing and Allied Health Source, Scopus, and Cochrane Controlled Trials Register. Studies were included if each involved: 1) individuals with LBP; 2) spinal manipulations performed by physical therapists compared to any control group that did not receive manipulations; 3) measurable clinical outcomes or efficiency of treatment measures, and 4) randomized control trials. The quality of included articles was determined by two independent authors using the criteria developed and used by the Physiotherapy Evidence Database (PEDro).

### RESULTS:

Six randomized control trials met the inclusion criteria of this systematic review. The most commonly used outcomes in these studies were some variation of pain rating scales and disability indexes. Notable results included varying degrees of effect sizes favoring physical therapy spinal manipulations and minimal adverse events resulting from this intervention. Additionally, the manipulation group in one study reported statistically significantly less medication use, health care utilization, and lost work time.

## CONCLUSION:

Based on the findings of this systematic review there is evidence to support the use of spinal manipulation by physical therapists in clinical practice. Physical therapy spinal manipulation appears to be a safe intervention that improves clinical outcomes for patients with low back pain.

PMID: 23316428 | PMCID: PMC3537457



<https://www.ncbi.nlm.nih.gov/pubmed/23316428>

## Effect of craniosacral therapy on lower urinary tract signs and symptoms in multiple sclerosis.

Raviv G, Shefi S, Nizani D, Achiron A.

Complement Ther Clin Pract. 2009 May;15(2):72-5. doi: 10.1016/j.ctcp.2008.12.006. Epub 2009 Jan 30.

### ABSTRACT

To examine whether craniosacral therapy improves lower urinary tract symptoms of multiple sclerosis (MS) patients. A prospective cohort study. Out-patient clinic of multiple sclerosis center in a referral medical center. Hands on craniosacral therapy (CST). Change in lower urinary tract symptoms, post voiding residual volume and quality of life. Patients from our multiple sclerosis clinic were assessed before and after craniosacral therapy. Evaluation included neurological examination, disability status determination, ultrasonographic post voiding residual volume estimation and questionnaires regarding lower urinary tract symptoms and quality of life. Twenty eight patients met eligibility criteria and were included in this study. Comparison of post voiding residual volume, lower urinary tract symptoms and quality of life before and after craniosacral therapy revealed a significant improvement ( $0.001 > p > 0.0001$ ). CST was found to be an effective means for treating lower urinary tract symptoms and improving quality of life in MS patients.

DOI: 10.1016/j.ctcp.2008.12.006 | PMID: 19341983



<https://www.ncbi.nlm.nih.gov/pubmed/19341983>

## A randomized controlled trial investigating the effects of craniosacral therapy on pain and heart rate variability in fibromyalgia patients.

Castro-Sánchez AM, Matarán-Peñarrocha GA, Sánchez-Labraca N, Quesada-Rubio JM, Granero-Molina J, Moreno-Lorenzo C.

Clin Rehabil. 2011 Jan;25(1):25-35. doi: 10.1177/0269215510375909. Epub 2010 Aug 11.

### CONTEXT:

Fibromyalgia is a prevalent musculoskeletal disorder associated with widespread mechanical tenderness, fatigue, non-refreshing sleep, depressed mood and pervasive dysfunction of the autonomic nervous system: tachycardia, postural intolerance, Raynaud's phenomenon and diarrhoea.

### OBJECTIVE:

To determine the effects of craniosacral therapy on sensitive tender points and heart rate variability in patients with fibromyalgia.

### DESIGN:

A randomized controlled trial.

### SUBJECTS:

Ninety-two patients with fibromyalgia were randomly assigned to an intervention group or placebo group.

### INTERVENTIONS:

Patients received treatments for 20 weeks. The intervention group underwent a craniosacral therapy protocol and the placebo group received sham treatment with disconnected magnetotherapy equipment.

### MAIN MEASURES:

Pain intensity levels were determined by evaluating tender points, and heart rate variability was recorded by 24-hour Holter monitoring.

## RESULTS:

After 20 weeks of treatment, the intervention group showed significant reduction in pain at 13 of the 18 tender points ( $P < 0.05$ ). Significant differences in temporal standard deviation of RR segments, root mean square deviation of temporal standard deviation of RR segments and clinical global impression of improvement versus baseline values were observed in the intervention group but not in the placebo group. At two months and one year post therapy, the intervention group showed significant differences versus baseline in tender points at left occiput, left-side lower cervical, left epicondyle and left greater trochanter and significant differences in temporal standard deviation of RR segments, root mean square deviation of temporal standard deviation of RR segments and clinical global impression of improvement.

## CONCLUSION:

Craniosacral therapy improved medium-term pain symptoms in patients with fibromyalgia.

DOI: 10.1177/0269215510375909 | PMID: 20702514



<https://www.ncbi.nlm.nih.gov/pubmed/20702514>

## Is craniosacral therapy effective for migraine? Tested with HIT-6 Questionnaire.

Arnadottir TS, Sigurdardottir AK.

Complement Ther Clin Pract. 2013 Feb;19(1):11-4. doi: 10.1016/j.ctcp.2012.09.003. Epub 2012 Nov 9.

### OBJECTIVE:

To determine whether or not craniosacral therapy alleviates migraine symptoms.

### METHODS:

A cross-over experimental design was used with twenty participants, aged between 20 and 50 years, who suffered from at least two migraine attacks per month. Participants were randomly assigned to two equal-sized groups, A and B. All received six craniosacral treatments over four weeks and the groups answered the "HIT-6" Questionnaire four times; every four weeks (Times 1, 2, 3 and 4). Group A, received treatment after answering the questionnaire the first time, but Group B, answered the questionnaire twice before receiving treatment.

### RESULTS:

Immediately after treatments and one month afterwards there was significant lowering in HIT-6 scorings compared with prior to treatment. There was also significant difference in HIT-6 scorings between Times 1 and 4 ( $p = 0.004$ ). The effect size was 0.43-0.55.

### CONCLUSION:

The results indicate that craniosacral treatment can alleviate migraine symptoms. Further research is suggested.

DOI: 10.1016/j.ctcp.2012.09.003 | PMID: 23337558



<https://www.ncbi.nlm.nih.gov/pubmed/23337558>

## Craniosacral Therapy for the Treatment of Chronic Neck Pain: A Randomized Sham-controlled Trial.

Haller H, Lauche R, Cramer H, Rampp T, Saha FJ, Ostermann T, Dobos G.

Clin J Pain. 2016 May;32(5):441-9. doi: 10.1097/AJP.0000000000000290.

### OBJECTIVES:

With growing evidence for the effectiveness of craniosacral therapy (CST) for pain management, the efficacy of CST remains unclear. This study therefore aimed at investigating CST in comparison with sham treatment in chronic nonspecific neck pain patients.

### MATERIALS AND METHODS:

A total of 54 blinded patients were randomized into either 8 weekly units of CST or light-touch sham treatment. Outcomes were assessed before and after treatment (week 8) and again 3 months later (week 20). The primary outcome was the pain intensity on a visual analog scale at week 8; secondary outcomes included pain on movement, pressure pain sensitivity, functional disability, health-related quality of life, well-being, anxiety, depression, stress perception, pain acceptance, body awareness, patients' global impression of improvement, and safety.

### RESULTS:

In comparison with sham, CST patients reported significant and clinically relevant effects on pain intensity at week 8 (-21 mm group difference; 95% confidence interval, -32.6 to -9.4;  $P=0.001$ ;  $d=1.02$ ) and at week 20 (-16.8 mm group difference; 95% confidence interval, -27.5 to -6.1;  $P=0.003$ ;  $d=0.88$ ). Minimal clinically important differences in pain intensity at week 20 were reported by 78% within the CST group, whereas 48% even had substantial clinical benefit. Significant between-group differences at week 20 were also found for pain on movement, functional disability, physical quality of life, anxiety and patients' global improvement. Pressure pain sensitivity and body awareness were significantly improved only at week 8. No serious adverse events were reported.

### DISCUSSION:

CST was both specifically effective and safe in reducing neck pain intensity and may

improve functional disability and the quality of life up to 3 months after intervention.

DOI: 10.1097/AJP.0000000000000290 | PMID: 26340656 | PMCID: PMC4894825



<https://www.ncbi.nlm.nih.gov/pubmed/26340656>

## Neurophysiological Effects of High Velocity and Low Amplitude Spinal Manipulation in Symptomatic and Asymptomatic Humans: A Systematic Literature

Wirth B, Gassner A, de Bruin ED, Axén I, Swanenburg J, Humphreys BK, Schweinhardt P.

Spine(PhilaPa1976).2019Aug1;44(15):E914-E926.doi:10.1097/BRS.0000000000003013.

### OBJECTIVE:

To summarize the evidence of neurophysiological effects of spinal manipulative therapy (SMT) with a high velocity low amplitude thrust (HVLA-SMT) in asymptomatic and symptomatic humans.

### SUMMARY OF BACKGROUND DATA:

HVLA-SMT is effective in reducing back pain, but its mode of action is not fully understood.

### METHODS:

A systematic literature search (until July 2018) was conducted by a professional librarian in seven databases (Medline (OvidSP), Premedline (PubMed), EMBASE, Cochrane, CINAHL, PEDro, and Scopus). Two authors selected the studies according to the a priori described criteria and scored study quality. Only controlled studies of at least moderate quality were included. Effects of HVLA-SMT on a particular outcome measure were defined as more than one study showing a significantly greater effect of HVLA-SMT compared with the control intervention.

### RESULTS:

From the 18 studies included (932 participants in total), there was evidence only for an association between HVLA-SMT and changes in the autonomic nervous system, reflected in changes in heart rate variability and skin conductance. Most studies focused on healthy volunteers and none related neurophysiologic changes to pain reduction.

### CONCLUSION:

This systematic review points to HVLA-SMT affecting the autonomic nervous system. The effects seem to depend on the spinal level of HVLA-SMT application and might

differ between healthy volunteers and pain patients. There is a need for high-quality studies that include patients, well characterized for pain duration and outcome measure baseline values, and address the relation between changes in neurophysiology and pain.

PMID: 31335790 | DOI: 10.1097/BRS.0000000000003013



<https://www.ncbi.nlm.nih.gov/pubmed/31335790>

## Credibility of a comparative sham control intervention for Craniosacral Therapy in patients with chronic neck pain.

Haller H1, Ostermann T2, Lauche R3, Cramer H3, Dobos G3.

Complement Ther Med. 2014 Dec;22(6):1053-9. doi: 10.1016/j.ctim.2014.09.007. Epub 2014 Oct 6.

### OBJECTIVES:

Determining efficacy in complementary medicine research requires valid placebo/sham control groups that are credible to patients and ensure successful blinding. Within the scope of this study, a light touch sham-control intervention for trials of Craniosacral Therapy (CST) was developed and tested for its credibility.

### METHODS:

Patients of a randomized controlled trial on chronic non-specific neck pain (NCT01526447) obtained the Credibility/Expectancy Questionnaire and the Helping Alliance/Satisfaction Questionnaire. Treatment and sham group respectively received 8 weekly sessions of CST or light touch. Data without (N=50) and with multiple imputation (N=54) were analyzed separately using logistic regression models. Adjusted odds ratios (AOR) and 95% confidence intervals (CI) were calculated to assess whether group outcome could be predicted from patients' credibility ratings. An additional t-test for analysis of the overall compliance/attendance was conducted.

### RESULTS:

Patients' ratings of treatment expectancy, credibility and therapeutic alliance were not found to have significant power for classifying patients into CST or sham group ( $p \geq .05$ ). Only satisfaction with treatment revealed a significant impact (AOR: 6.83; 95% CI: [1.54 | 30.24];  $p = .011$ ) in the non-imputed analysis, but not in the multiple imputation analysis (AOR: 4.09; 95% CI: [0.94 | 17.76];  $p = .060$ ). Compliance of both groups was not significantly different ( $p > .05$ ) as were reasons for non-attendance. No serious adverse events were reported.

### CONCLUSIONS:

Patients' expectancy, credibility and therapeutic alliance did not appear to affect study outcomes, blinding patients to group allocation was possible, and sham intervention was tolerable and safe. The design can therefore be recommended as control for non-specific treatment effects in future CST clinical trials.

DOI: 10.1016/j.ctim.2014.09.007 | PMID: 25453528



<https://www.ncbi.nlm.nih.gov/pubmed/25453528>

## Short-Term Changes in Algometry, Incliniometry, Stabilometry, and Urinary pH Analysis After a Thoracolumbar Junction Manipulation in Patients with Kidney Stones.

Oliva Pascual-Vaca Á, Punzano-Rodríguez R, Escribá-Astaburuaga P, Fernández-Domínguez JC, Ricard F, Franco-Sierra MA, Rodríguez-Blanco.

J Altern Complement Med. 2017 Aug;23(8):639-647. doi: 10.1089/acm.2017.0041. Epub 2017 May 24.

### OBJECTIVES:

To determine the efficacy of a high-velocity low-amplitude manipulation of the thoracolumbar junction in different urologic and musculoskeletal parameters in subjects suffering from renal lithiasis.

### DESIGN:

Randomized, controlled blinded clinical study.

### SETTINGS/LOCATION:

The Nephrology departments of two hospitals and one private consultancy of physiotherapy in Valencia (Spain).

### SUBJECTS:

Forty-six patients suffering from renal lithiasis.

### INTERVENTIONS:

The experimental group (EG, n = 23) received a spinal manipulation of the thoracolumbar junction, and the control group (CG, n = 23) received a sham procedure.

### OUTCOME MEASURES:

Pressure pain thresholds (PPTs) of both quadratus lumborum and spinous processes from T10 to L1, lumbar flexion range of motion, stabilometry, and urinary pH were measured before and immediately after the intervention. A comparison between pre-

and postintervention phases was performed and an analysis of variance for repeated measures using time (pre- and postintervention) as intrasubject variable and group (CG or EG) as intersubject variable.

## RESULTS:

Intragroup comparison showed a significant improvement for the EG in the lumbar flexion range of motion ( $p < 0.001$ ) and in all the PPT ( $p < 0.001$  in all cases). Between-group comparison showed significant changes in PPT in quadratus lumborum ( $p < 0.001$ ), as well as in the spinous processes of all of the evaluated levels ( $p < 0.05$ ). No changes in urinary pH were observed ( $p = 0.419$ ).

## CONCLUSION:

Spinal manipulation of the thoracolumbar junction seems to be effective in short term to improve pain sensitivity, as well as to increase the lumbar spine flexion.

DOI: 10.1089/acm.2017.0041 | PMID: 28537418



<https://www.ncbi.nlm.nih.gov/pubmed/28537418>

## The effects of spinal manipulative therapy on lower limb neurodynamic test outcomes in adults: a systematic review.

Maxwell CM, Lauchlan DT, Dall PM.

J Man Manip Ther. 2020 Feb;28(1):4-14. doi: 10.1080/10669817.2019.1569300. Epub 2019 Feb 5.

### OBJECTIVE:

Spinal Manipulative Therapy (SMT) is a routinely applied treatment modality for various musculoskeletal conditions, including low back pain. The precise mechanisms by which SMT elicits its effects are largely unknown, but recent research supports a multi-system explanation recognizing both biomechanical and neurophysiological mechanisms. Although the evaluation of changes in clinical presentation is complex, objective neurophysiological measures of sensitivity to movement (e.g. neurodynamic tests) can be a valuable clinical indicator in evaluating the effects of SMT. This review aimed to synthesize current literature investigating the effects of SMT on lower limb neurodynamics.

### METHOD:

Eight electronic databases were systematically searched for randomized controlled trials (RCT) that applied SMT (against any control) and evaluated lower limb neurodynamics (Passive Straight Leg Raise or Slump Test). Selection and data extraction were conducted by one researcher, reviewed by a second author. Risk of bias (RoB) was assessed using the Cochrane Back Review Group criteria.

### RESULTS:

Eight RCTs were included, one with high RoB. SMT produced a clinically meaningful ( $\geq 6^\circ$ ) difference in five of these studies compared with inert control, hamstring stretching, and as an adjunct to conventional physiotherapy, but not compared with standard care, as an adjunct to home exercise and advice, or when comparing different SMT techniques. Findings compared to sham were mixed. When reported, effects tentatively lasted up to 6 weeks post-intervention.

## CONCLUSION:

Limited evidence suggests SMT-improved range of motion and was more effective than some other interventions. Future research, using standardized Neurodynamic tests, should explore technique types and evaluate longer-term effects.

DOI: 10.1080/10669817.2019.1569300 | PMID: 30935328



<https://www.ncbi.nlm.nih.gov/pubmed/30935328>

## Short-term effect of spinal manipulation on pain perception, spinal mobility, and full height recovery in male subjects with degenerative disk disease: a randomized controlled trial.

Vieira-Pellenz F, Oliva-Pascual-Vaca A, Rodriguez-Blanco C, Heredia-Rizo AM, Ricard F, Almazán-Campos G.

Arch Phys Med Rehabil. 2014 Sep;95(9):1613-9. doi: 10.1016/j.apmr.2014.05.002. Epub 2014 May 24.

### OBJECTIVE:

To evaluate the short-term effect on spinal mobility, pain perception, neural mechanosensitivity, and full height recovery after high-velocity, low-amplitude (HVLA) spinal manipulation (SM) in the lumbosacral joint (L5-S1).

### DESIGN:

Randomized, double-blind, controlled clinical trial with evaluations at baseline and after intervention.

### SETTING:

University-based physical therapy research clinic.

### PARTICIPANTS:

Men (N=40; mean age  $\pm$  SD, 38  $\pm$  9.14 y) with diagnosed degenerative lumbar disease at L5-S1 were randomly divided into 2 groups: a treatment group (TG) (n=20; mean age  $\pm$  SD, 39  $\pm$  9.12 y) and a control group (CG) (n=20; mean age  $\pm$  SD, 37  $\pm$  9.31 y). All participants completed the intervention and follow-up evaluations.

### INTERVENTIONS:

A single L5-S1 SM technique (pull-move) was performed in the TG, whereas the CG received a single placebo intervention.

## MAIN OUTCOME MEASURES:

Measures included assessing the subject's height using a stadiometer. The secondary outcome measures included perceived low back pain, evaluated using a visual analog scale; neural mechanosensitivity, as assessed using the passive straight-leg raise (SLR) test; and amount of spinal mobility in flexion, as measured using the finger-to-floor distance (FFD) test.

## RESULTS:

The intragroup comparison indicated a significant improvement in all variables in the TG ( $P < .001$ ). There were no changes in the CG, except for the FFD test ( $P = .008$ ). In the between-group comparison of the mean differences from pre- to postintervention, there was statistical significance for all cases ( $P < .001$ ).

## CONCLUSIONS:

An HVLA SM in the lumbosacral joint performed on men with degenerative disk disease immediately improves self-perceived pain, spinal mobility in flexion, hip flexion during the passive SLR test, and subjects' full height. Future studies should include women and should evaluate the long-term results.

DOI: 10.1016/j.apmr.2014.05.002 | PMID: 24862763



<https://www.ncbi.nlm.nih.gov/pubmed/24862763>

## Comparative short-term effects of two thoracic spinal manipulation techniques in subjects with chronic mechanical neck pain: a randomized controlled trial.

Casanova-Méndez A, Oliva-Pascual-Vaca A, Rodriguez-Blanco C, Heredia-Rizo AM, Gogorza-Arroitaonandia K, Almazán-Campos G.

Man Ther. 2014 Aug;19(4):331-7. doi: 10.1016/j.math.2014.03.002. Epub 2014 Mar 14.

### ABSTRACT

Spinal Manipulation (SM) has been purported to decrease pain and improve function in subjects with non-specific neck pain. Previous research has investigated which individuals with non-specific neck pain will be more likely to benefit from SM. It has not yet been proven whether or not the effectiveness of thoracic SM depends on the specific technique being used. This double-blind randomized trial has compared the short-term effects of two thoracic SM maneuvers in subjects with chronic non-specific neck pain. Sixty participants were distributed randomly into two groups. One group received the Dog technique (n = 30), with the subject in supine position, and the other group underwent the Toggle-Recoil technique (n = 30), with the participant lying prone, T4 being the targeted area in both cases. Evaluations were made of self-reported neck pain (Visual Analogue Scale); neck mobility (Cervical Range of Motion); and pressure pain threshold at the cervical and thoracic levels (C4 and T4 spinous process) and over the site described for location of tense bands of the upper trapezius muscle. Measurements were taken before intervention, immediately afterward, and 20 min later. Both maneuvers improved neck mobility and mechanosensitivity and reduced pain in the short term. No major or clinical differences were found between the groups. In the between-groups comparison slightly better results were observed in the Toggle-Recoil group only for cervical extension ( $p = 0.009$ ), right lateral flexion ( $p = 0.004$ ) and left rotation ( $p < 0.05$ ).

DOI: 10.1016/j.math.2014.03.002 | PMID: 24679838



<https://www.ncbi.nlm.nih.gov/pubmed/24679838>

## Spinal Manipulation Vs Sham Manipulation for Nonspecific Low Back Pain: A Systematic Review and Meta-analysis.

Ruddock JK, Sallis H, Ness A, Perry RE.

J Chiropr Med. 2016 Sep;15(3):165-83. doi: 10.1016/j.jcm.2016.04.014. Epub 2016 May 25.

### OBJECTIVE:

The purpose of this systematic review was to identify and critically evaluate randomized controlled trials of spinal manipulation (SM) vs sham manipulation in the treatment of nonspecific low back pain.

### METHODS:

Four electronic databases were searched from their inception to March 2015 to identify all relevant trials. Reference lists of retrieved articles were hand-searched. All data were extracted by 2 independent reviewers, and risk of bias was assessed using the Cochrane Back Review Group Risk of Bias tool.

### RESULTS:

Nine randomized controlled trials were included in the systematic review, and 4 were found to be eligible for inclusion in a meta-analysis. Participants in the SM group had improved symptoms compared with participants receiving sham treatment (standardized mean difference = - 0.36; 95% confidence interval, - 0.59 to - 0.12). The majority of studies were of low risk of bias; however, several of the studies were small, the practitioner could not be blinded, and some studies did not conduct intention-to-treat analysis and had a high level of dropouts.

### CONCLUSION:

There is some evidence that SM has specific treatment effects and is more effective at reducing nonspecific low back pain when compared with an effective sham intervention. However, given the small number of studies included in this analysis, we should be cautious of making strong inferences based on these results.

DOI: 10.1016/j.jcm.2016.04.014



<https://www.ncbi.nlm.nih.gov/pubmed/27660593>

## Changes in pain perception after pelvis manipulation in women with primary dysmenorrhea: a randomized controlled trial.

Molins-Cubero S, Rodríguez-Blanco C, Oliva-Pascual-Vaca A, Heredia-Rizo AM, Boscá-Gandía JJ, Ricard F.

Pain Med. 2014 Sep;15(9):1455-63. doi: 10.1111/pme.12404. Epub 2014 Mar 25.

### OBJECTIVE:

This study aims to evaluate the immediate effect of a global pelvic manipulation (GPM) technique, bilaterally applied, on low back pelvic pain in women with primary dysmenorrhea (PD).

### DESIGN:

A prospective, randomized, double-blind, controlled trial.

### SETTING:

Faculty of Nursing, Physiotherapy and Podiatry. University of Sevilla, Spain.

### METHODS:

The sample group included 40 women ( $30 \pm 6.10$  years) that were divided into an experimental group (EG) (N = 20) who underwent a bilateral GPM technique and a control group (CG) (N = 20) who underwent a sham (placebo) intervention. Evaluations were made of self-reported low back pelvic pain (visual analog scale), pressure pain threshold (PPT) in sacroiliac joints (SIJs), and the endogenous response of the organism to pain following catecholamines and serotonin release in blood levels.

### RESULTS:

The intragroup comparison showed a significant improvement in the EG in the self-perceived low back pelvic pain ( $P = 0.003$ ) and in the mechanosensitivity in both SIJs ( $P = 0.001$ ). In the between-group comparison, there was a decrease in pain perception ( $P = 0.004$ ;  $F(1,38) = 9.62$ ;  $R(2) = 0.20$ ) and an increase in the PPT of both SIJs, in the right side ( $P = 0.001$ ;  $F(1,38) = 21.29$ ;  $R(2) = 0.35$ ) and in the left side ( $P = 0.001$ ;  $F(1,38) = 20.63$ ;  $R(2) = 0.35$ ). There were no intergroup differences for catecholamines plasma levels

(adrenaline  $P = 0.123$ ; noradrenaline  $P = 0.281$ ; dopamine  $P = 0.173$ ), but there were for serotonin levels ( $P = 0.045$ ;  $F(1,38) = 4.296$ ;  $R(2) = 0.10$ ).

## CONCLUSION:

The bilateral GPM technique improves in a short term the self-perceived low back pelvic pain, the PPT in both SIJs, and the serotonin levels in women with PD. It shows no significant differences with a sham intervention in catecholamines plasma levels.

DOI: 10.1111/pme.12404



<https://www.ncbi.nlm.nih.gov/pubmed/24666560>

## Short-term changes in median nerve neural tension after a suboccipital muscle inhibition technique in subjects with cervical whiplash: a randomised controlled trial.

Antolinos-Campillo PJ, Oliva-Pascual-Vaca A, Rodríguez-Blanco C, Heredia-Rizo AM, Espí-López GV, Ricard F.

Physiotherapy. 2014 Sep;100(3):249-55. doi: 10.1016/j.physio.2013.09.005. Epub 2013 Nov 4.

### OBJECTIVES:

To assess the immediate effect of a suboccipital muscle inhibition (SMI) technique on: (a) neck pain, (b) elbow extension range of motion during the upper limb neurodynamic test of the median nerve (ULNT-1), and (c) grip strength in subjects with cervical whiplash; and determine the relationships between key variables.

### DESIGN:

Randomised, single-blind, controlled clinical trial.

### SETTING:

Faculty of Nursing, Physiotherapy and Podiatry, University of Seville, Spain.

### PARTICIPANTS:

Forty subjects {mean age 34 years [standard deviation (SD) 3.6]} with Grade I or II cervical whiplash and a positive response to the ULNT-1 were recruited and distributed into two study groups: intervention group (IG) (n=20) and control group (CG) (n=20).

### INTERVENTIONS:

The IG underwent the SMI technique for 4minutes and the CG received a sham (placebo) intervention. Measures were collected immediately after the intervention.

### MAIN OUTCOME MEASURES:

The primary outcome was elbow range of motion during the ULNT-1, measured with a

goniometer. The secondary outcomes were self-perceived neck pain (visual analogue scale) and free-pain grip strength, measured with a digital dynamometer.

## RESULTS:

The mean baseline elbow range of motion was 116.0° (SD 10.2) for the CG and 130.1° (SD 7.8) for the IG. The within-group comparison found a significant difference in elbow range of motion for the IG [mean difference -15.4°, 95% confidence interval (CI) -20.1 to -10.6; P=0.01], but not for the CG (mean difference -4.9°, 95% CI -11.8 to 2.0; P=0.15). In the between-group comparison, the difference in elbow range of motion was significant (mean difference -10.5°, 95% CI -18.6 to -2.3; P=0.013), but the differences in grip strength (P=0.06) and neck pain (P=0.38) were not significant.

## CONCLUSION:

The SMI technique has an immediate positive effect on elbow extension in the ULNT-1. No immediate effects on self-perceived cervical pain or grip strength were observed.

DOI: 10.1016/j.physio.2013.09.005



<https://www.ncbi.nlm.nih.gov/pubmed/24405830>

## Cost-Effectiveness of Non-Invasive and Non-Pharmacological Interventions for Low Back Pain: a Systematic Literature Review.

Andronis L, Kinghorn P, Qiao S, Whitehurst DG, Durrell S, McLeod H.

Appl Health Econ Health Policy. 2017 Apr;15(2):173-201. doi: 10.1007/s40258-016-0268-8.

### BACKGROUND:

Low back pain (LBP) is a major health problem, having a substantial effect on peoples' quality of life and placing a significant economic burden on healthcare systems and, more broadly, societies. Many interventions to alleviate LBP are available but their cost effectiveness is unclear.

### OBJECTIVES:

To identify, document and appraise studies reporting on the cost effectiveness of non-invasive and non-pharmacological treatment options for LBP.

### METHODS:

Relevant studies were identified through systematic searches in bibliographic databases (EMBASE, MEDLINE, PsycINFO, Cochrane Library, CINAHL and the National Health Service Economic Evaluation Database), 'similar article' searches and reference list scanning. Study selection was carried out by three assessors, independently. Study quality was assessed using the Consensus on Health Economic Criteria checklist. Data were extracted using customized extraction forms.

### RESULTS:

Thirty-three studies were identified. Study interventions were categorised as: combined physical exercise and psychological therapy, (2) physical exercise therapy only, (3) information and education, and (4) manual therapy. Interventions assessed within each category varied in terms of their components and delivery. In general, combined physical and psychological treatments, information and education interventions, and manual therapies appeared to be cost effective when compared with the study-specific comparators. There is inconsistent evidence around the cost effectiveness of physical

exercise programmes as a whole, with yoga, but not group exercise, being cost effective.

## CONCLUSIONS:

The identified evidence suggests that combined physical and psychological treatments, medical yoga, information and education programmes, spinal manipulation and acupuncture are likely to be cost-effective options for LBP.

DOI: 10.1007/s40258-016-0268-8 | PMID: 27550240



<https://www.ncbi.nlm.nih.gov/pubmed/27550240>

## Effect of manual therapy techniques on headache disability in patients with tension-type headache. Randomized controlled trial.

Espí-López GV, Rodríguez-Blanco C, Oliva-Pascual-Vaca A, Benítez-Martínez JC, Lluch E, Falla D.

Eur J Phys Rehabil Med. 2014 Dec;50(6):641-7. Epub 2014 Apr 30.

### BACKGROUND:

Tension-type headache (TTH) is the most common type of primary headache however there is no clear evidence as to which specific treatment is most effective or whether combined treatment is more effective than individual treatments.

### AIM:

To assess the effectiveness of manual therapy techniques, applied to the suboccipital region, on aspects of disability in a sample of patients with tension-type headache.

### DESIGN:

Randomized Controlled Trial.

### SETTING:

Specialized centre for headache treatment.

### POPULATION:

Seventy-six (62 women) patients (age:  $39.9 \pm 10.9$  years) with episodic chronic TTH.

### METHODS:

Patients were randomly divided into four treatment groups: 1) suboccipital soft tissue inhibition; 2) occiput-atlas-axis manipulation; 3) combined treatment of both techniques; 4) control. Four sessions were applied over 4 weeks and disability was assessed before and after treatment using the Headache Disability Inventory (HDI). Headache frequency, severity and the functional and emotional subscales of the questionnaire were assessed. Photophobia, phonophobia and pericranial tenderness were also mo-

nitored.

## RESULTS:

Headache frequency was significantly reduced with the manipulative and combined treatment ( $P<0.05$ ), and the severity and functional subscale of the HDI changed in all three treatment groups ( $P<0.05$ ). Manipulation treatment also reduced the score on the emotional subscale of the HDI ( $P<0.05$ ). The combined intervention showed a greater effect at reducing the overall HDI score compared to the group that received suboccipital soft tissue inhibition and to the control group (both  $P<0.05$ ). In addition, photophobia, phonophobia and pericranial tenderness only improved in the group receiving combined therapy ( $P<0.05$ ).

## CONCLUSION:

When given individually, suboccipital soft tissue inhibition and occiput-atlas-axis manipulation resulted in changes in different parameters related to the disability caused by TTH. However, when the two treatments were combined, effectiveness was noted for all aspects of disability and other symptoms including photophobia, phonophobia and pericranial tenderness.

## CLINICAL REHABILITATION IMPACT:

Although individual manual therapy treatments showed a positive change in headache features, measures of photophobia, photophobia and pericranial tenderness only improved in the group that received the combined treatment suggesting that combined treatment is the most appropriate for symptomatic relief of TTH.

PMID: 24785463

 <https://www.ncbi.nlm.nih.gov/pubmed/24785463>

## Osteopathic Manipulative Treatment Alters Gastric Myoelectric Activity in Healthy Subjects.

Shadiack E 3rd, Jouett N, van den Raadt A, Liganor R, Watters J, Hensel K, Smith M.

J Altern Complement Med. 2018 Oct 30. doi: 10.1089/acm.2018.0277. [Epub ahead of print]

### OBJECTIVES:

It is unclear whether osteopathic manipulative treatment (OMT) affects gastric myoelectric activity (GMA), an index of gastric motility. We hypothesized that OMT significantly alters power spectral density (PSD) analyses of electrogastrography (EGG) recordings, an index of GMA, compared with time control OMT.

### DESIGN:

GMA data were obtained from nine subjects before and after OMT and time control on separate days in a cross-over design. Fifteen-minute EGG recordings were obtained before and after each intervention and after a water challenge (WC). Percent power in the normogastric range (PPN) was estimated from PSD analyses. Absolute percent change of PPN and dominant frequency (DF) from baseline to postintervention and baseline to post-WC was computed and compared using two-way repeated-measures ANOVA.

### RESULTS:

OMT altered PPN versus time control (time control:  $5.3\% \pm 1.2\%$ ; OMT:  $24.5\% \pm 4.5\%$ ;  $p = 0.015$ ). WC altered PPN compared with time control (post-time control  $\Delta$ PPN:  $5.3\% \pm 1.2\%$ ; post-drink  $\Delta$ PPN:  $30.3\% \pm 7.2\%$ ;  $p < 0.01$ ). However, WC did not alter PPN with prior OMT treatment (post-OMT  $\Delta$ PPN:  $24.5\% \pm 4.5\%$ ; post-WC  $\Delta$ PPN:  $19.4\% \pm 5.6\%$ ;  $p = 0.47$ ). Nevertheless, OMT reduced the rate of change for DF compared with time control (WC post-time control:  $37.9\% \pm 7.4\%$ ; WC post-OMT:  $20.0\% \pm 5.9\%$ ;  $p = 0.02$ ).

### CONCLUSIONS:

We conclude that OMT significantly alters GMA compared with time control and that

(2) OMT reduces the rate of change in the frequency response to WC within the normal frequency range of 2-4 cycles per minute, indicating a physiological effect.

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<https://www.ncbi.nlm.nih.gov/pubmed/30376351>

## Glucose Metabolic Changes in the Brain and Muscles of Patients with Nonspecific Neck Pain Treated by Spinal Manipulation Therapy: A [18F]FDG PET Study.

Inami A, Ogura T, Watanuki S, Masud MM, Shibuya K, Miyake M, Matsuda R, Hiraoka K, Itoh M, Fuhr AW, Yanai K, Tashiro M.

Evid Based Complement Alternat Med. 2017;2017:4345703. doi: 10.1155/2017/4345703. Epub 2017 Jan 12.

### OBJECTIVE.

The aim of this study was to investigate changes in brain and muscle glucose metabolism that are not yet known, using positron emission tomography with [18F]fluorodeoxyglucose ([18F]FDG PET).

### METHODS.

Twenty-one male volunteers were recruited for the present study. [18F]FDG PET scanning was performed twice on each subject: once after the spinal manipulation therapy (SMT) intervention (treatment condition) and once after resting (control condition). We performed the SMT intervention using an adjustment device. Glucose metabolism of the brain and skeletal muscles was measured and compared between the two conditions. In addition, we measured salivary amylase level as an index of autonomic nervous system (ANS) activity, as well as muscle tension and subjective pain intensity in each subject.

### RESULTS.

Changes in brain activity after SMT included activation of the dorsal anterior cingulate cortex, cerebellar vermis, and somatosensory association cortex and deactivation of the prefrontal cortex and temporal sites. Glucose uptake in skeletal muscles showed a trend toward decreased metabolism after SMT, although the difference was not significant. Other measurements indicated relaxation of cervical muscle tension, decrease in salivary amylase level (suppression of sympathetic nerve activity), and pain relief after SMT.

### CONCLUSION.

Brain processing after SMT may lead to physiological relaxation via a decrease in sympathetic nerve activity.

DOI: 10.1155/2017/4345703 | PMID: 28167971 | PMCID: PMC5267084

 <https://www.ncbi.nlm.nih.gov/pubmed/28167971>

## Cerebral metabolic changes in men after chiropractic spinal manipulation for neck pain.

Ogura T, Tashiro M, Masud M, Watanuki S, Shibuya K, Yamaguchi K, Itoh M, Fukuda H, Yanai K.

Altern Ther Health Med. 2011 Nov-Dec;17(6):12-7.

### BACKGROUND:

Chiropractic spinal manipulation (CSM) is an alternative treatment for back pain. The autonomic nervous system is often involved in spinal dysfunction. Although studies on the effects of CSM have been performed, no chiropractic study has examined regional cerebral metabolism using positron emission tomography (PET).

### OBJECTIVE:

The aim of the present study was to investigate the effects of CSM on brain responses in terms of cerebral glucose metabolic changes measured by [<sup>18</sup>F]fluorodeoxyglucose positron emission tomography (FDG-PET).

### METHODS:

Twelve male volunteers were recruited. Brain PET scanning was performed twice on each participant, at resting and after CSM. Questionnaires were used for subjective evaluations. A visual analogue scale (VAS) was rated by participants before and after chiropractic treatment, and muscle tone and salivary amylase were measured.

### RESULTS:

Increased glucose metabolism was observed in the inferior prefrontal cortex, anterior cingulate cortex, and middle temporal gyrus, and decreased glucose metabolism was found in the cerebellar vermis and visual association cortex, in the treatment condition ( $P < .001$ ). Comparisons of questionnaires indicated a lower stress level and better quality of life in the treatment condition. A significantly lower VAS was noted after CSM. Cervical muscle tone and salivary amylase were decreased after CSM. Conclusion The results of this study suggest that CSM affects regional cerebral glucose metabolism related to sympathetic relaxation and pain reduction.



<https://www.ncbi.nlm.nih.gov/pubmed/22314714>

## Effects of spinal manipulation versus therapeutic exercise on adults with chronic low back pain: a literature review.

Merepeza A.

J Can Chiropr Assoc. 2014 Dec;58(4):456-66.

### BACKGROUND CONTEXT:

Chronic low back pain (CLBP) is a prevalent disorder that has a significant burden to society in terms of loss of work time and increased economic cost. Two common treatment choices of intervention for CLBP are spinal manipulation and prescribed exercise.

### PURPOSE:

The purpose of this systematic review was to examine the effectiveness of spinal manipulation vs prescribed exercise for patients diagnosed with CLBP. Studies that compared head-to-head spinal manipulation to an exercise group were included in this review.

### METHODS:

A search of the current literature was conducted using a keyword process in CINAHL, Cochrane Register of Controlled Trials Database, Medline, and Embase. The search was conducted on, and included studies available up to August 29(th) 2014. Studies were included based on PICOS criteria 1) individuals with CLBP defined as lasting 12 weeks or longer; 2) spinal manipulation performed by a health care practitioner; 3) prescribed exercise for the treatment of CLBP and monitored by a health care practitioner; 4) measurable clinical outcomes for reducing pain, disability or improving function; 5) randomized controlled trials. The quality of included articles was determined by the author using the criteria developed and used by the Physiotherapy Evidence Database (PEDro).

### RESULTS:

Three randomized controlled trials met the inclusion criteria of this systematic review and were included in this review. The outcomes used in these studies included Disability Indexes, Pain Scales and function improvement scales. The results included a mix of effects with one study finding spinal manipulation as more effective and another

finding the exercises more so. The third study found both interventions offering equal effects in the long term.

## CONCLUSION:

Based on the findings of this systematic review there is no conclusive evidence that clearly favours spinal manipulation or exercise as more effective in treatment of CLBP. More studies are needed to further explore which intervention is more effective.

PMID: 25550671 | PMCID: PMC4262810



<https://www.ncbi.nlm.nih.gov/pubmed/25550671>

## Lymphatic pump manipulation mobilizes inflammatory mediators into lymphatic circulation.

Schander A, Downey HF, Hodge LM.

Exp Biol Med (Maywood). 2012 Jan;237(1):58-63. doi: 10.1258/ebm.2011.011220. Epub 2011 Dec 14.

### ABSTRACT

Lymph stasis can result in edema and the accumulation of particulate matter, exudates, toxins and bacteria in tissue interstitial fluid, leading to inflammation, impaired immune cell trafficking, tissue hypoxia, tissue fibrosis and a variety of diseases. Previously, we demonstrated that osteopathic lymphatic pump techniques (LPTs) significantly increased thoracic and intestinal duct lymph flow. The purpose of this study was to determine if LPT would mobilize inflammatory mediators into the lymphatic circulation. Under anesthesia, thoracic or intestinal lymph of dogs was collected at resting (pre-LPT), during four minutes of LPT, and for 10 min following LPT (post-LPT), and the lymphatic concentrations of interleukin-2 (IL-2), IL-4, IL-6, IL-10, interferon- $\gamma$ , tissue necrosis factor  $\alpha$ , monocyte chemotactic protein-1 (MCP-1), keratinocyte chemoattractant, superoxide dismutase (SOD) and nitrotyrosine (NT) were measured. LPT significantly increased MCP-1 concentrations in thoracic duct lymph. Further, LPT increased both thoracic and intestinal duct lymph flux of cytokines and chemokines as compared with their respective pre-LPT flux. In addition, LPT increased lymphatic flux of SOD and NT. Ten minutes following cessation of LPT, thoracic and intestinal lymph flux of cytokines, chemokines, NT and SOD were similar to pre-LPT, demonstrating that their flux was transient and a response to LPT. This re-distribution of inflammatory mediators during LPT may provide scientific rationale for the clinical use of LPT to enhance immunity and treat infection.

DOI: 10.1258/ebm.2011.011220 | PMID: 22169162



<https://www.ncbi.nlm.nih.gov/pubmed/22169162>

## Osteopathic manipulative therapy induces early plasma cytokine release and mobilization of a population of blood dendritic cells.

Walkowski S, Singh M, Puertas J, Pate M, Goodrum K, Benencia F.

PLoS One. 2014 Mar 10;9(3):e90132. doi: 10.1371/journal.pone.0090132. eCollection 2014.

### ABSTRACT

It has been claimed that osteopathic manipulative treatment (OMT) is able to enhance the immune response of individuals. In particular, it has been reported that OMT has the capability to increase antibody titers, enhance the efficacy of vaccination, and upregulate the numbers of circulating leukocytes. Recently, it has been shown in human patients suffering chronic low back pain, that OMT is able to modify the levels of cytokines such as IL-6 and TNF- $\alpha$  in blood upon repeated treatment. Further, experimental animal models show that lymphatic pump techniques can induce a transient increase of cytokines in the lymphatic circulation. Taking into account all these data, we decided to investigate in healthy individuals the capacity of OMT to induce a rapid modification of the levels of cytokines and leukocytes in circulation. Human volunteers were subjected to a mixture of lymphatic and thoracic OMT, and shortly after the levels of several cytokines were evaluated by protein array technology and ELISA multiplex analysis, while the profile and activation status of circulating leukocytes was extensively evaluated by multicolor flow cytometry. In addition, the levels of nitric oxide and C-reactive protein (CRP) in plasma were determined. In this study, our results show that OMT was not able to induce a rapid modification in the levels of plasma nitrites or CRP or in the proportion or activation status of central memory, effector memory or naïve CD4 and CD8 T cells. A significant decrease in the proportion of a subpopulation of blood dendritic cells was detected in OMT patients. Significant differences were also detected in the levels of immune molecules such as IL-8, MCP-1, MIP-1 $\alpha$  and most notably, G-CSF. Thus, OMT is able to induce a rapid change in the immunological profile of particular circulating cytokines and leukocytes.

DOI: 10.1371/journal.pone.0090132 | PMID: 24614605 | PMCID: PMC3948629



<https://www.ncbi.nlm.nih.gov/pubmed/24614605>

## Lymphatic pump treatment mobilizes leukocytes from the gut associated lymphoid tissue into lymph.

Hodge LM, Bearden MK, Schander A, Huff JB, Williams A Jr, King HH, Downey HF.

Lymphat Res Biol. 2010 Jun;8(2):103-10. doi: 10.1089/lrb.2009.0011.

### BACKGROUND:

Lymphatic pump techniques (LPT) are used clinically by osteopathic practitioners for the treatment of edema and infection; however, the mechanisms by which LPT enhances lymphatic circulation and provides protection during infection are not understood. Rhythmic compressions on the abdomen during LPT compress the abdominal area, including the gut-associated lymphoid tissues (GALT), which may facilitate the release of leukocytes from these tissues into the lymphatic circulation. This study is the first to document LPT-induced mobilization of leukocytes from the GALT into the lymphatic circulation.

### METHODS AND RESULTS:

Catheters were inserted into either the thoracic or mesenteric lymph ducts of dogs. To determine if LPT enhanced the release of leukocytes from the mesenteric lymph nodes (MLN) into lymph, the MLN were fluorescently labeled in situ. Lymph was collected during 4 min pre-LPT, 4 min LPT, and 10 min following cessation of LPT. LPT significantly increased lymph flow and leukocytes in both mesenteric and thoracic duct lymph. LPT had no preferential effect on any specific leukocyte population, since neutrophil, monocyte, CD4+ T cell, CD8+ T cell, IgG+B cell, and IgA+B cell numbers were similarly increased. In addition, LPT significantly increased the mobilization of leukocytes from the MLN into lymph. Lymph flow and leukocyte counts fell following LPT treatment, indicating that the effects of LPT are transient.

### CONCLUSIONS:

LPT mobilizes leukocytes from GALT, and these leukocytes are transported by the lymphatic circulation. This enhanced release of leukocytes from GALT may provide scientific rationale for the clinical use of LPT to improve immune function.

DOI: 10.1089/lrb.2009.0011 | PMID: 20583872 | PMCID: PMC2939849



<https://www.ncbi.nlm.nih.gov/pubmed/20583872>

## Lymphatic pump treatment augments lymphatic flux of lymphocytes in rats.

Huff JB, Schander A, Downey HF, Hodge LM.

Lymphat Res Biol. 2010 Dec;8(4):183-7. doi: 10.1089/lrb.2010.0009.

### BACKGROUND:

Lymphatic pump techniques (LPT) are used by osteopathic practitioners for the treatment of edema and infection; however, the mechanisms by which LPT enhances the lymphatic and immune systems are poorly understood.

### METHODS AND RESULTS:

To measure the effect of LPT on the rat, the cisterna chyli (CC) of 10 rats were cannulated and lymph was collected during 4 min of 1) pre-LPT baseline, 2) 4 min LPT, and 3) 10 min post-LPT recovery. LPT increased significantly ( $p < 0.05$ ) lymph flow from a baseline of  $24 \pm 5 \mu\text{l}/\text{min}$  to  $89 \pm 30 \mu\text{l}/\text{min}$ . The baseline CC lymphocyte flux was  $0.65 \pm 0.21 \times 10^6$  lymphocytes/min, and LPT increased CC lymphocyte flux to  $6.10 \pm 0.99 \times 10^6$  lymphocytes/min ( $p < 0.01$ ). LPT had no preferential effect on any lymphocyte population, since total lymphocytes, CD4+ T cells, CD8+ T cells, and B cell numbers were similarly increased. To determine if LPT mobilized gut-associated lymphocytes into the CC lymph, gut-associated lymphocytes in the CC lymph were identified by staining CC lymphocytes for the gut homing receptor integrin  $\alpha 4\beta 7$ . LPT significantly increased ( $p < 0.01$ ) the flux of  $\alpha 4\beta 7$  positive CC lymphocytes from a baseline of  $0.70 \pm 0.03 \times 10^5$  lymphocytes/min to  $6.50 \pm 0.10 \times 10^5$  lymphocytes/min during LPT. Finally, lymphocyte flux during recovery was similar to baseline, indicating the effects of LPT are transient.

### CONCLUSIONS:

Collectively, these results suggest that LPT may enhance immune surveillance by increasing the numbers of lymphocytes released in to lymphatic circulation, especially from the gut associated lymphoid tissue. The rat provides a useful model to further investigate the effect of LPT on the lymphatic and immune systems.

DOI: 10.1089/lrb.2010.0009 | PMID: 21190489 | PMCID: PMC3025762



<https://www.ncbi.nlm.nih.gov/pubmed/21190489>

## Thoracic and abdominal lymphatic pump techniques inhibit the growth of *S. pneumoniae* bacteria in the lungs of rats.

Creasy C, Schander A, Orlowski A, Hodge LM.

Lymphat Res Biol. 2013 Sep;11(3):183-6. doi: 10.1089/lrb.2013.0007. Epub 2013 Sep 11.

### BACKGROUND:

Osteopathic physicians utilize manual medicine techniques called lymphatic pump techniques (LPT) to improve lymphatic flow and enhance immunity. Clinical studies report that LPT enhances antibody responses to bacterial vaccines, shortens duration of cough in patients with respiratory disease, and shortens the duration of intravenous antibiotic therapy and hospital stay in patients with pneumonia. The purpose of this study was to identify if thoracic LPT (Th-LPT) or abdominal LPT (Ab-LPT) would reduce *Streptococcus pneumoniae* colony-forming units (CFU) in the lungs of rats with acute pneumonia.

### METHODS AND RESULTS:

Rats were nasally infected with *S. pneumoniae* and received either control, sham, Ab-LPT, or Th-LPT once daily for 3 consecutive days. On day 4 post-infection, lungs were removed and bacteria were enumerated. Three daily applications of either Ab-LPT or Th-LPT were able to significantly ( $p < 0.05$ ) reduce the numbers of pulmonary bacteria compared to control and sham. There were no significant differences in the percentage or concentration of leukocytes in blood between groups, suggesting neither Ab-LPT nor Th-LPT release leukocytes into blood circulation.

### CONCLUSIONS:

Our data demonstrate that LPT may protect against pneumonia by inhibiting bacterial growth in the lung; however, the mechanism of protection is unclear. Once these mechanisms are understood, LPT can be optimally applied to patients with pneumonia, which may substantially reduce morbidity, mortality, and frequency of hospitalization.

DOI: 10.1089/lrb.2013.0007 | PMID: 24024572 | PMCID: PMC3780326



<https://www.ncbi.nlm.nih.gov/pubmed/24024572>

## Lymphatic pump treatment repeatedly enhances the lymphatic and immune systems.

Schander A, Padro D, King HH, Downey HF, Hodge LM.

Lymphat Res Biol. 2013 Dec;11(4):219-26. doi: 10.1089/lrb.2012.0021.

### BACKGROUND:

Osteopathic practitioners utilize manual therapies called lymphatic pump techniques (LPT) to treat edema and infectious diseases. While previous studies examined the effect of a single LPT treatment on the lymphatic system, the effect of repeated applications of LPT on lymphatic output and immunity has not been investigated. Therefore, the purpose of this study was to measure the effects of repeated LPT on lymphatic flow, lymph leukocyte numbers, and inflammatory mediator concentrations in thoracic duct lymph (TDL).

### METHODS AND RESULTS:

The thoracic ducts of five mongrel dogs were cannulated, and lymph samples were collected during pre-LPT, 4 min of LPT, and 2 hours post-LPT. A second LPT (LPT-2) was applied after a 2 hour rest period. TDL flow was measured, and TDL were analyzed for the concentration of leukocytes and inflammatory mediators. Both LPT treatments significantly increased TDL flow, leukocyte count, total leukocyte flux, and the flux of interleukin-8 (IL-8), keratinocyte-derived chemoattractant (KC), nitrite (NO<sub>2</sub><sup>-</sup>), and superoxide dismutase (SOD). The concentration of IL-6 increased in lymph over time in all experimental groups; therefore, it was not LPT dependent.

### CONCLUSION:

Clinically, it can be inferred that LPT at a rate of 1 pump per sec for a total of 4 min can be applied every 2 h, thus providing scientific rationale for the use of LPT to repeatedly enhance the lymphatic and immune system.

DOI: 10.1089/lrb.2012.0021 | PMID: 24364845 | PMCID: PMC3875196

 <https://www.ncbi.nlm.nih.gov/pubmed/24364845>

## Lymphatic pump treatment as an adjunct to antibiotics for pneumonia in a rat model.

Hodge LM, Creasy C, Carter K, Orlowski A, Schander A, King HH. Erratum in: J Am Osteopath Assoc. 2015 Jun;115(6):357. Schander, Artur [added].

J Am Osteopath Assoc. 2015 May;115(5):306-16. doi: 10.7556/jaoa.2015.061.

### BACKGROUND:

Lymphatic pump treatment (LPT) is a technique used by osteopathic physicians as an adjunct to antibiotics for patients with respiratory tract infections, and previous studies have demonstrated that LPT reduces bacterial load in the lungs of rats with pneumonia. Currently, it is unknown whether LPT affects drug efficacy.

### OBJECTIVE:

To determine whether the combination of antibiotics and LPT would reduce bacterial load in the lungs of rats with acute pneumonia.

### METHODS:

Rats were infected intranasally with  $5 \times 10^7$  colony-forming units (CFU) of *Streptococcus pneumoniae*. At 24, 48, and 72 hours after infection, the rats received no therapy (control), 4 minutes of sham therapy, or 4 minutes of LPT, followed by subcutaneous injection of 40 mg/kg of levofloxacin or sterile phosphate-buffered saline. At 48, 72, and 96 hours after infection, the spleens and lungs were collected, and *S pneumoniae* CFU were enumerated. Blood was analyzed for a complete blood cell count and leukocyte differential count.

### RESULTS:

At 48 and 72 hours after infection, no statistically significant differences in pulmonary CFU were found between control, sham therapy, or LPT when phosphate-buffered saline was administered; however, the reduction in CFU was statistically significant in all rats given levofloxacin. The combination of sham therapy and levofloxacin decreased bacterial load at 72 and 96 hours after infection, and LPT and levofloxacin significantly reduced CFU compared with sham therapy and levofloxacin at both time points

(P<.05). Colony-forming units were not detected in the spleens at any time. No statistically significant differences in hematologic findings between any treatment groups were found at any time point measured.

## CONCLUSION:

The results suggest that 3 applications of LPT induces an additional protective mechanism when combined with levofloxacin and support its use as an adjunctive therapy for the management of pneumonia; however, the mechanism responsible for this protection is unclear.

DOI: 10.7556/jaoa.2015.061 | PMID: 25938525



<https://www.ncbi.nlm.nih.gov/pubmed/25938525>

## Lymphatic Pump Treatment Mobilizes Bioactive Lymph That Suppresses Macrophage Activity In Vitro.

Castillo R, Schander A, Hodge LM.

J Am Osteopath Assoc. 2018 Jul 1;118(7):455-461. doi: 10.7556/jaoa.2018.099.

### CONTEXT:

By promoting the recirculation of tissue fluid, the lymphatic system preserves tissue health, aids in the absorption of gastrointestinal lipids, and supports immune surveillance. Failure of the lymphatic system has been implicated in the pathogenesis of several infectious and inflammatory diseases. Thus, interventions that enhance lymphatic circulation, such as osteopathic lymphatic pump treatment (LPT), should aid in the management of these diseases.

### OBJECTIVE:

To determine whether thoracic duct lymph (TDL) mobilized during LPT would alter the function of macrophages in vitro.

### METHODS:

The thoracic ducts of 6 mongrel dogs were cannulated, and TDL samples were collected before (baseline), during, and 10 minutes after LPT. Thoracic duct lymph flow was measured, and TDL samples were analyzed for protein concentration. To measure the effect of TDL on macrophage activity, RAW 264.7 macrophages were cultured for 1 hour to acclimate. After 1 hour, cell-free TDL collected at baseline, during LPT, and after TDL was added at 5% total volume per well and co-cultured with or without 500 ng per well of lipopolysaccharide (LPS) for 24 hours. As a control for the addition of 5% TDL, macrophages were cultured with phosphate-buffered saline (PBS) at 5% total volume per well and co-cultured with or without 500 ng per well of LPS for 24 hours. After culture, cell-free supernatants were assayed for nitrite (NO<sub>2</sub>-), tumor necrosis factor α (TNF-α) and interleukin 10 (IL-10). Macrophage viability was measured using flow cytometry.

### RESULTS:

Lymphatic pump treatment significantly increased TDL flow and the flux of protein in

TDL ( $P < .001$ ). After culture, macrophage viability was approximately 90%. During activation with LPS, baseline TDL, TDL during LPT, and TDL after LPT significantly decreased the production of  $\text{NO}_2^-$ ,  $\text{TNF-}\alpha$ , and IL-10 by macrophages ( $P < .05$ ). However, no significant differences were found in viability or the production of  $\text{NO}_2^-$ ,  $\text{TNF-}\alpha$ , or IL-10 between macrophages cultured with LPS plus TDL taken before, during, and after LPT ( $P > .05$ ).

## CONCLUSION:

The redistribution of protective lymph during LPT may provide scientific rationale for the clinical use of LPT to reduce inflammation and manage edema.

DOI: 10.7556/jaoa.2018.099 | PMID: 29946663



<https://www.ncbi.nlm.nih.gov/pubmed/29946663>

## The role of gentle touch in perinatal osteopathic manual therapy.

McGlone F, Cerritelli F, Walker S, Esteves J.

Neurosci Biobehav Rev. 2017 Jan;72:1-9. doi: 10.1016/j.neubiorev.2016.11.009. Epub 2016 Nov 11.

### ABSTRACT

Osteopathic medicine is a system of manual diagnosis and treatment. While there is growing evidence that osteopathy is effective in a range of clinical conditions, the underlying biological basis of its therapeutic effects remain largely unknown. Given that the sense of touch plays a critical role in osteopathy, in this perspective article, with a particular focus on perinatal care, we explore the potential mechanisms by which stimulation of the skin senses can exert beneficial physiological and psychological effects, aiding growth and development. We propose that a class of low threshold mechanosensitive c-fibre, named c-tactile afferents, which respond optimally to gentle, slow moving touch are likely to play a direct and significant role in the efficacy of manual therapies. A greater understanding of the impact the type and quality of touch plays in therapeutic tactile interventions and in particular the neuroscience underpinning these effects will aid the development of more targeted, population specific interventions.

DOI: 10.1016/j.neubiorev.2016.11.009 | PMID: 27845175



<https://www.ncbi.nlm.nih.gov/pubmed/27845175>

## Profile of osteopathic practice in Spain: results from a standardized data collection study.

Alvarez Bustins G, López Plaza PV, Carvajal SR.

BMC Complement Altern Med. 2018 Apr 11;18(1):129. doi: 10.1186/s12906-018-2190-0.

### BACKGROUND:

There is limited research regarding patients' profiles and consumer attitudes and habits of osteopathy in Spain. The purpose of this study was to profile patients who regularly receive osteopathic care in Spain using an internationally developed standardized data collection tool.

### METHOD:

During the period between April 2014 and December 2015, a UK-developed standardized data collection tool was distributed to Spanish osteopaths who voluntarily agreed to participate in this cross-sectional study.

### RESULTS:

Thirty-six osteopaths participated in this study and returned a total of 314 completed datasets. Of 314 patients, 61% were women and 39% were men, with a mean age of 40 years (SD 17.02 years, range 0 to 83 years). Forty-four percent were full-time salaried workers, and in 78% of cases, receiving osteopathic treatment was the patient's own choice. Chronic spinal pain presentations were the most frequent reasons for consultation. Seventy-five percent of patients presented with a coexisting condition, mainly gastrointestinal disorders and headaches. The main treatment approach consisted of mobilization techniques, followed by soft tissue, cranial and high velocity thrust techniques. Improvement or resolution of the complaint was experienced by 93% of patients after a small number of sessions. Adverse events were minor and occurred in 7% of all cases.

### CONCLUSION:

This is the first study carried out in Spain analyzing the profile of patients who receive osteopathic care. The typical patient who receives osteopathic care in Spain is midd-

le-aged, presents mainly with chronic spinal pain, and voluntarily seeks osteopathic treatment. Osteopathic treatment produces a significant improvement in the majority of cases with a low rate of minor adverse events reported.

PMID: 29642901 | PMCID: PMC5896131 | DOI: 10.1186/s12906-018-2190-0

 <https://www.ncbi.nlm.nih.gov/pubmed/29642901>

## Effectiveness of an Osteopathic Abdominal Manual Intervention in Pain Thresholds, Lumbopelvic Mobility, and Posture in Women with Chronic Functional Constipation.

Martínez-Ochoa MJ, Fernández-Domínguez JC, Morales-Asencio JM, González-Iglesias J1, Ricard F, Oliva-Pascual-Vaca Á.

J Altern Complement Med. 2018 Aug;24(8):816-824. doi: 10.1089/acm.2018.0081. Epub 2018 May 21.

### OBJECTIVES:

To assess the effect of an osteopathic abdominal manual intervention (AMI) on pressure pain thresholds (PPTs), mobility, hip flexibility, and posture in women with chronic functional constipation.

### DESIGN:

Randomized, double-blind placebo-controlled trial.

### SETTING/LOCATION:

Subjects were recruited for the study by referral from different gastroenterology outpatient clinics in the city of Madrid (Spain).

### SUBJECTS:

Sixty-two patients suffering from chronic functional constipation according to the guidelines of the Congress of Rome III.

### INTERVENTIONS:

The experimental group (n = 31) received an osteopathic AMI, and the control group (n = 31) received a sham procedure.

### OUTCOME MEASURES:

PPTs at different levels, including vertebral levels C7, T3, T10, T11, and T12, trunk flexion range of motion (ROM), hip flexibility, and posture, were measured before and im-

mediately after the intervention. A comparison between the difference between the pre- and postintervention values using the Student's t test for independent samples or nonparametric U-Mann-Whitney test depending on the distribution normality of the analyzed variables was performed.

## RESULTS:

In the intergroup comparison, statistically significant differences were found in PPT at T11 ( $p = 0.011$ ) and T12 ( $p = 0.001$ ) and also in the trunk flexion ROM ( $p < 0.05$ ). Moreover, women showed no adverse effects with acceptable pain tolerance to the intervention.

## CONCLUSION:

The application of an osteopathic AMI is well tolerated and improves pain sensitivity in areas related to intestinal innervation, as well as lumbar flexion.

DOI: 10.1089/acm.2018.0081 | PMID: 29782181



<https://www.ncbi.nlm.nih.gov/pubmed/29782181>

## Effect of the soft-tissue techniques in the quality of life in patients with Crohn's disease: A randomized controlled trial.

Espí-López GV, Inglés M, Soliva-Cazabán I, Serra-Añó P.

Medicine (Baltimore). 2018 Dec;97(51):e13811. doi: 10.1097/MD.00000000000013811.

### BACKGROUND:

Crohn's disease (CD) is a highly prevalent inflammatory bowel disease (IBD), characterized by recurring flares altered by periods of inactive disease and remission, affecting physical and psychological aspects and quality of life (QoL). The aim of this study was to determine the therapeutic benefits of soft non-manipulative osteopathic techniques in patients with CD.

### METHODS:

A single-blind randomized controlled trial was performed. 30 individuals with CD were divided into 2 groups: 16 in the experimental group (EG) and 14 in the control group (CG). The intervention period lasted 30 days (1 session every 10 days). Pain, global quality of life (GQoL) and QoL specific for CD (QoLCD) were assessed before and after the intervention. Anxiety and depression levels were measured at the beginning of the study.

### RESULTS:

We observed a significant effect of the treatment in both the physical and task subscales of the GQoL ( $P=.01$  and  $P=.04$ , respectively) and also in the QoLCD ( $P\leq.0001$ ) but not in pain score ( $P=.28$ ). When the intensity of pain was taken into consideration in the analysis of the EG, there was a significantly greater increment in the QoLCD after treatment in people without pain than in those with pain ( $P=.02$ ) The improvements in GQoL were independent from the disease status ( $P=.16$ ).

### CONCLUSIONS:

Soft, non-manipulative osteopathic treatment is effective in improving overall and physical-related QoL in CD patients, regardless of the phase of the disease. Pain is an important factor that inversely correlates with the improvements in QoL.

DOI: 10.1097/MD.00000000000013811.



<https://www.ncbi.nlm.nih.gov/pubmed/30572544>

## Effects of manual therapy on treatment duration and motor development in infants with severe nonsynostotic plagiocephaly: a randomised controlled pilot study.

Cabrera-Martos I, Valenza MC, Valenza-Demet G, Benítez-Feliponi A, Robles-Vizcaíno C, Ruiz-Extremera A.

Childs Nerv Syst. 2016 Nov;32(11):2211-2217. Epub 2016 Jul 27.

### PURPOSE:

Despite growing evidence regarding nonsynostotic plagiocephaly and their repercussions on motor development, there is little evidence to support the use of manual therapy as an adjuvant option. The aim of this study was to evaluate the effects of a therapeutic approach based on manual therapy as an adjuvant option on treatment duration and motor development in infants with severe nonsynostotic plagiocephaly.

### METHODS:

This is a randomised controlled pilot study. The study was conducted at a university hospital. Forty-six infants with severe nonsynostotic plagiocephaly (types 4-5 of the Argenta scale) referred to the Early Care and Monitoring Unit were randomly allocated to a control group receiving standard treatment (repositioning and an orthotic helmet) or to an experimental group treated with manual therapy added to standard treatment. Infants were discharged when the correction of the asymmetry was optimal taken into account the previous clinical characteristics. The outcome measures were treatment duration and motor development assessed with the Alberta Infant Motor Scale (AIMS) at baseline and at discharge.

### RESULTS:

Asymmetry after the treatment was minimal (type 0 or 1 according to the Argenta scale) in both groups. A comparative analysis showed that treatment duration was significantly shorter ( $p < 0.001$ ) in the experimental group ( $109.84 \pm 14.45$  days) compared to the control group ( $148.65 \pm 11.53$  days). The motor behaviour was normal (scores above the 16th percentile of the AIMS) in all the infants after the treatment.

### CONCLUSIONS:

Manual therapy added to standard treatment reduces the treatment duration in infants with severe nonsynostotic plagiocephaly.

DOI: 10.1007/s00381-016-3200-5 | PMID: 27465676



<https://www.ncbi.nlm.nih.gov/pubmed/27465676>

## Assessment of Pulmonary Function After Osteopathic Manipulative Treatment vs Standard Pulmonary Rehabilitation in a Healthy Population.

Lorenzo S, Nicotra CM, Mentreddy AR, Padia HJ, Stewart DO, Hussein MO, Quinn TA.

J Am Osteopath Assoc. 2019 Feb 11. doi: 10.7556/jaoa.2019.026. [Epub ahead of print]

### CONTEXT:

Standard pulmonary rehabilitation (SPR) does not use osteopathic manipulative treatment (OMT), but OMT has potential to improve lung function and patient perception of breathing.

### OBJECTIVE:

To analyze the immediate effects of OMT and SPR techniques on pulmonary function using spirometry and subjective ratings in young, healthy persons.

### METHODS:

Participants were healthy students recruited from the Lake Erie College of Osteopathic Medicine-Bradenton and were randomly assigned to either the OMT or SPR group. During the first 4 weeks, each participant in the OMT group received 1 OMT technique (rib raising, doming of the diaphragm, thoracic lymphatic pump, and thoracic high velocity, low amplitude), and each participant in the SPR group received 1 SPR treatment (tapotement, pursed lip breathing, saline nebulizer, and rest) per week. Treatments were then ranked based on positive change in pulmonary function as measured by forced expiratory volume in the first second of expiration (FEV1) and forced vital capacity (FVC). During the fifth week, the OMT group received the 2 highest-ranked OMT techniques, and the SPR group received the 2 highest-ranked SPR treatments. During the sixth week, the OMT group received the highest-ranked OMT and SPR treatment, while the SPR group received the same treatment combination but in the reverse order. Pulmonary function, as measured through FEV1, FVC, and FEV1/FVC, were collected before and after each treatment or treatment combination. Participants subjectively rated change in breathing after each treatment.

### RESULTS:

A total of 53 students participated in the study, with 28 in the OMT group and 25 in the SPR group. In the OMT group, rib raising yielded the highest positive mean (SD) change of 0.001 (0.136) L in FEV1 and 0.052 (0.183) L in FVC, followed by lymphatic pump, with a change of 0.080 (0.169) L in FEV1 and -0.031 (0.229) L in FVC. In the SPR group, pursed lip breathing yielded the highest positive mean (SD) change of 0.101 (0.278) L in FEV1 and 0.031 (0.179) L in FVC, followed by tapotement, with a change of 0.045 (0.229) L in FEV1 and 0.061 (0.239) L in FVC. Saline treatment significantly decreased lung function. All other treatments did not result in any significant changes in lung function. Overall, SPR subjective ratings were significantly lower than ratings for both OMT and combination (OMT+SPR) treatments.

## CONCLUSIONS:

Saline significantly reduced lung function and had low subjective posttreatment ratings in young healthy adults. Additionally, OMT and combination OMT and SPR significantly improved subjective breathing more than SPR alone. Future applications of this study include evaluating OMT and SPR effects on lung function in patients with various pulmonary conditions.

DOI: 10.7556/jaoa.2019.026.



<https://www.ncbi.nlm.nih.gov/pubmed/30741314>

## Effects of Cervical High-Velocity Low-Amplitude Techniques on Range of Motion, Strength Performance, and Cardiovascular Outcomes: A Review.

Galindez-Ibarbengoetxea X, Setuain I, Andersen LL, Ramírez-Velez R, González-Izal M, Jauregi A Izquierdo M.

J Altern Complement Med. 2017 Sep;23(9):667-675. doi: 10.1089/acm.2017.0002. Epub 2017 Jul 21.

### BACKGROUND:

Cervical high-velocity low-amplitude (HVLA) manipulation technique is among the oldest and most frequently used chiropractic manual therapy, but the physiologic and biomechanics effects were not completely clear.

### OBJECTIVE:

This review aims to describe the effects of cervical HVLA manipulation techniques on range of motion, strength, and cardiovascular performance.

### METHODS/DESIGN:

A systematic search was conducted of the electronic databases from January 2000 to August 2016: PubMed (n = 131), ScienceDirect (n = 101), Scopus (n = 991), PEDro (n = 33), CINAHL (n = 884), and SciELO (n = 5). Two independent reviewers conducted the screening process to determine article eligibility. The intervention that included randomized controlled trials was thrust, or HVLA, manipulative therapy directed to the cervical spine. Methodological quality was assessed using the Cochrane risk-of-bias tool. The initial search rendered 2145 articles. After screening titles and abstracts, 11 articles remained for full-text review.

### RESULTS:

The review shows that cervical HVLA manipulation treatment results in a large effect size ( $d > 0.80$ ) on increasing cervical range of motion and mouth opening. In patients with lateral epicondylalgia, cervical HVLA manipulation resulted in increased pain-free handgrip strength, with large effect sizes (1.44 and 0.78, respectively). Finally, in subjects with hypertension the blood pressure seemed to decrease after cervical HVLA

manipulation. Higher quality studies are needed to develop a stronger evidence-based foundation for HVLA manipulation techniques as a treatment for cervical conditions.

DOI: 10.1089/acm.2017.0002.



<https://www.ncbi.nlm.nih.gov/pubmed/28731832>

# Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomised controlled trials

BMJ 2019;364:l689. Sidney M Rubinstein

BMJ 2019; 364 doi: <https://doi.org/10.1136/bmj.l689> (Published 13 March 2019) Cite this as: BMJ 2019;364:l689

## OBJECTIVE

To assess the benefits and harms of spinal manipulative therapy (SMT) for the treatment of chronic low back pain.

## DESIGN

Systematic review and meta-analysis of randomised controlled trials.

Data sources Medline, PubMed, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL, Physiotherapy Evidence Database (PEDro), Index to Chiropractic Literature, and trial registries up to 4 May 2018, including reference lists of eligible trials and related reviews.

Eligibility criteria for selecting studies Randomised controlled trials examining the effect of spinal manipulation or mobilisation in adults ( $\geq 18$  years) with chronic low back pain with or without referred pain. Studies that exclusively examined sciatica were excluded, as was grey literature. No restrictions were applied to language or setting.

## REVIEW METHODS

Two reviewers independently selected studies, extracted data, and assessed risk of bias and quality of the evidence. The effect of SMT was compared with recommended therapies, non-recommended therapies, sham (placebo) SMT, and SMT as an adjuvant therapy. Main outcomes were pain and back specific functional status, examined as mean differences and standardised mean differences (SMD), respectively. Outcomes were examined at 1, 6, and 12 months. Quality of evidence was assessed using GRADE. A random effects model was used and statistical heterogeneity explored.

## RESULTS

47 randomised controlled trials including a total of 9211 participants were identified, who were on average middle aged (35-60 years). Most trials compared SMT with recommended therapies. Moderate quality evidence suggested that SMT has similar effects to other recommended therapies for short term pain relief (mean difference  $-3.17$ , 95% confidence interval  $-7.85$  to  $1.51$ ) and a small, clinically better improvement in function (SMD  $-0.25$ , 95% confidence interval  $-0.41$  to  $-0.09$ ). High quality evidence suggested that compared with non-recommended therapies SMT results in small, not clinically better effects for short term pain relief (mean difference  $-7.48$ ,  $-11.50$  to  $-3.47$ ) and small to moderate clinically better improvement in function (SMD  $-0.41$ ,  $-0.67$  to  $-0.15$ ). In general, these results were similar for the intermediate and long term outcomes as were the effects of SMT as an adjuvant therapy. Evidence for sham SMT was low to very low quality; therefore these effects should be considered uncertain. Statistical heterogeneity could not be explained. About half of the studies examined adverse and serious adverse events, but in most of these it was unclear how and whether these events were registered systematically. Most of the observed adverse events were musculoskeletal related, transient in nature, and of mild to moderate severity. One study with a low risk of selection bias and powered to examine risk ( $n=183$ ) found no increased risk of an adverse event (relative risk  $1.24$ , 95% confidence interval  $0.85$  to  $1.81$ ) or duration of the event ( $1.13$ ,  $0.59$  to  $2.18$ ) compared with sham SMT. In one study, the Data Safety Monitoring Board judged one serious adverse event to be possibly related to SMT.

## CONCLUSION

SMT produces similar effects to recommended therapies for chronic low back pain, whereas SMT seems to be better than non-recommended interventions for improvement in function in the short term. Clinicians should inform their patients of the potential risks of adverse events associated with SMT.

DOI: <https://doi.org/10.1136/bmj.l689>

 <https://www.bmj.com/content/bmj/364/bmj.l689.full.pdf>

## Timing of oral feeding changes in premature infants who underwent osteopathic manipulative treatment.

Vismara L, Manzotti A, Tarantino AG, Bianchi G, Nonis A, La Rocca S, Lombardi E, Lista G, Agosti M.

Complement Ther Med. 2019 Apr;43:49-52. doi: 10.1016/j.ctim.2019.01.003. Epub 2019 Jan 8.

### BACKGROUND:

The delayed transition from gavage-to-nipple feeding is one of the most significant factors that may prolong hospital length of stay (LOS). Osteopathic manipulative treatment (OMT) has been demonstrated to be effective regarding LOS reduction, but no investigations have documented its clinical validity for attaining oral feeding.

### OBJECTIVES:

To assess OMT utility regarding the timing of oral feeding in healthy preterm infants.

### DESIGN:

Preliminary propensity score-matched retrospective cohort study.

### SETTING:

Data were extrapolated from the neonatal intensive care unit (NICU) of Del Ponte Hospital in Varese, Italy, during the period between March 2012 and December 2013.

### INTERVENTIONS:

Two propensity score-matched groups of healthy preterm infants aged 28+0 to 33+6 were compared, observing those supported with OMT until hospital discharge and control subjects.

### MAIN OUTCOME MEASURES:

Days from birth to the attainment of oral feeding was the primary endpoint. Body weight, body length, head circumference and LOS were considered as secondary en-

dpoints.

## RESULTS:

Seventy premature infants were included in the study as the control group (n = 35; body weight (BW) =  $1457.9 \pm 316.2$  g; gestational age (GA) =  $31.5 \pm 1.73$  wk) and the osteopathic group (n = 35; BW =  $1509.6 \pm 250.8$  g; GA =  $31.8 \pm 1.64$  wk). The two groups had analogous characteristics at study entry. In this cohort, we observed a significant reduction in TOF (-5.00 days; p = 0.042) in the osteopathic group with a greater effect in very low birth weight infants.

## CONCLUSIONS:

These data demonstrate the utility and potential efficacy of OMT for the attainment of oral feeding. Further adequately powered clinical trials are recommended.

DOI: 10.1016/j.ctim.2019.01.003.



<https://www.ncbi.nlm.nih.gov/pubmed/30935554>

## Osteopathic care for low back pain and neck pain: A cost-utility analysis.

Verhaeghe N, Schepers J, van Dun P, Annemans L.

Complement Ther Med. 2018 Oct;40:207-213. doi: 10.1016/j.ctim.2018.06.001. Epub 2018 Jun 9.

### OBJECTIVES:

The aim was to examine the health and economic consequences of osteopathic care for low back pain and neck pain in addition to usual care compared to usual care alone.

### DESIGN:

A decision tree model considering a one-year time horizon was applied. The analysis occurred from a health insurance perspective only considering direct medical costs. The health effects were expressed as quality-adjusted life years (QALYs).

### MAIN OUTCOMES:

The main outcome was the incremental cost-effectiveness ratio (ICER). The uncertainty around key input parameters was addressed applying one-way and probabilistic sensitivity analyses (5000 simulations).

### RESULTS:

For low back pain, osteopathy resulted in cost savings (€385.1 vs €501.8/patient) at improved QALYs (0.666 vs. 0.614) compared to usual care. For neck pain, osteopathy resulted in additional costs (€577.3 vs. €521.0) and improved QALYs (0.639 vs. 0.609) resulting in an ICER of €1,870/QALY. The one-way sensitivity analysis identified the hospitalization cost (back) and osteopathy cost (neck) as major cost drivers. The probabilistic sensitivity analysis resulted in an average net saving of €163 (95%CI-€260, -€49.1) and a QALY gain of 0.06 (95%CI -0.06, 0.17) for low back pain and an average additional cost of €55.1 (95%CI €20.9, €129) and improved QALY gain of 0.03 (95%CI-0.06, 0.12) for neck pain.

### CONCLUSIONS:

Osteopathy was found to be a 'dominant' (low back pain) and cost-effective strategy (neck pain) compared to usual care. Further health economic evaluation studies considering a broader range of cost items and longer time horizon are required.

DOI: 10.1016/j.ctim.2018.06.001 | PMID: 30219451

 <https://www.ncbi.nlm.nih.gov/pubmed/30219451>

## Ultrasound Evaluation of Diaphragmatic Mobility and Contractility After Osteopathic Manipulative Techniques in Healthy Volunteers: A Prospective, Randomized, Double-Blinded Clinical Trial.

Mancini D, Cesari M, Lunghi C, Benigni AM, Antonelli Incalzi R, Scarlata S.

J Manipulative Physiol Ther. 2019 Jan;42(1):47-54. doi: 10.1016/j.jmpt.2018.08.001. Epub 2019 Apr 5.

### OBJECTIVE:

The purpose of this study was to investigate the effect of a session of osteopathic manipulative techniques on diaphragmatic motion and thickness in healthy participants.

### METHODS:

This was a prospective, randomized, double-blinded, case vs sham vs control clinical trial performed in an outpatient osteopathic clinic in Rome, Italy. Sixty-seven healthy participants, mean age  $40.4 \pm 14.5$  years, received an ultrasound evaluation of diaphragmatic motion and thickness, followed by a systematic osteopathic evaluation. After randomization, the experimental group ( $n = 22$ ) received osteopathic manipulation, whereas the sham ( $n = 22$ ) and the control ( $n = 22$ ) groups had a light touch approach and simple observation, respectively. After a 1-session intervention, new osteopathic and ultrasound assessments were repeated in all participants.

### RESULTS:

A statistically significant increase in diaphragmatic mobility was observed in the experimental group after the osteopathic manipulation ( $\Delta = 14.5$  mm,  $P < .001$ ; analysis of variance  $P < .001$  vs both sham:  $\Delta = -0.22$  mm, and control:  $\Delta = -2.09$  mm groups). A strong linear relationship was observed between the diaphragmatic motion gradient, measured with ultrasonography, and the score assigned by the operator evaluating the change of diaphragm mobility after intervention.

### CONCLUSION:

Osteopathic techniques used in this study improved the diaphragmatic motion (but not the muscle thickness) in healthy participants. Further studies are needed to confirm

our findings and eventually identify the clinical conditions that may benefit from osteopathic manipulative treatment of the diaphragm.

DOI: 10.1016/j.jmpt.2018.08.001.



<https://www.ncbi.nlm.nih.gov/pubmed/30955907>

## The Impact of Spinal Manipulation on Migraine Pain and Disability: A Systematic Review and Meta-Analysis.

Rist PM, Hernandez A, Bernstein C, Kowalski M, Osypiuk K, Vining R, Long CR, Goertz C, Song R, Wayne PM.

Headache. 2019 Apr;59(4):532-542. doi: 10.1111/head.13501. Epub 2019 Mar 14.

### BACKGROUND:

Several small studies have suggested that spinal manipulation may be an effective treatment for reducing migraine pain and disability. We performed a systematic review and meta-analysis of published randomized clinical trials (RCTs) to evaluate the evidence regarding spinal manipulation as an alternative or integrative therapy in reducing migraine pain and disability.

### METHODS:

PubMed and the Cochrane Library databases were searched for clinical trials that evaluated spinal manipulation and migraine-related outcomes through April 2017. Search terms included: migraine, spinal manipulation, manual therapy, chiropractic, and osteopathic. Meta-analytic methods were employed to estimate the effect sizes (Hedges'  $g$ ) and heterogeneity ( $I^2$ ) for migraine days, pain, and disability. The methodological quality of retrieved studies was examined following the Cochrane Risk of Bias Tool.

### RESULTS:

Our search identified 6 RCTs (pooled  $n = 677$ ; range of  $n = 42-218$ ) eligible for meta-analysis. Intervention duration ranged from 2 to 6 months; outcomes included measures of migraine days (primary outcome), migraine pain/intensity, and migraine disability. Methodological quality varied across the studies. For example, some studies received high or unclear bias scores for methodological features such as compliance, blinding, and completeness of outcome data. Due to high levels of heterogeneity when all 6 studies were included in the meta-analysis, the 1 RCT performed only among chronic migraineurs was excluded. Heterogeneity across the remaining studies was low. We observed that spinal manipulation reduced migraine days with an overall small effect size (Hedges'  $g = -0.35$ , 95% CI:  $-0.53, -0.16$ ,  $P < .001$ ) as well as migraine pain/intensity.

## CONCLUSIONS:

Spinal manipulation may be an effective therapeutic technique to reduce migraine days and pain/intensity. However, given the limitations to studies included in this meta-analysis, we consider these results to be preliminary. Methodologically rigorous, large-scale RCTs are warranted to better inform the evidence base for spinal manipulation as a treatment for migraine.

DOI: 10.1111/head.13501.



<https://www.ncbi.nlm.nih.gov/pubmed/30973196>

## Osteopathic manual treatment in patients with diabetes mellitus and comorbid chronic low back pain: subgroup results from the OSTEOPATHIC Trial.

Licciardone JC, Kearns CM, Hodge LM, Minotti DE.

J Am Osteopath Assoc. 2013 Jun;113(6):468-78.

### CONTEXT:

Chronic pain is often present in patients with diabetes mellitus.

### OBJECTIVE:

To assess the effects of osteopathic manual treatment (OMT) in patients with diabetes mellitus and comorbid chronic low back pain (LBP).

### DESIGN:

Randomized, double-blind, sham-controlled, 2×2 factorial trial, including OMT and ultrasound therapy (UST) interventions.

### SETTING:

University-based study in Dallas-Fort Worth, Texas.

### PATIENTS:

A subgroup of 34 patients (7%) with diabetes mellitus within 455 adult patients with nonspecific chronic LBP enrolled in the OSTEOPATHic Health outcomes In Chronic low back pain (OSTEOPATHIC) Trial.

### MAIN STUDY MEASURES:

The Outpatient Osteopathic SOAP Note Form was used to measure somatic dysfunction at baseline. A 100-mm visual analog scale was used to measure LBP severity over 12 weeks from randomization to study exit. Paired serum concentrations of tumor-necrosis factor (TNF)- $\alpha$  obtained at baseline and study exit were available for 6 subgroup patients.

## RESULTS:

Key osteopathic lesions were observed in 27 patients (79%) with diabetes mellitus vs 243 patients (58%) without diabetes mellitus ( $P=.01$ ). The reduction in LBP severity over 12 weeks was significantly greater in 19 patients with diabetes mellitus who received OMT than in 15 patients with diabetes mellitus who received sham OMT (mean between-group difference in changes in the visual analog scale pain score, -17 mm; 95% confidence interval [CI], -32 mm to -1 mm;  $P=.04$ ). This difference was clinically relevant (Cohen  $d=0.7$ ). A corresponding significantly greater reduction in TNF- $\alpha$  serum concentration was noted in patients with diabetes mellitus who received OMT, compared with those who received sham OMT (mean between-group difference, -6.6 pg/mL; 95% CI, -12.4 to -0.8 pg/mL;  $P=.03$ ). This reduction was also clinically relevant (Cohen  $d=2.7$ ). No significant changes in LBP severity or TNF- $\alpha$  serum concentration were associated with UST during the 12-week period.

## CONCLUSION:

Severe somatic dysfunction was present significantly more often in patients with diabetes mellitus than in patients without diabetes mellitus. Patients with diabetes mellitus who received OMT had significant reductions in LBP severity during the 12-week period. Decreased circulating levels of TNF- $\alpha$  may represent a possible mechanism for OMT effects in patients with diabetes mellitus. A larger clinical trial of patients with diabetes mellitus and comorbid chronic LBP is warranted to more definitively assess the efficacy and mechanisms of action of OMT in this population.

PMID: 23739758



<https://www.ncbi.nlm.nih.gov/pubmed/23739758>

## Osteopathic Manipulative Treatment Effect on Pain Relief and Quality of Life in Oncology Geriatric Patients: A Nonrandomized Controlled Clinical Trial.

Arienti C, Bosisio T, Ratti S, Miglioli R, Negrini S.

Integr Cancer Ther. 2018 Dec;17(4):1163-1171. doi: 10.1177/1534735418796954. Epub 2018 Aug 31.

### PURPOSE:

The aim of present study was to study the effect of osteopathic manipulation on pain relief and quality of life improvement in hospitalized oncology geriatric patients.

### METHODS:

A nonrandomized controlled clinical trial was performed in the Oncology Rehabilitation Unit, Milan, Italy, from September 2015 to March 2016. Twenty-three older cancer patients were enrolled and allocated in 2 experimental groups: the study group (OMT group, N = 12) underwent osteopathic manipulative treatment in addition to physiotherapy, and the control group (PT group, N = 12) underwent only physiotherapy. At enrollment (T0), 24 recruited oncology patients completed the sociodemographic forms and were evaluated for pain intensity and quality of life by an external examiner. All patients were reevaluated every week (T1, T2, T3, and T4) for pain intensity and at the end of the study treatment (T4) for quality of life. A standard level of significance was set at  $\alpha < .05$ .

### RESULTS:

The 2 groups did not significantly differ in age (  $P = .682$ ), body mass index (  $P = .413$ ), or gender (  $P = 1$ ). The osteopathic manipulative treatment added to physiotherapy produced a significant reduction in Numeric Rating Scale (NRS) scores both at T2 (  $P = .004$ ) and T4 (  $P = .002$ ). The difference in quality of life improvements between T0 and T4 was not statistically significant. NRS improved in the PT group at T4. Between-group analysis of NRS and quality of life with the Mann-Whitney test did not show any significant difference between the 2 treatments.

### CONCLUSIONS:

Our study showed a significant improvement in pain relief and a nonsignificant improvement in quality of life in hospitalized geriatric oncology patients during osteopathic manipulative treatment.

DOI: 10.1177/1534735418796954 | Epub 2018 Aug 31.

 <https://www.ncbi.nlm.nih.gov/pubmed/30168356>

## Effects of osteopathic manipulative treatment on patients with multiple sclerosis: A pilot study.

Porcari B, Russo M, Naro A, La Via C, Pullia M, Accorinti M, De Luca R, Calabrò RS.

Complement Ther Med. 2019 Apr;43:154-156. doi: 10.1016/j.ctim.2019.01.023. Epub 2019 Jan 30.

### OBJECTIVES:

To describe the effects of osteopathic manipulative treatment in patients affected by Multiple Sclerosis (MS).

### DESIGN AND SETTING:

This is a pilot study involving 20 MS patients attending the IRCCS Neurolesi "Bonino-Pulejo", Messina, Italy.

### INTERVENTION:

The clinical evaluation was performed before starting rehabilitation treatment (T0) and after 8 weeks of treatment (T1). The CG sample undergo a conventional rehabilitation training (CRT), 5 times/week for 60 min (for a total of 40 sessions), the EG performed the same CRT (but with a different frequency, i.e. 3 times/week, for a total of 24 sessions) and a specific OMT 2 times/week for 60 min (for a total of 16 sessions).

### MAIN OUTCOME MEASURES:

We analyzed the scores recorded in the following main scales: Expanded Disability Status Scale (EDSS), 10 m walking test (10mWT), Hamilton anxiety rating scale (HRS-A), and the Fatigue severity scale (FSS).

### RESULTS:

Our data showed a reduction in the FSS score for the EG ( $40 \pm 1,41$  at T0 vs  $37 \pm 2,32$  at T1;  $p = 0.04$ ) but not in the CG ( $41 \pm 2,41$  at T0 vs  $39 \pm 2,6$  at T1) with an intergroup difference  $p < 0.00$ . An improvement of HRS-A and 10mWT was also detected in the EG.

### CONCLUSIONS:

Our data raise idea that OMT might be useful in rehabilitative setting in MS patients, with particular regard to anxiety and fatigue.

DOI: 10.1016/j.ctim.2019.01.023 | Epub 2019 Jan 30.



<https://www.ncbi.nlm.nih.gov/pubmed/30935523>

## Cerebral Perfusion Changes After Osteopathic Manipulative Treatment: A Randomized Manual-Placebo-Controlled Trial.

Tamburella F, Piras F, Piras F, Spanò B, Tramontano M, Gili T.

Front Physiol. 2019 Apr 5;10:403. doi: 10.3389/fphys.2019.00403. eCollection 2019.

### ABSTRACT

Osteopathic Manipulative Treatment (OMT) is a therapeutic approach aimed at enhancing the body's self-regulation focusing on somatic dysfunctions correction. Despite evidence of OMT effectiveness, the underlying neurophysiological mechanisms, as well as blood perfusion effects, are still poorly understood. The study aim was to address OMT effects on cerebral blood flow (CBF) in asymptomatic young volunteers as measured by Magnetic Resonance Arterial Spin Labeling (ASL) method. Thirty blinded participants were randomized to OMT or placebo, and evaluated with an MRI protocol before manual intervention (T0), immediately after (T1), and 3 days later (T2). After T0 MRI, participants received 45 min of OMT, focused on correcting whole body somatic dysfunctions, or placebo manual treatment, consisting of passive touches in a protocolled order. After treatment, participants completed a de-blinding questionnaire about treatment perception. Results show significant differences due to treatment only for the OMT group (OMTg): perfusion decreased (compared to T0) in a cluster comprising the left posterior cingulate cortex (PCC) and the superior parietal lobule, while increased at T2 in the contralateral PCC. Furthermore, more than 60% of participants believed they had undergone OMT. The CBF modifications at T2 suggest that OMT produced immediate but reversible effects on CBF.

DOI: 10.3389/fphys.2019.00403.



<https://www.ncbi.nlm.nih.gov/pubmed/31024346>

## The immediate effect of osteopathic cervical spine mobilization on median nerve mechanosensitivity: A triple-blind, randomized, placebo-controlled trial.

Whelan G, Johnston R, Millward C, Edwards DJ.

J Bodyw Mov Ther. 2018 Apr;22(2):252-260. doi: 10.1016/j.jbmt.2017.05.009. Epub 2017 May 18.

### BACKGROUND:

Neurodynamics is a clinical medium for testing the mechanical sensitivity of peripheral nerves which innervate the tissues of both the upper and lower limb. Currently, there is paucity in the literature of neurodynamic testing in osteopathic research, and where there is research, these are often methodologically flawed, without the appropriate comparators, blinding and reliability testing.

### AIMS:

This study aimed to assess the physiological effects (measured through Range of Motion; ROM), of a commonly utilized cervical mobilization treatment during a neurodynamic test, with the appropriate methodology, i.e., compared against a control and sham. Specifically, this was to test whether cervical mobilization could reduce upper limb neural mechanical sensitivity.

### METHODOLOGY:

Thirty asymptomatic participants were assessed and randomly allocated to either a control, sham or mobilization group, where they were all given a neurodynamic test and ROM was assessed.

### RESULTS:

The results showed that the mobilization group had the greatest and most significant increase in ROM with Change-Left  $p < 0.05$  and Change-Right  $p < 0.05$  compared against the control group, and Change-Left  $p < 0.01$  and Change-Right  $p < 0.05$  compared against the sham group.

### CONCLUSIONS:

This study has highlighted that, as expected, cervical mobilization has an effect at reducing upper limb neural mechanical sensitivity. However, there may be other factors interacting with neural mechanosensitivity outside of somatic influences such as psychological expectation bias. Further research could utilize the methodology employed here, but with other treatment areas to help develop neural tissue research. In addition to this, further exploration of psychological factors should be made such as utilizing complex top-down cognitive processing theories such as the neuromatrix or categorization theories to help further understand cognitive biases such as the placebo effect, which is commonly ignored in osteopathic research, as well as other areas of science, and which would further complete a holistic perspective.

DOI: 10.1016/j.jbmt.2017.05.009.



<https://www.ncbi.nlm.nih.gov/pubmed/29861216>

**An evaluation of osteopathic treatment on psychological outcomes with patients suffering from chronic pain: A prospective observational cohort study collected through a health and well-being academy.**

Edwards DJ, Toutt C.

Health Psychol Open. 2018 May 10;5(1):2055102918774684. doi: 10.1177/2055102918774684. eCollection 2018 Jan-Jun.

**ABSTRACT**

Co-morbid mental health conditions such as anxiety, depression and fear avoidance are often associated with chronic pain. This novel study aimed to explore the impact of osteopathic treatment on several psychological outcome measures relating to anxiety, depression, mental health and fear avoidance for a chronic pain population receiving osteopathic treatment over a 2-week period. The findings show that there were significant reductions in anxiety, pain, mental health dysfunction and improvements in self-care. These results are promising, and it is suggested that now a full-scale randomised controlled trial should be conducted.

DOI: 10.1177/2055102918774684



<https://www.ncbi.nlm.nih.gov/pubmed/29780605>

## Osteopathic care for spinal complaints: A systematic literature review.

Verhaeghe N, Schepers J, van Dun P, Annemans L.

PLoS One. 2018 Nov 2;13(11):e0206284. doi: 10.1371/journal.pone.0206284. eCollection 2018.

### ABSTRACT

The aim of the current study was to evaluate the literature examining the impact of osteopathic care for spinal complaints. The bibliographic databases Medline (Pubmed), Web of Science, Embase, and PEDro were searched. In addition, a number of grey literature sources were searched. Only randomized controlled trials conducted in high-income Western countries were considered. Two authors independently screened the titles and abstracts. Primary outcomes included 'pain' and 'functional status', while secondary outcomes included 'medication use' and 'health status'. It was examined if differences existed related to the treatment protocol and geography (European vs. US studies). Study quality was assessed using the risk of bias tool of the Cochrane Back Review Group. Nineteen studies were included and qualitatively synthesized. Nine studies were from the US, followed by Germany with seven studies. The majority of studies (n = 13) focused on low back pain. In general, mixed findings related to the impact of osteopathic care on primary and secondary outcomes were observed. For the primary outcomes, a clear distinction between US and European studies was found, in favor of the latter ones. Studies were characterized by substantial methodological differences in sample sizes, number of treatments, control groups, and follow-up. In conclusion, there is some evidence suggesting that osteopathic care may be effective for people suffering from spinal complaints. Further studies with larger study samples and assessment of long-term impact are required to further increase the evidence-based knowledge of the potential of osteopathic care for individuals suffering from spinal complaints.

DOI: 10.1371/journal.pone.0206284.

 <https://www.ncbi.nlm.nih.gov/pubmed/30388155>

## Effects of Myofascial Release in Nonspecific Chronic Low Back Pain: A Randomized Clinical Trial.

Arguisuelas MD, Lisón JF, Sánchez-Zuriaga D, Martínez-Hurtado I, Doménech-Fernández J.

Spine (Phila Pa 1976). 2017 May 1;42(9):627-634. doi: 10.1097/BRS.0000000000001897.

### STUDY DESIGN:

Double-blind, randomized parallel sham-controlled trial with concealed allocation and intention-to treat analysis.

### OBJECTIVE:

To investigate the effects of an isolate myofascial release (MFR) protocol on pain, disability, and fear-avoidance beliefs in patients with chronic low back pain (CLBP).

### SUMMARY OF BACKGROUND DATA:

MFR is a form of manual medicine widely used by physiotherapists in the management of different musculoskeletal pathologies. Up to this moment, no previous studies have reported the effects of an isolated MFR treatment in patients with CLBP.

### METHODS:

Fifty-four participants, with nonspecific CLBP, were randomized to MFR group (n=27) receiving four sessions of myofascial treatment, each lasting 40 minutes, and to control group (n=27) receiving a sham MFR. Variables studied were pain measured by means Short Form McGill Pain Questionnaire (SF-MPQ) and visual analog scale (VAS), disability measured with Roland Morris Questionnaire, and fear-avoidance beliefs measured with Fear-Avoidance Beliefs Questionnaire.

### RESULTS:

Subjects receiving MFR displayed significant improvements in pain (SF-MPQ) (mean difference -7.8; 95% confidence interval [CI]: -14.5 to -1.1, P=0.023) and sensory SF-MPQ subscale (mean difference -6.1; 95% CI: -10.8 to -1.5, P=0.011) compared to the sham group, but no differences were found in VAS between groups. Disability and the

Fear-Avoidance Beliefs Questionnaire score also displayed a significant decrease in the MFR group ( $P < 0.05$ ) as compared to sham MFR.

## CONCLUSION:

MFR therapy produced a significant improvement in both pain and disability. Because the minimal clinically important differences in pain and disability are, however, included in the 95% CI, we cannot know whether this improvement is clinically relevant.

DOI: 10.1097/BRS.0000000000001897.



<https://www.ncbi.nlm.nih.gov/pubmed/28441294>

## Osteopathic Manipulative Treatment Including Specific Diaphragm Techniques Improves Pain and Disability in Chronic Nonspecific Low Back Pain: A Randomized Trial.

Martí-Salvador M, Hidalgo-Moreno L, Doménech-Fernández J, Lisón JF, Arguisuelas MD

Arch Phys Med Rehabil. 2018 Sep;99(9):1720-1729. doi: 10.1016/j.apmr.2018.04.022. Epub 2018 May 19..

### OBJECTIVE:

To investigate the effects of an osteopathic manipulative treatment (OMT), which includes a diaphragm intervention compared to the same OMT with a sham diaphragm intervention in chronic nonspecific low back pain (NS-CLBP).

### DESIGN:

Parallel group randomized controlled trial.

### SETTING:

Private and institutional health centers.

### PARTICIPANTS:

Participants (N=66) (18-60y) with a diagnosis of NS-CLBP lasting at least 3 months.

### INTERVENTIONS:

Participants were randomized to receive either an OMT protocol including specific diaphragm techniques (n=33) or the same OMT protocol with a sham diaphragm intervention (n=33), conducted in 5 sessions provided during 4 weeks.

### MAIN OUTCOME MEASURES:

The primary outcomes were pain (evaluated with the Short-Form McGill Pain Questionnaire [SF-MPQ] and the visual analog scale [VAS]) and disability (assessed with the Roland-Morris Questionnaire [RMQ] and the Oswestry Disability Index [ODI]). Secondary outcomes were fear-avoidance beliefs, level of anxiety and depression, and pain

catastrophization. All outcome measures were evaluated at baseline, at week 4, and at week 12.

## RESULTS:

A statistically significant reduction was observed in the experimental group compared to the sham group in all variables assessed at week 4 and at week 12 (SF-MPQ [mean difference -6.2; 95% confidence interval, -8.6 to -3.8]; VAS [mean difference -2.7; 95% confidence interval, -3.6 to -1.8]; RMQ [mean difference -3.8; 95% confidence interval, -5.4 to -2.2]; ODI [mean difference -10.6; 95% confidence interval, -14.9 to 6.3]). Moreover, improvements in pain and disability were clinically relevant.

## CONCLUSIONS:

An OMT protocol that includes diaphragm techniques produces significant and clinically relevant improvements in pain and disability in patients with NS-CLBP compared to the same OMT protocol using sham diaphragm techniques.

DOI: 10.1016/j.apmr.2018.04.022.



<https://www.ncbi.nlm.nih.gov/pubmed/29787734>

**The efficacy of manual therapy and exercise for different stages of non-specific low back pain: an update of systematic reviews. J Man Manip Ther. 2014 May;22(2):59-74.**

Hidalgo B, Detrembleur C, Hall T, Mahaudens P, Nielens H.

J Man Manip Ther. 2014 May;22(2):59-74. doi: 10.1179/2042618613Y.0000000041.

**METHOD:**

A systematic review of MT with a literature search covering the period of January 2000 to April 2013 was conducted by two independent reviewers according to Cochrane and PRISMA guidelines. A total of 360 studies were evaluated using qualitative criteria. Two stages of LBP were categorized; combined acute-subacute and chronic. Further sub-classification was made according to MT intervention: MT1 (manipulation); MT2 (mobilization and soft-tissue-techniques); and MT3 (MT1 combined with MT2). In each sub-category, MT could be combined or not with exercise or usual medical care (UMC). Consequently, quantitative evaluation criteria were applied to 56 eligible randomized controlled trials (RCTs), and hence 23 low-risk of bias RCTs were identified for review. Only studies providing new updated information (11/23 RCTs) are presented here.

**RESULTS:**

Acute-subacute LBP: STRONG-evidence in favour of MT1 when compared to sham for pain, function and health improvements in the short-term (1-3 months). MODERATE-evidence to support MT1 and MT3 combined with UMC in comparison to UMC alone for pain, function and health improvements in the short-term. Chronic LBP: MODERATE to STRONG-evidence in favour of MT1 in comparison to sham for pain, function and overall-health in the short-term. MODERATE-evidence in favour of MT3 combined with exercise or UMC in comparison to exercise and back-school was established for pain, function and quality-of-life in the short and long-term. LIMITED-evidence in favour of MT2 combined with exercise and UMC in comparison to UMC alone for pain and function from short to long-term. LIMITED-evidence of no effect for MT1 with extension-exercise compared to extension-exercise alone for pain in the short to long-term.

**CONCLUSION:**

This systematic review updates the evidence for MT with exercise or UMC for different stages of LBP and provides recommendations for future studies.

DOI: 10.1179/2042618613Y.0000000041



<https://www.ncbi.nlm.nih.gov/pubmed/24976749>

**Brain Mechanisms of Anticipated Painful Movements and Their Modulation by Manual Therapy in Chronic Low Back Pain. J Pain. 2018 Nov;19(11):1352-1365.**

Ellingsen DM, Napadow V, Protsenko E, Mawla I, Kowalski MH, Swensen D, O'Dwyer-Swensen D, Edwards RR, Kettner N, Loggia ML.

J Pain. 2018 Nov;19(11):1352-1365. doi: 10.1016/j.jpain.2018.05.012. Epub 2018 Jul 3.

## ABSTRACT

Heightened anticipation and fear of movement-related pain has been linked to detrimental fear-avoidance behavior in chronic low back pain (cLBP). Spinal manipulative therapy (SMT) has been proposed to work partly by exposing patients to nonharmful but forceful mobilization of the painful joint, thereby disrupting the relationship among pain anticipation, fear, and movement. Here, we investigated the brain processes underpinning pain anticipation and fear of movement in cLBP, and their modulation by SMT, using functional magnetic resonance imaging. Fifteen cLBP patients and 16 healthy control (HC) subjects were scanned while observing and rating video clips depicting back-straining or neutral physical exercises, which they knew they would have to perform at the end of the visit. This task was repeated after a single session of spinal manipulation (cLBP and HC group) or mobilization (cLBP group only), in separate visits. Compared with HC subjects, cLBP patients reported higher expected pain and fear of performing the observed exercises. These ratings, along with clinical pain, were reduced by SMT. Moreover, cLBP, relative to HC subjects, demonstrated higher blood oxygen level-dependent signal in brain circuitry that has previously been implicated in salience, social cognition, and mentalizing, while observing back straining compared with neutral exercises. The engagement of this circuitry was reduced after SMT, and especially the spinal manipulation session, proportionally to the magnitude of SMT-induced reduction in anticipated pain and fear. This study sheds light on the brain processing of anticipated pain and fear of back-straining movement in cLBP, and suggests that SMT may reduce cognitive and affective-motivational aspects of fear-avoidance behavior, along with corresponding brain processes.

## PERSPECTIVE:

This study of cLBP patients investigated how SMT affects clinical pain, expected pain,

and fear of physical exercises. The results indicate that one of the mechanisms of SMT may be to reduce pain expectancy, fear of movement, and associated brain responses.

DOI: 10.1016/j.jpain.2018.05.012 | PMID: 30392530 | PMCID: PMC6220681



<https://www.ncbi.nlm.nih.gov/pubmed/30392530>

## Effects of myofascial release in erector spinae myoelectric activity and lumbar spine kinematics in non-specific chronic low back pain: Randomized controlled trial.

Arguisuelas MD, Lisón JF, Doménech-Fernández J, Martínez-Hurtado I, Salvador Coloma P, Sánchez-Zuriaga D.

Clin Biomech (Bristol, Avon). 2019 Mar;63:27-33. doi: 10.1016/j.clinbiomech.2019.02.009. Epub 2019 Feb 14.

### BACKGROUND:

Flexion-relaxation response of the lumbar erector spinae has been previously studied after different interventions such as exercise programs or spinal manipulation, in subjects with chronic low back pain. The objective of the study was to investigate the effects of an isolated myofascial release protocol on erector spinae myoelectric activity and lumbar spine kinematics in chronic low back pain.

### METHODS:

Thirty-six participants, with nonspecific chronic low back pain, were randomized to myofascial release group (n = 18) receiving four sessions of myofascial treatment, each lasting 40 min, and to control group (n = 18) receiving a sham myofascial release. Electromyographic and kinematic variables as well as pain and disability questionnaires were analyzed.

### FINDINGS:

There was a bilateral reduction of the flexion relaxation ratio in individuals receiving myofascial release and who did not show myoelectric silence at baseline (right difference M = 0.34, 95% CI [0.16, 0.33],  $p \leq .05$  and left difference M = 0.45, 95% CI [0.16, 0.73],  $p \leq .05$ ). There was also a significant reduction in pain in the myofascial release group (difference M = -9.1, 95% CI [-16.3, -1.8],  $p \leq .05$ ) and disability (difference M = -5.6, 95% CI [-9.1, -2.1],  $p \leq .05$ ), compared with control group. No significant differences between groups were found for the kinematic variables.

### INTERPRETATION:

The myofascial release protocol contributed to the normalization of the flexion- relaxation response in individuals who did not show myoelectric silence before the intervention, and also showed a significant reduction in pain and disability compared with the sham group.

DOI: 10.1016/j.clinbiomech.2019.02.009.



<https://www.ncbi.nlm.nih.gov/pubmed/30784788>

## Effects of diaphragmatic myofascial release on gastroesophageal reflux disease: a preliminary randomized controlled trial.

Martínez-Hurtado I, Arguisuelas MD, Almela-Notari P, Cortés X, Barrasa-Shaw A, Campos-González JC, Lisón JF.

Sci Rep. 2019 May 13;9(1):7273. doi: 10.1038/s41598-019-43799-y.

### ABSTRACT

The purpose of this study is to investigate whether implementing a myofascial release (MFR) protocol designed to restore the myofascial properties of the diaphragm has any effect on the symptoms, quality of life, and consumption of proton pump inhibitors (PPI) drugs by patients with non-erosive gastroesophageal reflux disease (GERD). We randomized 30 patients with GERD into a MFR group or a sham group. Changes in symptomatology and quality of life were measured with the Reflux Disease Questionnaire and the Gastrointestinal Quality of Life Index. Need of PPIs was measured as the milligrams of drug intake over the 7 days prior to each assessment. All variables were assessed at baseline, one week and 4 weeks after the end of the treatment. At week 4, patients receiving MFR showed significant improvements in symptomatology (mean difference -1.1; 95% CI: -1.7 to -0.5), gastrointestinal quality of life (mean difference 18.1; 95% CI: 4.8 to 31.5), and PPIs use (mean difference -97 mg; 95% CI: -162 to -32), compared to the sham group. These preliminary findings indicate that the application of the MFR protocol we used in this study decreased the symptoms and PPIs usage and increased the quality of life of patients with non-erosive GERD up to four weeks after the end of the treatment.

DOI: 10.1038/s41598-019-43799-y.



<https://www.ncbi.nlm.nih.gov/pubmed/31086250>

**Physical Therapy Approaches in the Treatment of Low Back Pain. Pain Ther. 2018 Dec;7(2):127-137.**

Shipton EA.

Pain Ther. 2018 Dec;7(2):127-137. doi: 10.1007/s40122-018-0105-x. Epub 2018 Sep 18.

**ABSTRACT**

Globally, in 2016, low back pain (LBP) contributed 57.6 million of total years lived with disability. Low Back Pain Guidelines regularly recommend the use of physical exercise for non-specific LBP. Early non-pharmacological treatment is endorsed. This includes education and self-management, and the recommencement of normal activities and exercise, with the addition of psychological programs in those whose symptoms persist. The aim of physical treatments is to improve function and prevent disability from getting worse. There is no evidence available to show that one type of exercise is superior to another, and participation can be in a group or in an individual exercise program. Active strategies such as exercise are related to decreased disability. Passive methods (rest, medications) are associated with worsening disability, and are not recommended. The Danish, United States of America, and the United Kingdom Guidelines recommend the use of exercise on its own, or in combination with other non-pharmacological therapies. These include tai chi, yoga, massage, and spinal manipulation. Public health programs should educate the public on the prevention of low back pain. In chronic low back pain, the physical therapy exercise approach remains a first-line treatment, and should routinely be used.

DOI: 10.1007/s40122-018-0105-x



<https://www.ncbi.nlm.nih.gov/pubmed/30229473>

## Effectiveness of physical therapy on the suboccipital area of patients with tension-type headache: A meta-analysis of randomized controlled trials.

Jiang W, Li Z, Wei N, Chang W, Chen W, Sui HJ.

Medicine (Baltimore). 2019 May;98(19):e15487. doi: 10.1097/MD.00000000000015487.

### BACKGROUND:

There has been a lot of research on physical therapy for tension-type headaches. However, the efficacy of physical therapy on the suboccipital region remains unclear.

### OBJECTIVE:

To establish the effectiveness of physical therapy on the suboccipital area of patients with tension-type headache.

### METHODS:

Databases including Cochrane Library, Medline/Pubmed, CNKI, Embase, and Google Scholar were searched. After independent study selection by 2 authors, data were extracted and collected independently. On 1 hand, authors compared the treatment of the suboccipital area with control group. On the other hand, the efficacy of several physical therapy techniques on the suboccipital region was compared. The quality of the included studies was assessed using the Cochrane Handbook. RevMan 5.3 software was used for data analysis. The primary outcome measures were the cervical range of motion, the visual analog scale, and headache disability inventory.

### RESULTS:

Six randomized controlled trials with a total of 505 participants were included. Suboccipital soft-tissue inhibition technique (SIT)+occiput-atlas-axis global manipulation (OAA) was more effective than SIT in increasing craniocervical extension at 4 weeks post-treatment, the overall mean differences (MD) was 3.61, 95% confidence interval (CI) (0.89-6.34). There was no difference at 8 weeks post-treatment (MD 2.38, 95% CI -1.02 to 5.78,  $P=.17$ ). SIT was more effective than SIT+OAA in increasing cervical flexion at 4-week post-treatment (MD -3.36, 95% CI -6.65 to -0.05). SIT+OAA was more effective than SIT on decreasing intensity of pain at 4-week post-treatment (MD -0.91, 95%

CI -1.78 to -0.04), but no difference at 8-week (MD -0.43, 95% CI -1.18 to 0.33, P=.27). SIT+OAA was more effective than SIT in reducing the functional score of the headache disability inventory at 4-week post-treatment (MD -4.47, 95% CI -8.44 to -0.50). These results may indicate that the SIT+OAA combined therapy is more effective in short term (4-week), no major difference in longer term (8-week).

## CONCLUSION:

Combined therapy may be more suitable for the treatment of tension-type headache.

DOI: 10.1097/MD.00000000000015487.



<https://www.ncbi.nlm.nih.gov/pubmed/31083183>

## Effects of manual therapy on treatment duration and motor development in infants with severe nonsynostotic plagiocephaly: a randomised controlled pilot study.

Cabrera-Martos I, Valenza MC, Valenza-Demet G, Benítez-Feliponi A, Robles-Vizcaíno C, Ruiz-Extremera A.

Childs Nerv Syst. 2016 Nov;32(11):2211-2217. Epub 2016 Jul 27.

### PURPOSE:

Despite growing evidence regarding nonsynostotic plagiocephaly and their repercussions on motor development, there is little evidence to support the use of manual therapy as an adjuvant option. The aim of this study was to evaluate the effects of a therapeutic approach based on manual therapy as an adjuvant option on treatment duration and motor development in infants with severe nonsynostotic plagiocephaly.

### METHODS:

This is a randomised controlled pilot study. The study was conducted at a university hospital. Forty-six infants with severe nonsynostotic plagiocephaly (types 4-5 of the Argenta scale) referred to the Early Care and Monitoring Unit were randomly allocated to a control group receiving standard treatment (repositioning and an orthotic helmet) or to an experimental group treated with manual therapy added to standard treatment. Infants were discharged when the correction of the asymmetry was optimal taken into account the previous clinical characteristics. The outcome measures were treatment duration and motor development assessed with the Alberta Infant Motor Scale (AIMS) at baseline and at discharge.

### RESULTS:

Asymmetry after the treatment was minimal (type 0 or 1 according to the Argenta scale) in both groups. A comparative analysis showed that treatment duration was significantly shorter ( $p < 0.001$ ) in the experimental group ( $109.84 \pm 14.45$  days) compared to the control group ( $148.65 \pm 11.53$  days). The motor behaviour was normal (scores above the 16th percentile of the AIMS) in all the infants after the treatment.

### CONCLUSIONS:

Manual therapy added to standard treatment reduces the treatment duration in infants with severe nonsynostotic plagiocephaly.

DOI: 10.1007/s00381-016-3200-5 | PMID: 27465676



<https://www.ncbi.nlm.nih.gov/pubmed/27465676>

## Psychophysiological effects of massage-myofascial release after exercise: a randomized sham-control study.

Arroyo-Morales M, Olea N, Martínez MM, Hidalgo-Lozano A, Ruiz-Rodríguez C, Díaz-Rodríguez L.

J Altern Complement Med. 2008 Dec;14(10):1223-9. doi: 10.1089/acm.2008.0253.

### OBJECTIVE:

The aim of this study was to evaluate the effect of massage on neuromuscular recruitment, mood state, and mechanical nociceptive threshold (MNT) after high-intensity exercise.

### DESIGN:

This was a prospective randomized clinical trial using between-groups design.

### SETTING:

The study was conducted at a university-based sports medicine clinic.

### PARTICIPANTS:

Sixty-two (62) healthy active students age 18-26 participated.

### INTERVENTIONS:

Participants, randomized into two groups, performed three 30-second Wingate tests and immediately received whole-body massage-myofascial induction or placebo (sham ultrasound/magnetotherapy) treatment. The duration (40 minutes), position, and the rapist were the same for both treatments.

### MAIN OUTCOME MEASURES:

Dependent variables were surface electromyography (sEMG) of quadriceps, profile of mood states (POMS) and mechanical nociceptive threshold (MNT) of trapezius and masseter muscles. These data were assessed at baseline and after exercise and recovery periods.

## RESULTS:

Generalized estimating equations models were performed on dependent variables to assess differences between groups. Significant differences were found in effects of treatment on sEMG of Vastus Medialis (VM) ( $p = 0.02$ ) and vigor subscale ( $p = 0.04$ ). After the recovery period, there was a significant decrease in electromyographic (EMG) activity of VM ( $p = 0.02$ ) in the myofascial-release group versus a nonsignificant increase in the placebo group ( $p = 0.32$ ), and a decrease in vigor ( $p < 0.01$ ) in the massage group versus no change in the placebo group ( $p = 0.86$ ).

## CONCLUSIONS:

Massage reduces EMG amplitude and vigor when applied as a passive recovery technique after a high-intensity exercise protocol. Massage may induce a transient loss of muscle strength or a change in the muscle fiber tension-length relationship, influenced by alterations of muscle function and a psychological state of relaxation.

DOI: 10.1089/acm.2008.0253. | PMID: 19123877



<https://www.ncbi.nlm.nih.gov/pubmed/19123877>

## Effects of Cervical High-Velocity Low-Amplitude Techniques on Range of Motion, Strength Performance, and Cardiovascular Outcomes: A Review.

Galindez-Ibarbengoetxea X, Setuain I, Andersen LL, Ramírez-Velez R, González-Izal M, Jauregi A, Izquierdo M.

J Altern Complement Med. 2017 Sep;23(9):667-675. doi: 10.1089/acm.2017.0002. Epub 2017 Jul 21.

### BACKGROUND:

Cervical high-velocity low-amplitude (HVLA) manipulation technique is among the oldest and most frequently used chiropractic manual therapy, but the physiologic and biomechanics effects were not completely clear.

### OBJECTIVE:

This review aims to describe the effects of cervical HVLA manipulation techniques on range of motion, strength, and cardiovascular performance.

### METHODS/DESIGN:

A systematic search was conducted of the electronic databases from January 2000 to August 2016: PubMed (n = 131), ScienceDirect (n = 101), Scopus (n = 991), PEDro (n = 33), CINAHL (n = 884), and SciELO (n = 5). Two independent reviewers conducted the screening process to determine article eligibility. The intervention that included randomized controlled trials was thrust, or HVLA, manipulative therapy directed to the cervical spine. Methodological quality was assessed using the Cochrane risk-of-bias tool. The initial search rendered 2145 articles. After screening titles and abstracts, 11 articles remained for full-text review.

### RESULTS:

The review shows that cervical HVLA manipulation treatment results in a large effect size ( $d > 0.80$ ) on increasing cervical range of motion and mouth opening. In patients with lateral epicondylalgia, cervical HVLA manipulation resulted in increased pain-free handgrip strength, with large effect sizes (1.44 and 0.78, respectively). Finally, in subjects with hypertension the blood pressure seemed to decrease after cervical HVLA

manipulation. Higher quality studies are needed to develop a stronger evidence-based foundation for HVLA manipulation techniques as a treatment for cervical conditions.

DOI: 10.1089/acm.2017.0002. | Epub 2017 Jul 21.



<https://www.ncbi.nlm.nih.gov/pubmed/28731832>

# Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomised controlled trials

Sidney M Rubinstein

BMJ 2019; 364 doi: <https://doi.org/10.1136/bmj.l689> (Published 13 March 2019) Cite this as: BMJ 2019;364:l689

## OBJECTIVE

To assess the benefits and harms of spinal manipulative therapy (SMT) for the treatment of chronic low back pain.

## DESIGN

Systematic review and meta-analysis of randomised controlled trials.

Data sources Medline, PubMed, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL, Physiotherapy Evidence Database (PEDro), Index to Chiropractic Literature, and trial registries up to 4 May 2018, including reference lists of eligible trials and related reviews.

Eligibility criteria for selecting studies Randomised controlled trials examining the effect of spinal manipulation or mobilisation in adults ( $\geq 18$  years) with chronic low back pain with or without referred pain. Studies that exclusively examined sciatica were excluded, as was grey literature. No restrictions were applied to language or setting.

## REVIEW METHODS

Two reviewers independently selected studies, extracted data, and assessed risk of bias and quality of the evidence. The effect of SMT was compared with recommended therapies, non-recommended therapies, sham (placebo) SMT, and SMT as an adjuvant therapy. Main outcomes were pain and back specific functional status, examined as mean differences and standardised mean differences (SMD), respectively. Outcomes were examined at 1, 6, and 12 months. Quality of evidence was assessed using GRADE. A random effects model was used and statistical heterogeneity explored.

## RESULTS

47 randomised controlled trials including a total of 9211 participants were identified, who were on average middle aged (35-60 years). Most trials compared SMT with recommended therapies. Moderate quality evidence suggested that SMT has similar effects to other recommended therapies for short term pain relief (mean difference  $-3.17$ , 95% confidence interval  $-7.85$  to  $1.51$ ) and a small, clinically better improvement in function (SMD  $-0.25$ , 95% confidence interval  $-0.41$  to  $-0.09$ ). High quality evidence suggested that compared with non-recommended therapies SMT results in small, not clinically better effects for short term pain relief (mean difference  $-7.48$ ,  $-11.50$  to  $-3.47$ ) and small to moderate clinically better improvement in function (SMD  $-0.41$ ,  $-0.67$  to  $-0.15$ ). In general, these results were similar for the intermediate and long term outcomes as were the effects of SMT as an adjuvant therapy. Evidence for sham SMT was low to very low quality; therefore these effects should be considered uncertain. Statistical heterogeneity could not be explained. About half of the studies examined adverse and serious adverse events, but in most of these it was unclear how and whether these events were registered systematically. Most of the observed adverse events were musculoskeletal related, transient in nature, and of mild to moderate severity. One study with a low risk of selection bias and powered to examine risk ( $n=183$ ) found no increased risk of an adverse event (relative risk  $1.24$ , 95% confidence interval  $0.85$  to  $1.81$ ) or duration of the event ( $1.13$ ,  $0.59$  to  $2.18$ ) compared with sham SMT. In one study, the Data Safety Monitoring Board judged one serious adverse event to be possibly related to SMT.

## CONCLUSION

SMT produces similar effects to recommended therapies for chronic low back pain, whereas SMT seems to be better than non-recommended interventions for improvement in function in the short term. Clinicians should inform their patients of the potential risks of adverse events associated with SMT.

DOI: <https://doi.org/10.1136/bmj.l689>



<https://www.bmj.com/content/bmj/364/bmj.l689.full.pdf>

## Osteopathic care for low back pain and neck pain: A cost-utility analysis.

Verhaeghe N, Schepers J, van Dun P, Annemans L.

Complement Ther Med. 2018 Oct;40:207-213. doi: 10.1016/j.ctim.2018.06.001. Epub 2018 Jun 9.

### OBJECTIVES:

The aim was to examine the health and economic consequences of osteopathic care for low back pain and neck pain in addition to usual care compared to usual care alone.

### DESIGN:

A decision tree model considering a one-year time horizon was applied. The analysis occurred from a health insurance perspective only considering direct medical costs. The health effects were expressed as quality-adjusted life years (QALYs).

### MAIN OUTCOMES:

The main outcome was the incremental cost-effectiveness ratio (ICER). The uncertainty around key input parameters was addressed applying one-way and probabilistic sensitivity analyses (5000 simulations).

### RESULTS:

For low back pain, osteopathy resulted in cost savings (€385.1 vs €501.8/patient) at improved QALYs (0.666 vs. 0.614) compared to usual care. For neck pain, osteopathy resulted in additional costs (€577.3 vs. €521.0) and improved QALYs (0.639 vs. 0.609) resulting in an ICER of €1,870/QALY. The one-way sensitivity analysis identified the hospitalization cost (back) and osteopathy cost (neck) as major cost drivers. The probabilistic sensitivity analysis resulted in an average net saving of €163 (95%CI-€260, -€49.1) and a QALY gain of 0.06 (95%CI -0.06, 0.17) for low back pain and an average additional cost of €55.1 (95%CI €20.9, €129) and improved QALY gain of 0.03 (95%CI-0.06, 0.12) for neck pain.

## CONCLUSIONS:

Osteopathy was found to be a 'dominant' (low back pain) and cost-effective strategy (neck pain) compared to usual care. Further health economic evaluation studies considering a broader range of cost items and longer time horizon are required.

DOI: 10.1016/j.ctim.2018.06.001.



<https://www.ncbi.nlm.nih.gov/pubmed/30219451>

## Ultrasound Evaluation of Diaphragmatic Mobility and Contractility After Osteopathic Manipulative Techniques in Healthy Volunteers: A Prospective, Randomized, Double-Blinded Clinical Trial.

Mancini D, Cesari M, Lunghi C, Benigni AM, Antonelli Incalzi R, Scarlata S.

J Manipulative Physiol Ther. 2019 Jan;42(1):47-54. doi: 10.1016/j.jmpt.2018.08.001. Epub 2019 Apr 5.

### OBJECTIVE:

The purpose of this study was to investigate the effect of a session of osteopathic manipulative techniques on diaphragmatic motion and thickness in healthy participants.

### METHODS:

This was a prospective, randomized, double-blinded, case vs sham vs control clinical trial performed in an outpatient osteopathic clinic in Rome, Italy. Sixty-seven healthy participants, mean age  $40.4 \pm 14.5$  years, received an ultrasound evaluation of diaphragmatic motion and thickness, followed by a systematic osteopathic evaluation. After randomization, the experimental group ( $n = 22$ ) received osteopathic manipulation, whereas the sham ( $n = 22$ ) and the control ( $n = 22$ ) groups had a light touch approach and simple observation, respectively. After a 1-session intervention, new osteopathic and ultrasound assessments were repeated in all participants.

### RESULTS:

A statistically significant increase in diaphragmatic mobility was observed in the experimental group after the osteopathic manipulation ( $\Delta = 14.5$  mm,  $P < .001$ ; analysis of variance  $P < .001$  vs both sham:  $\Delta = -0.22$  mm, and control:  $\Delta = -2.09$  mm groups). A strong linear relationship was observed between the diaphragmatic motion gradient, measured with ultrasonography, and the score assigned by the operator evaluating the change of diaphragm mobility after intervention.

### CONCLUSION:

Osteopathic techniques used in this study improved the diaphragmatic motion (but not the muscle thickness) in healthy participants. Further studies are needed to confirm

our findings and eventually identify the clinical conditions that may benefit from osteopathic manipulative treatment of the diaphragm.

DOI : 10.1016/j.jmpt.2018.08.001.



<https://www.ncbi.nlm.nih.gov/pubmed/30955907>

## The Impact of Spinal Manipulation on Migraine Pain and Disability: A Systematic Review and Meta-Analysis.

Rist PM, Hernandez A, Bernstein C, Kowalski M, Osypiuk K, Vining R, Long CR, Goertz C, Song R, Wayne PM.

Headache. 2019 Apr;59(4):532-542. doi: 10.1111/head.13501. Epub 2019 Mar 14.

### BACKGROUND:

Several small studies have suggested that spinal manipulation may be an effective treatment for reducing migraine pain and disability. We performed a systematic review and meta-analysis of published randomized clinical trials (RCTs) to evaluate the evidence regarding spinal manipulation as an alternative or integrative therapy in reducing migraine pain and disability.

### METHODS:

PubMed and the Cochrane Library databases were searched for clinical trials that evaluated spinal manipulation and migraine-related outcomes through April 2017. Search terms included: migraine, spinal manipulation, manual therapy, chiropractic, and osteopathic. Meta-analytic methods were employed to estimate the effect sizes (Hedges'  $g$ ) and heterogeneity ( $I^2$ ) for migraine days, pain, and disability. The methodological quality of retrieved studies was examined following the Cochrane Risk of Bias Tool.

### RESULTS:

Our search identified 6 RCTs (pooled  $n = 677$ ; range of  $n = 42-218$ ) eligible for meta-analysis. Intervention duration ranged from 2 to 6 months; outcomes included measures of migraine days (primary outcome), migraine pain/intensity, and migraine disability. Methodological quality varied across the studies. For example, some studies received high or unclear bias scores for methodological features such as compliance, blinding, and completeness of outcome data. Due to high levels of heterogeneity when all 6 studies were included in the meta-analysis, the 1 RCT performed only among chronic migraineurs was excluded. Heterogeneity across the remaining studies was low. We observed that spinal manipulation reduced migraine days with an overall small effect size (Hedges'  $g = -0.35$ , 95% CI:  $-0.53, -0.16$ ,  $P < .001$ ) as well as migraine pain/intensity.

## CONCLUSIONS:

Spinal manipulation may be an effective therapeutic technique to reduce migraine days and pain/intensity. However, given the limitations to studies included in this meta-analysis, we consider these results to be preliminary. Methodologically rigorous, large-scale RCTs are warranted to better inform the evidence base for spinal manipulation as a treatment for migraine.

DOI: 10.1111/head.13501.



<https://www.ncbi.nlm.nih.gov/pubmed/30973196>

## Osteopathic manual treatment in patients with diabetes mellitus and comorbid chronic low back pain: subgroup results from the OSTEOPATHIC Trial.

Licciardone JC, Kearns CM, Hodge LM, Minotti DE.

J Am Osteopath Assoc. 2013 Jun;113(6):468-78.

### CONTEXT:

Chronic pain is often present in patients with diabetes mellitus.

### OBJECTIVE:

To assess the effects of osteopathic manual treatment (OMT) in patients with diabetes mellitus and comorbid chronic low back pain (LBP).

### DESIGN:

Randomized, double-blind, sham-controlled, 2×2 factorial trial, including OMT and ultrasound therapy (UST) interventions.

### SETTING:

University-based study in Dallas-Fort Worth, Texas.

### PATIENTS:

A subgroup of 34 patients (7%) with diabetes mellitus within 455 adult patients with nonspecific chronic LBP enrolled in the OSTEOPATHic Health outcomes In Chronic low back pain (OSTEOPATHIC) Trial.

### MAIN STUDY MEASURES:

The Outpatient Osteopathic SOAP Note Form was used to measure somatic dysfunction at baseline. A 100-mm visual analog scale was used to measure LBP severity over 12 weeks from randomization to study exit. Paired serum concentrations of tumor-necrosis factor (TNF)- $\alpha$  obtained at baseline and study exit were available for 6 subgroup patients.

## RESULTS:

Key osteopathic lesions were observed in 27 patients (79%) with diabetes mellitus vs 243 patients (58%) without diabetes mellitus ( $P=.01$ ). The reduction in LBP severity over 12 weeks was significantly greater in 19 patients with diabetes mellitus who received OMT than in 15 patients with diabetes mellitus who received sham OMT (mean between-group difference in changes in the visual analog scale pain score, -17 mm; 95% confidence interval [CI], -32 mm to -1 mm;  $P=.04$ ). This difference was clinically relevant (Cohen  $d=0.7$ ). A corresponding significantly greater reduction in TNF- $\alpha$  serum concentration was noted in patients with diabetes mellitus who received OMT, compared with those who received sham OMT (mean between-group difference, -6.6 pg/mL; 95% CI, -12.4 to -0.8 pg/mL;  $P=.03$ ). This reduction was also clinically relevant (Cohen  $d=2.7$ ). No significant changes in LBP severity or TNF- $\alpha$  serum concentration were associated with UST during the 12-week period.

## CONCLUSION:

Severe somatic dysfunction was present significantly more often in patients with diabetes mellitus than in patients without diabetes mellitus. Patients with diabetes mellitus who received OMT had significant reductions in LBP severity during the 12-week period. Decreased circulating levels of TNF- $\alpha$  may represent a possible mechanism for OMT effects in patients with diabetes mellitus. A larger clinical trial of patients with diabetes mellitus and comorbid chronic LBP is warranted to more definitively assess the efficacy and mechanisms of action of OMT in this population.

PMID: 23739758



<https://www.ncbi.nlm.nih.gov/pubmed/23739758>

## Osteopathic Manipulative Treatment Effect on Pain Relief and Quality of Life in Oncology Geriatric Patients: A Nonrandomized Controlled Clinical Trial.

Arienti C, Bosisio T, Ratti S, Miglioli R, Negrini S.

Integr Cancer Ther. 2018 Dec;17(4):1163-1171. doi: 10.1177/1534735418796954. Epub 2018 Aug 31.

### PURPOSE:

The aim of present study was to study the effect of osteopathic manipulation on pain relief and quality of life improvement in hospitalized oncology geriatric patients.

### METHODS:

A nonrandomized controlled clinical trial was performed in the Oncology Rehabilitation Unit, Milan, Italy, from September 2015 to March 2016. Twenty-three older cancer patients were enrolled and allocated in 2 experimental groups: the study group (OMT group, N = 12) underwent osteopathic manipulative treatment in addition to physiotherapy, and the control group (PT group, N = 12) underwent only physiotherapy. At enrollment (T0), 24 recruited oncology patients completed the sociodemographic forms and were evaluated for pain intensity and quality of life by an external examiner. All patients were reevaluated every week (T1, T2, T3, and T4) for pain intensity and at the end of the study treatment (T4) for quality of life. A standard level of significance was set at  $\alpha < .05$ .

### RESULTS:

The 2 groups did not significantly differ in age (  $P = .682$ ), body mass index (  $P = .413$ ), or gender (  $P = 1$ ). The osteopathic manipulative treatment added to physiotherapy produced a significant reduction in Numeric Rating Scale (NRS) scores both at T2 (  $P = .004$ ) and T4 (  $P = .002$ ). The difference in quality of life improvements between T0 and T4 was not statistically significant. NRS improved in the PT group at T4. Between-group analysis of NRS and quality of life with the Mann-Whitney test did not show any significant difference between the 2 treatments.

### CONCLUSIONS:

Our study showed a significant improvement in pain relief and a nonsignificant improvement in quality of life in hospitalized geriatric oncology patients during osteopathic manipulative treatment.

DOI: 10.1177/1534735418796954.



<https://www.ncbi.nlm.nih.gov/pubmed/30168356>

## Effects of osteopathic manipulative treatment on patients with multiple sclerosis: A pilot study.

Porcari B, Russo M, Naro A, La Via C, Pullia M, Accorinti M, De Luca R, Calabrò RS.

Complement Ther Med. 2019 Apr;43:154-156. doi: 10.1016/j.ctim.2019.01.023. Epub 2019 Jan 30.

### OBJECTIVES:

To describe the effects of osteopathic manipulative treatment in patients affected by Multiple Sclerosis (MS).

### DESIGN AND SETTING:

This is a pilot study involving 20 MS patients attending the IRCCS Neurolesi "Bonino-Pulejo", Messina, Italy.

### INTERVENTION:

The clinical evaluation was performed before starting rehabilitation treatment (T0) and after 8 weeks of treatment (T1). The CG sample undergo a conventional rehabilitation training (CRT), 5 times/week for 60 min (for a total of 40 sessions), the EG performed the same CRT (but with a different frequency, i.e. 3 times/week, for a total of 24 sessions) and a specific OMT 2 times/week for 60 min (for a total of 16 sessions).

### MAIN OUTCOME MEASURES:

We analyzed the scores recorded in the following main scales: Expanded Disability Status Scale (EDSS), 10 m walking test (10mWT), Hamilton anxiety rating scale (HRS-A), and the Fatigue severity scale (FSS).

### RESULTS:

Our data showed a reduction in the FSS score for the EG ( $40 \pm 1,41$  at T0 vs  $37 \pm 2,32$  at T1;  $p = 0.04$ ) but not in the CG ( $41 \pm 2,41$  at T0 vs  $39 \pm 2,6$  at T1) with an intergroup difference  $p < 0.00$ . An improvement of HRS-A and 10mWT was also detected in the EG.

### CONCLUSIONS:

Our data raise idea that OMT might be useful in rehabilitative setting in MS patients, with particular regard to anxiety and fatigue.

DOI: 10.1016/j.ctim.2019.01.023.



<https://www.ncbi.nlm.nih.gov/pubmed/30935523>

## Cerebral Perfusion Changes After Osteopathic Manipulative Treatment: A Randomized Manual Placebo-Controlled Trial.

Tamburella F, Piras F, Piras F, Spanò B, Tramontano M, Gili T.

Front Physiol. 2019 Apr 5;10:403. doi: 10.3389/fphys.2019.00403. eCollection 2019.

### ABSTRACT

Osteopathic Manipulative Treatment (OMT) is a therapeutic approach aimed at enhancing the body's self-regulation focusing on somatic dysfunctions correction. Despite evidence of OMT effectiveness, the underlying neurophysiological mechanisms, as well as blood perfusion effects, are still poorly understood. The study aim was to address OMT effects on cerebral blood flow (CBF) in asymptomatic young volunteers as measured by Magnetic Resonance Arterial Spin Labeling (ASL) method. Thirty blinded participants were randomized to OMT or placebo, and evaluated with an MRI protocol before manual intervention (T0), immediately after (T1), and 3 days later (T2). After T0 MRI, participants received 45 min of OMT, focused on correcting whole body somatic dysfunctions, or placebo manual treatment, consisting of passive touches in a protocolled order. After treatment, participants completed a de-blinding questionnaire about treatment perception. Results show significant differences due to treatment only for the OMT group (OMTg): perfusion decreased (compared to T0) in a cluster comprising the left posterior cingulate cortex (PCC) and the superior parietal lobule, while increased at T2 in the contralateral PCC. Furthermore, more than 60% of participants believed they had undergone OMT. The CBF modifications at T2 suggest that OMT produced immediate but reversible effects on CBF.

DOI: 10.3389/fphys.2019.00403.



<https://www.ncbi.nlm.nih.gov/pubmed/31024346>

## The immediate effect of osteopathic cervical spine mobilization on median nerve mechanosensitivity: A triple-blind, randomized, placebo-controlled trial.

Whelan G, Johnston R, Millward C, Edwards DJ.

J Bodyw Mov Ther. 2018 Apr;22(2):252-260. doi: 10.1016/j.jbmt.2017.05.009. Epub 2017 May 18.

### BACKGROUND:

Neurodynamics is a clinical medium for testing the mechanical sensitivity of peripheral nerves which innervate the tissues of both the upper and lower limb. Currently, there is paucity in the literature of neurodynamic testing in osteopathic research, and where there is research, these are often methodologically flawed, without the appropriate comparators, blinding and reliability testing.

### AIMS:

This study aimed to assess the physiological effects (measured through Range of Motion; ROM), of a commonly utilized cervical mobilization treatment during a neurodynamic test, with the appropriate methodology, i.e., compared against a control and sham. Specifically, this was to test whether cervical mobilization could reduce upper limb neural mechanical sensitivity.

### METHODOLOGY:

Thirty asymptomatic participants were assessed and randomly allocated to either a control, sham or mobilization group, where they were all given a neurodynamic test and ROM was assessed.

### RESULTS:

The results showed that the mobilization group had the greatest and most significant increase in ROM with Change-Left  $p < 0.05$  and Change-Right  $p < 0.05$  compared against the control group, and Change-Left  $p < 0.01$  and Change-Right  $p < 0.05$  compared against the sham group.

### CONCLUSIONS:

This study has highlighted that, as expected, cervical mobilization has an effect at reducing upper limb neural mechanical sensitivity. However, there may be other factors interacting with neural mechanosensitivity outside of somatic influences such as psychological expectation bias. Further research could utilize the methodology employed here, but with other treatment areas to help develop neural tissue research. In addition to this, further exploration of psychological factors should be made such as utilizing complex top-down cognitive processing theories such as the neuromatrix or categorization theories to help further understand cognitive biases such as the placebo effect, which is commonly ignored in osteopathic research, as well as other areas of science, and which would further complete a holistic perspective.

DOI: 10.1016/j.jbmt.2017.05.009.

 <https://www.ncbi.nlm.nih.gov/pubmed/29861216>

**An evaluation of osteopathic treatment on psychological outcomes with patients suffering from chronic pain: A prospective observational cohort study collected through a health and well-being academy.**

Edwards DJ, Toutt C.

Health Psychol Open. 2018 May 10;5(1):2055102918774684. doi: 10.1177/2055102918774684. eCollection 2018 Jan-Jun.

**ABSTRACT**

Co-morbid mental health conditions such as anxiety, depression and fear avoidance are often associated with chronic pain. This novel study aimed to explore the impact of osteopathic treatment on several psychological outcome measures relating to anxiety, depression, mental health and fear avoidance for a chronic pain population receiving osteopathic treatment over a 2-week period. The findings show that there were significant reductions in anxiety, pain, mental health dysfunction and improvements in self-care. These results are promising, and it is suggested that now a full-scale randomised controlled trial should be conducted.

DOI: 10.1177/2055102918774684.



<https://www.ncbi.nlm.nih.gov/pubmed/29780605>

## Osteopathic care for spinal complaints: A systematic literature review.

Verhaeghe N, Schepers J, van Dun P, Annemans L.

PLoS One. 2018 Nov 2;13(11):e0206284. doi: 10.1371/journal.pone.0206284. eCollection 2018.

### ABSTRACT

The aim of the current study was to evaluate the literature examining the impact of osteopathic care for spinal complaints. The bibliographic databases Medline (Pubmed), Web of Science, Embase, and PEDro were searched. In addition, a number of grey literature sources were searched. Only randomized controlled trials conducted in high-income Western countries were considered. Two authors independently screened the titles and abstracts. Primary outcomes included 'pain' and 'functional status', while secondary outcomes included 'medication use' and 'health status'. It was examined if differences existed related to the treatment protocol and geography (European vs. US studies). Study quality was assessed using the risk of bias tool of the Cochrane Back Review Group. Nineteen studies were included and qualitatively synthesized. Nine studies were from the US, followed by Germany with seven studies. The majority of studies (n = 13) focused on low back pain. In general, mixed findings related to the impact of osteopathic care on primary and secondary outcomes were observed. For the primary outcomes, a clear distinction between US and European studies was found, in favor of the latter ones. Studies were characterized by substantial methodological differences in sample sizes, number of treatments, control groups, and follow-up. In conclusion, there is some evidence suggesting that osteopathic care may be effective for people suffering from spinal complaints. Further studies with larger study samples and assessment of long-term impact are required to further increase the evidence-based knowledge of the potential of osteopathic care for individuals suffering from spinal complaints.

DOI: 10.1371/journal.pone.0206284.

 <https://www.ncbi.nlm.nih.gov/pubmed/30388155>

## Effects of Myofascial Release in Nonspecific Chronic Low Back Pain: A Randomized Clinical Trial.

Arguisuelas MD, Lisón JF, Sánchez-Zuriaga D, Martínez-Hurtado I, Doménech-Fernández J.

Spine (Phila Pa 1976). 2017 May 1;42(9):627-634. doi: 10.1097/BRS.0000000000001897.

### STUDY DESIGN:

Double-blind, randomized parallel sham-controlled trial with concealed allocation and intention-to treat analysis.

### OBJECTIVE:

To investigate the effects of an isolate myofascial release (MFR) protocol on pain, disability, and fear-avoidance beliefs in patients with chronic low back pain (CLBP).

### SUMMARY OF BACKGROUND DATA:

MFR is a form of manual medicine widely used by physiotherapists in the management of different musculoskeletal pathologies. Up to this moment, no previous studies have reported the effects of an isolated MFR treatment in patients with CLBP.

### METHODS:

Fifty-four participants, with nonspecific CLBP, were randomized to MFR group (n=27) receiving four sessions of myofascial treatment, each lasting 40 minutes, and to control group (n=27) receiving a sham MFR. Variables studied were pain measured by means Short Form McGill Pain Questionnaire (SF-MPQ) and visual analog scale (VAS), disability measured with Roland Morris Questionnaire, and fear-avoidance beliefs measured with Fear-Avoidance Beliefs Questionnaire.

### RESULTS:

Subjects receiving MFR displayed significant improvements in pain (SF-MPQ) (mean difference -7.8; 95% confidence interval [CI]: -14.5 to -1.1, P=0.023) and sensory SF-MPQ subscale (mean difference -6.1; 95% CI: -10.8 to -1.5, P=0.011) compared to the sham group, but no differences were found in VAS between groups. Disability and the

Fear-Avoidance Beliefs Questionnaire score also displayed a significant decrease in the MFR group ( $P < 0.05$ ) as compared to sham MFR.

## CONCLUSION:

MFR therapy produced a significant improvement in both pain and disability. Because the minimal clinically important differences in pain and disability are, however, included in the 95% CI, we cannot know whether this improvement is clinically relevant.

DOI: 10.1097/BRS.0000000000001897.



<https://www.ncbi.nlm.nih.gov/pubmed/28441294>

## Osteopathic Manipulative Treatment Including Specific Diaphragm Techniques Improves Pain and Disability in Chronic Nonspecific Low Back Pain: A Randomized Trial.

Martí-Salvador M, Hidalgo-Moreno L, Doménech-Fernández J, Lisón JF, Arguisuelas MD.

Arch Phys Med Rehabil. 2018 Sep;99(9):1720-1729. doi: 10.1016/j.apmr.2018.04.022. Epub 2018 May 19.

### OBJECTIVE:

To investigate the effects of an osteopathic manipulative treatment (OMT), which includes a diaphragm intervention compared to the same OMT with a sham diaphragm intervention in chronic nonspecific low back pain (NS-CLBP).

### DESIGN:

Parallel group randomized controlled trial.

### SETTING:

Private and institutional health centers.

### PARTICIPANTS:

Participants (N=66) (18-60y) with a diagnosis of NS-CLBP lasting at least 3 months.

### INTERVENTIONS:

Participants were randomized to receive either an OMT protocol including specific diaphragm techniques (n=33) or the same OMT protocol with a sham diaphragm intervention (n=33), conducted in 5 sessions provided during 4 weeks.

### MAIN OUTCOME MEASURES:

The primary outcomes were pain (evaluated with the Short-Form McGill Pain Questionnaire [SF-MPQ] and the visual analog scale [VAS]) and disability (assessed with the Roland-Morris Questionnaire [RMQ] and the Oswestry Disability Index [ODI]). Secondary outcomes were fear-avoidance beliefs, level of anxiety and depression, and pain

catastrophization. All outcome measures were evaluated at baseline, at week 4, and at week 12.

## RESULTS:

A statistically significant reduction was observed in the experimental group compared to the sham group in all variables assessed at week 4 and at week 12 (SF-MPQ [mean difference -6.2; 95% confidence interval, -8.6 to -3.8]; VAS [mean difference -2.7; 95% confidence interval, -3.6 to -1.8]; RMQ [mean difference -3.8; 95% confidence interval, -5.4 to -2.2]; ODI [mean difference -10.6; 95% confidence interval, -14.9 to 6.3]). Moreover, improvements in pain and disability were clinically relevant.

## CONCLUSIONS:

An OMT protocol that includes diaphragm techniques produces significant and clinically relevant improvements in pain and disability in patients with NS-CLBP compared to the same OMT protocol using sham diaphragm techniques.

DOI: 10.1016/j.apmr.2018.04.022.



<https://www.ncbi.nlm.nih.gov/pubmed/29787734>

## Effects of myofascial release in erector spinae myoelectric activity and lumbar spine kinematics in non-specific chronic low back pain: Randomized controlled trial.

Arguisuelas MD, Lisón JF, Doménech-Fernández J, Martínez-Hurtado I, Salvador Coloma P, Sánchez-Zuriaga D.

Clin Biomech (Bristol, Avon). 2019 Mar;63:27-33. doi: 10.1016/j.clinbiomech.2019.02.009. Epub 2019 Feb 14.

### BACKGROUND:

Flexion-relaxation response of the lumbar erector spinae has been previously studied after different interventions such as exercise programs or spinal manipulation, in subjects with chronic low back pain. The objective of the study was to investigate the effects of an isolated myofascial release protocol on erector spinae myoelectric activity and lumbar spine kinematics in chronic low back pain.

### METHODS:

Thirty-six participants, with nonspecific chronic low back pain, were randomized to myofascial release group (n = 18) receiving four sessions of myofascial treatment, each lasting 40 min, and to control group (n = 18) receiving a sham myofascial release. Electromyographic and kinematic variables as well as pain and disability questionnaires were analyzed.

### FINDINGS:

There was a bilateral reduction of the flexion relaxation ratio in individuals receiving myofascial release and who did not show myoelectric silence at baseline (right difference M = 0.34, 95% CI [0.16, 0.33],  $p \leq .05$  and left difference M = 0.45, 95% CI [0.16, 0.73],  $p \leq .05$ ). There was also a significant reduction in pain in the myofascial release group (difference M = -9.1, 95% CI [-16.3, -1.8],  $p \leq .05$ ) and disability (difference M = -5.6, 95% CI [-9.1, -2.1],  $p \leq .05$ ), compared with control group. No significant differences between groups were found for the kinematic variables.

### INTERPRETATION:

The myofascial release protocol contributed to the normalization of the flexion- relaxation response in individuals who did not show myoelectric silence before the intervention, and also showed a significant reduction in pain and disability compared with the sham group.

DOI: 10.1016/j.clinbiomech.2019.02.009.

 <https://www.ncbi.nlm.nih.gov/pubmed/30784788>

## Effects of diaphragmatic myofascial release on gastroesophageal reflux disease: a preliminary randomized controlled trial.

Martínez-Hurtado I, Arguisuelas MD, Almela-Notari P, Cortés X Barrasa-Shaw A, Campos-González JC, Lisón JF.

Sci Rep. 2019 May 13;9(1):7273. doi: 10.1038/s41598-019-43799-y.

### ABSTRACT

The purpose of this study is to investigate whether implementing a myofascial release (MFR) protocol designed to restore the myofascial properties of the diaphragm has any effect on the symptoms, quality of life, and consumption of proton pump inhibitors (PPI) drugs by patients with non-erosive gastroesophageal reflux disease (GERD). We randomized 30 patients with GERD into a MFR group or a sham group. Changes in symptomatology and quality of life were measured with the Reflux Disease Questionnaire and the Gastrointestinal Quality of Life Index. Need of PPIs was measured as the milligrams of drug intake over the 7 days prior to each assessment. All variables were assessed at baseline, one week and 4 weeks after the end of the treatment. At week 4, patients receiving MFR showed significant improvements in symptomatology (mean difference -1.1; 95% CI: -1.7 to -0.5), gastrointestinal quality of life (mean difference 18.1; 95% CI: 4.8 to 31.5), and PPIs use (mean difference -97 mg; 95% CI: -162 to -32), compared to the sham group. These preliminary findings indicate that the application of the MFR protocol we used in this study decreased the symptoms and PPIs usage and increased the quality of life of patients with non-erosive GERD up to four weeks after the end of the treatment.

DOI: 10.1038/s41598-019-43799-y.



<https://www.ncbi.nlm.nih.gov/pubmed/31086250>

## Visceral osteopathic manipulative treatment reduces patient reported digestive toxicities induced by adjuvant chemotherapy in breast cancer: A randomized controlled clinical study.

Lagrange A, et al. Eur J Obstet Gynecol Reprod Biol. 2019.

Eur J Obstet Gynecol Reprod Biol. 2019 Oct;241:49-55. doi: 10.1016/j.ejogrb.2019.08.003. Epub 2019 Aug 12.

### OBJECTIVE:

Breast cancer patients often benefit from adjuvant chemotherapy, a protocol whose effectiveness is accompanied by disabling adverse effects. The aim of this controlled clinical study was to determine the impact of visceral osteopathy on the incidence of nausea/vomiting, constipation and overall quality of life (QoL) in women operated for breast cancer and undergoing adjuvant chemotherapy in Centre Georges François Leclerc, CGFL.

### STUDY DESIGN:

Ninety-four women operated for a breast cancer stage 1-3, in complete resection and to whom a 3 FEC 100 chemotherapy was prescribed, were randomly allocated to experimental or placebo group. Experimental group underwent a visceral osteopathic technique and placebo group was subjected to a superficial manipulation after each chemotherapy cycle. Rate of grade  $\geq 1$  nausea/vomiting or constipation, on the first 3 cycles of FEC 100, were reported. QoL was evaluated using the EORTC QLQ-C30 questionnaire.

### RESULTS:

Rate of nausea/vomiting episodes of grade  $\geq 1$  was high in both experimental and placebo group. Constipation episodes of grade  $\geq 1$  were also frequent. No significant differences were found between the two groups concerning the rate of nausea/vomiting ( $p = 0.569$ ) or constipation ( $p = 0.204$ ) according to clinician reported side-effects but patient reported impact of constipation and diarrhoea on quality of life was significantly lower in experimental group ( $p = 0.036$  and  $p = 0.038$ , respectively).

### CONCLUSION:

Osteopathy does not reduce the incidence of nausea/vomiting in women operated for breast cancer and undergoing adjuvant chemotherapy. In contrast, patient reported digestive quality of life was significantly ameliorated by osteopathy. Clinicaltrials.gov Identifier: NCT02840890.

PMID 31430616



<https://www.ncbi.nlm.nih.gov/pubmed/31430616>

# Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomised controlled trials

Sidney M Rubinstein, Annemarie de Zoete, Marienke van Middelkoop, Willem JJ Assendelft, Michiel R de Boer, Maurits W van Tulder

BMJ 2019;364:l689.

## OBJECTIVE

To assess the benefits and harms of spinal manipulative therapy (SMT) for the treatment of chronic low back pain.

## DESIGN

Systematic review and meta-analysis of randomised controlled trials.

## DATA SOURCES

Medline, PubMed, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), CINAHL, Physiotherapy Evidence Database (PEDro), Index to Chiropractic Literature, and trial registries up to 4 May 2018, including reference lists of eligible trials and related reviews.

Eligibility criteria for selecting studies Randomised controlled trials examining the effect of spinal manipulation or mobilisation in adults ( $\geq 18$  years) with chronic low back pain with or without referred pain. Studies that exclusively examined sciatica were excluded, as was grey literature. No restrictions were applied to language or setting.

## REVIEW METHODS

Two reviewers independently selected studies, extracted data, and assessed risk of bias and quality of the evidence. The effect of SMT was compared with recommended therapies, non-recommended therapies, sham (placebo) SMT, and SMT as an adjuvant therapy. Main outcomes were pain and back specific functional status, examined as mean differences and standardised mean differences (SMD), respectively. Outcomes were examined at 1, 6, and 12 months. Quality of evidence was assessed using GRADE.

A random effects model was used and statistical heterogeneity explored.

## RESULTS

47 randomised controlled trials including a total of 9211 participants were identified, who were on average middle aged (35-60 years). Most trials compared SMT with recommended therapies. Moderate quality evidence suggested that SMT has similar effects to other recommended therapies for short term pain relief (mean difference  $-3.17$ , 95% confidence interval  $-7.85$  to  $1.51$ ) and a small, clinically better improvement in function (SMD  $-0.25$ , 95% confidence interval  $-0.41$  to  $-0.09$ ). High quality evidence suggested that compared with non-recommended therapies SMT results in small, not clinically better effects for short term pain relief (mean difference  $-7.48$ ,  $-11.50$  to  $-3.47$ ) and small to moderate clinically better improvement in function (SMD  $-0.41$ ,  $-0.67$  to  $-0.15$ ). In general, these results were similar for the intermediate and long term outcomes as were the effects of SMT as an adjuvant therapy. Evidence for sham SMT was low to very low quality; therefore these effects should be considered uncertain. Statistical heterogeneity could not be explained. About half of the studies examined adverse and serious adverse events, but in most of these it was unclear how and whether these events were registered systematically. Most of the observed adverse events were musculoskeletal related, transient in nature, and of mild to moderate severity. One study with a low risk of selection bias and powered to examine risk ( $n=183$ ) found no increased risk of an adverse event (relative risk  $1.24$ , 95% confidence interval  $0.85$  to  $1.81$ ) or duration of the event ( $1.13$ ,  $0.59$  to  $2.18$ ) compared with sham SMT. In one study, the Data Safety Monitoring Board judged one serious adverse event to be possibly related to SMT.

## CONCLUSION

SMT produces similar effects to recommended therapies for chronic low back pain, whereas SMT seems to be better than non-recommended interventions for improvement in function in the short term. Clinicians should inform their patients of the potential risks of adverse events associated with SMT.

DOI: <https://doi.org/10.1136/bmj.l689>

 <https://www.bmj.com/content/bmj/364/bmj.l689.full.pdf>

## The efficacy of muscle energy techniques in symptomatic and asymptomatic subjects: a systematic review.

Thomas E, Cavallaro AR, Mani D, Bianco A, Palma A.

Chiropr Man Therap. 2019 Aug 27;27:35. doi: 10.1186/s12998-019-0258-7. eCollection 2019.

### BACKGROUND:

Muscle energy techniques are applied to reduce pain and increase range of motion. These are applied to a variety of pathological conditions and on asymptomatic subjects. There is however limited knowledge on their effectiveness and which protocol may be the most beneficial.

### OBJECTIVE:

The aim of this review is to determine the efficacy of muscle energy techniques (MET) in symptomatic and asymptomatic subjects.

### DESIGN:

Systematic Review.

### METHODS:

A literature search was performed using the following database: Cochrane Library, MEDLINE, NLM Pubmed and ScienceDirect. Studies regarding MET in asymptomatic and symptomatic patients were considered for investigation. The main outcomes took into account range of motion, chronic and acute pain and trigger points. Two trained investigators independently screened eligible studies according to the eligibility criteria, extracted data and assessed risk of bias. Randomized control trials (RCT's) were analyzed for quality using the PEDro scale.

### RESULTS:

A total of 26 studies were considered eligible and included in the quantitative synthesis: 14 regarding symptomatic patients and 12 regarding asymptomatic subjects. Quality assessment of the studies through the PEDro scale observed a "moderate to high" qua-

lity of the included records.

## CONCLUSIONS:

MET are an effective treatment for reducing chronic and acute pain of the lower back. MET are also effective in treating chronic neck pain and chronic lateral epicondylitis. MET can be applied to increase range of motion of a joint when a functional limitation is present. Other techniques seem to be more appropriate compared to MET for trigger points.

DOI: 10.1186/s12998-019-0258-7.



<https://www.ncbi.nlm.nih.gov/pubmed/31462989>

## Can myofascial techniques modify immunological parameters?

Fernández-Pérez AM, Peralta-Ramírez MI, Pilat A, Moreno-Lorenzo C, Villaverde-Gutiérrez C, Arroyo-Morales M.

J Altern Complement Med. 2013 Jan;19(1):24-8. doi: 10.1089/acm.2011.0589. Epub 2012 Nov 23.

### OBJECTIVES:

The objective was to determine the effect of myofascial techniques on the modulation of immunological variables.

### DESIGN:

Thirty-nine healthy male volunteers were randomly assigned to an experimental or control group.

### INTERVENTIONS:

The experimental group underwent three manual therapy modalities: suboccipital muscle release, so-called fourth intracranial ventricle compression, and deep cervical fascia release. The control group remained in a resting position for the same time period under the same environmental conditions.

### OUTCOME MEASURES:

Changes in counts of CD3, CD4, CD8, CD19, and natural killer (NK) cells (as immunological markers) between baseline and 20 minutes post-intervention.

### RESULTS:

Repeated-measures ANOVA revealed a significant time  $\times$  groups interaction ( $F(1,35)=9.33$ ;  $p=0.004$ ) for CD19. There were no significant time  $\times$  group interaction effects on CD3, CD4, CD8, or NK cell counts. Intrasubject analyses showed a higher CD19 count in the experimental group post-intervention versus baseline ( $t=-4.02$ ;  $p=0.001$ ), with no changes in the control group ( $t=0.526$ ;  $p=0.608$ ).

### CONCLUSION:

A major immunological modulation, with an increased B lymphocyte count, was observed at 20 minutes after the application of craniocervical myofascial induction techniques.

DOI: 10.1089/acm.2011.0589.



<https://www.ncbi.nlm.nih.gov/pubmed/23176374>

## Effectiveness of craniosacral therapy in the treatment of infantile colic. A randomized controlled trial.

Castejón-Castejón M, Murcia-González MA, Martínez Gil JL, Todri J, Suárez Rancel M, Lena O, Chillón-Martínez R.

Complement Ther Med. 2019 Dec;47:102164. doi: 10.1016/j.ctim.2019.07.023. Epub 2019 Aug 13.

### OBJECTIVES:

To determine the effectiveness of Craniosacral Therapy (CST) for the treatment of infantile colic.

### MATERIAL AND METHODS:

This randomized controlled trial was conducted on 58 infants, aged 0-84 days, diagnosed with infantile colic. The babies received a 30-40 minute CST session once a week (experimental group) or no treatment (control group). Babies in the CST group received either 1, 2 or 3 CST sessions over a 14-day period. Data were collected at 4 different times over the 24-day period, day 0 (baseline), day 7, day 14 and day 24. Crying (primary outcome) and sleep (secondary outcome) were evaluated using a crying and sleep diary, and colic severity was measured using the Infant Colic Severity Questionnaire (secondary outcome).

### RESULTS:

There was a statistically significant difference between groups (CST and control) in crying hours ( $F = 188.47$ ;  $p < 0.0005$ ;  $\eta^2 = 0.78$ ), sleep hours ( $F = 61.20$ ;  $p < 0.0005$ ,  $\eta^2 = 0.54$ ) and colic severity ( $F = 143.74$ ;  $p < 0.0005$ ,  $\eta^2 = 0.73$ ) across all the time points. In comparison with the control group, CST babies reported significant and clinically relevant effects in crying hours on day 7 (-2.47 h (95%CI, -2.95 to -1.99);  $p < 0.0005$ ;  $d = 1.73$ ), on day 14 (-3.29 h (95%CI, -3.7 to -2.8);  $p < 0.0005$ ;  $d = 2.87$ ) and on day 24 (-3.20 h (95%CI, -3.7 to -2.6);  $p < 0.0005$ ;  $d = 2.54$ ); in sleep hours on day 7 (-2.47 h (95%CI, -2.95 to -1.99);  $p < 0.0005$ ;  $d = 1.73$ ) on day 14 (-3.29 h (95%CI, -3.7 to -2.8);  $p < 0.0005$ ;  $d = 2.87$ ) and on day 24 (-3.20 h (95%CI, -3.7 to -2.6);  $p < 0.0005$ ;  $d = 2.54$ ).

## CONCLUSIONS:

Craniosacral therapy appears to be effective and safe for infantile colic by reducing the number of crying hours, the colic severity and increasing the total hours of sleep.

DOI: 10.1016/j.ctim.2019.07.023.



<https://www.ncbi.nlm.nih.gov/pubmed/31780018>

## Craniosacral therapy for chronic pain: a systematic review and meta-analysis of randomized controlled trials.

Haller H, Lauche R, Sundberg T, Dobos G, Cramer H.

BMC Musculoskelet Disord. 2019 Dec 31;21(1):1. doi: 10.1186/s12891-019-3017-y.

### OBJECTIVES:

To systematically assess the evidence of Craniosacral Therapy (CST) for the treatment of chronic pain.

### METHODS:

PubMed, Central, Scopus, PsycInfo and Cinahl were searched up to August 2018. Randomized controlled trials (RCTs) assessing the effects of CST in chronic pain patients were eligible. Standardized mean differences (SMD) and 95% confidence intervals (CI) were calculated for pain intensity and functional disability (primary outcomes) using Hedges' correction for small samples. Secondary outcomes included physical/mental quality of life, global improvement, and safety. Risk of bias was assessed using the Cochrane tool.

### RESULTS:

Ten RCTs of 681 patients with neck and back pain, migraine, headache, fibromyalgia, epicondylitis, and pelvic girdle pain were included. CST showed greater post intervention effects on: pain intensity (SMD = -0.32, 95%CI = [- 0.61,-0.02]) and disability (SMD = -0.58, 95%CI = [- 0.92,-0.24]) compared to treatment as usual; on pain intensity (SMD = -0.63, 95%CI = [- 0.90,-0.37]) and disability (SMD = -0.54, 95%CI = [- 0.81,-0.28]) compared to manual/non-manual sham; and on pain intensity (SMD = -0.53, 95%CI = [- 0.89,-0.16]) and disability (SMD = -0.58, 95%CI = [- 0.95,-0.21]) compared to active manual treatments. At six months, CST showed greater effects on pain intensity (SMD = -0.59, 95%CI = [- 0.99,-0.19]) and disability (SMD = -0.53, 95%CI = [- 0.87,-0.19]) versus sham. Secondary outcomes were all significantly more improved in CST patients than in other groups, except for six-month mental quality of life versus sham. Sensitivity analyses revealed robust effects of CST against most risk of bias domains. Five of the 10 RCTs reported safety data. No serious adverse events occurred. Minor adverse events were

equally distributed between the groups.

## DISCUSSION:

In patients with chronic pain, this meta-analysis suggests significant and robust effects of CST on pain and function lasting up to six months. More RCTs strictly following CONSORT are needed to further corroborate the effects and safety of CST on chronic pain.

DOI: 10.1186/s12891-019-3017-y.



<https://www.ncbi.nlm.nih.gov/pubmed/31892357>

## Effects of Osteopathic Manual Therapy on Hyperinflation in Patients with Chronic Obstructive Pulmonary Disease: A Randomized Cross-Over Study.

Maskey-Warzechowska M, Mierzejewski M, Gorska K, Golowicz R, Jesien L, Krenke R.

Adv Exp Med Biol. 2019;1222:17-25. doi: 10.1007/5584\_2019\_418.

### ABSTRACT

Osteopathic manual therapy (OMT) may reduce hyperinflation in patients with chronic obstructive pulmonary disease (COPD) by improving breathing mechanics. The aim of the study was to evaluate the immediate effects of OMT on hyperinflation in stable COPD patients with forced expired volume in 1 s (FEV1) <50% predicted. Nineteen COPD patients of the median age 68 (IQR 63-72) years and the median FEV1 39.8 (IQR 33.4-46.6) % predicted were enrolled into the study. For the first session, patients were randomly assigned to either OMT or sham therapy. During the second session, the two groups of patients were crossed over. Pulmonary function and dyspnea were compared before and after both procedures. Neither pulmonary function nor dyspnea differed significantly before and after OMT or sham procedures. However, 36.7% and 47.4% patients achieved the minimally important difference for residual volume (RV) reduction after both OMT and sham therapy, respectively. Responders to OMT had a greater median (IQR) baseline sense of dyspnea compared to non-responders, assessed on a visual analog scale, of 7.0 (4.5-7.0) vs. 3.0 (0.0-5.0),  $p = 0.040$ , respectively. Although OMT did not have an immediate effect on hyperinflation or dyspnea, a subgroup experienced a reduction in RV following OMT and sham therapy. Future studies are needed to identify the characteristics of responders.

DOI: 10.1007/5584\_2019\_418.



<https://www.ncbi.nlm.nih.gov/pubmed/31541364>

## Effectiveness of an osteopathic treatment on the autonomic nervous system: a systematic review of the literature.

Rechberger V, Biberschick M, Porthun J.

Eur J Med Res. 2019 Oct 25;24(1):36. doi: 10.1186/s40001-019-0394-5.

### OBJECTIVE:

The objective of this systematic review was to evaluate the effectiveness of an osteopathic treatment on the autonomic nervous system (ANS). For this purpose, published primary studies were analysed and critically evaluated.

### METHOD:

To generate this review, 15 electronic databases were systematically searched for studies. Randomized clinical controlled trials (RCT) and clinical controlled trials (CCT) are included in the review and evaluated with appropriate assessment tools (Downs and Black Checklist and the checklist from Kienle and Kiene).

### RESULTS:

23 published studies (10 RCT, 1 clinic multi-centre study, 1 CCT, 5 randomized cross-over studies, 5 randomized pilot studies and 1 single case study) are included in this review. The studies were evaluated with the assessment tools according to their quality. 3 studies are graded as high quality, 11 as moderate and 8 as low-quality studies.

### CONCLUSION:

The included published studies represent a good level of evidence. Due to a small number of subjects and no follow-ups, the methodological quality is rated as moderate. A significant change on the ANS was shown in studies including High-Velocity Low-Amplitude Techniques (HVLAT). No statement could be drawn in studies in which they used cranial osteopathic techniques due to the lack of methodological quality. A significant change on the ANS is shown in the treatment of the suboccipital region. In studies which evaluated the effectiveness of mobilization in the cervical and thoracic region, no statement could be displayed due to a low level of evidence. None of the findings in these studies have given statements if ANS activation takes place in the sympathetic or

parasympathetic system.

DOI: 10.1186/s40001-019-0394-5.

 <https://www.ncbi.nlm.nih.gov/pubmed/31653268>

## Effects of Osteopathic Visceral Treatment in Patients with Gastroesophageal Reflux: A Randomized Controlled Trial.

Eguaras N, Rodríguez-López ES, Lopez-Dicastillo O, Franco-Sierra MÁ, Ricard F, Oliva-Pascual-Vaca Á.

J Clin Med. 2019 Oct 19;8(10). pii: E1738. doi: 10.3390/jcm8101738.

### ABSTRACT

Osteopathic manual treatment has been recommended as a non-pharmacological therapy for Gastroesophageal Reflux Disease (GERD). However, to date, no study has supported the effectiveness of this intervention with respect to the symptoms of the disease. Our goal was to assess the effect of an osteopathic manual technique for the lower esophageal sphincter on GERD symptoms, cervical mobility and on the C4 spinous process pressure pain threshold (PPTs).

### METHODS:

A randomized, double-blind placebo-controlled trial was performed. Sixty subjects suffering from GERD participated in this study and were randomly assigned to either an experimental group (EG) (n = 29), who received the osteopathic technique for the lower esophageal sphincter, or to a control group (CG) (n = 31), who received a manual contact, which mimicked the osteopathic technique without exerting any therapeutic force. Randomization was computer-generated, with allocation concealed by sequentially numbered, opaque, sealed envelopes. The GerdQ questionnaire was used to assess symptom changes the week after intervention. Cervical Range of Motion (CROM) and algometer were used to evaluate cervical mobility and PPTs before and after both treatments. Before-after between groups comparison (t-test) was used for statistical analysis of the outcome, with two measurement points (GerdQ), while repeated-measures ANOVA was used for those outcomes with four measurement points (CROM and PPT).

### RESULTS:

The application of the osteopathic manual treatment in subjects with GERD produced a significant improvement in symptoms one week after the intervention (p = 0.005) with

a between-groups difference of 1.49 points in GerdQ score (95% CI: 0.47-2.49). PPT C4 improved in the EG after the treatment ( $p = 0.034$ ;  $\eta^2 = 0.048$ ) (between-groups difference 8.78 Newton/cm<sup>2</sup>; 95% CI: 0.48-17.09). CROM also increased in the EG compared to the CG ( $p < 0.001$ ;  $\eta^2 = 0.108$ ) (between-groups difference 33.89 degrees; 95% CI: 15.17-52.61).

## CONCLUSIONS:

The manual osteopathic technique produces an improvement in GERD symptoms one week after treatment, cervical mobility, and PPTs. This may mean that osteopathic treatment is useful for improving symptoms of GERD.

DOI: 10.3390/jcm8101738.



<https://www.ncbi.nlm.nih.gov/pubmed/31635110>

## Osteopathic manipulation treatment versus therapeutic exercises in patients with chronic nonspecific low back pain: A randomized, controlled and double-blind study.

de Oliveira Meirelles F, de Oliveira Muniz Cunha JC, da Silva EB.

J Back Musculoskelet Rehabil. 2019 Oct 14. doi: 10.3233/BMR-181355. [Epub ahead of print]

### BACKGROUND:

Osteopathic manipulation treatment is widely used in the clinical practice in the care of patients with chronic nonspecific low back pain, however, its benefits still seem uncertain.

### OBJECTIVE:

This study aimed to verify the efficacy of osteopathic manipulation for chronic nonspecific low back pain.

### MATERIALS AND METHODS:

Forty-two participants with chronic nonspecific low back pain were selected and randomized into two groups: Active Control Group (ACG - n= 19) and Osteopathic Manipulation Treatment Group (OMTG - n= 23). Therapeutic exercises were performed with the ACG and osteopathic manipulation techniques with the OMTG. The interventions were carried out over 5 weeks of treatment, totaling 10 treatments for the ACG and 5 for the OMTG. The visual analogue scale (VAS) was used to measure chronic nonspecific low back pain and the Oswestry Disability Index 2.0, Tampa Scale of Kinesiophobia and Beck Depression Inventory were used to measure disability, kinesiophobia and depression, respectively.

### RESULTS:

The final chronic nonspecific low back pain in both groups was significantly lower than the initial low back pain ( $p \leq 0.01$ ) and the final chronic nonspecific low back pain of the OMTG was significantly lower than that of the ACG ( $p = 0.001$ ).

## CONCLUSION:

This study demonstrated that the treatments were effective in both groups. However, the efficacy of the osteopathic manipulation treatment was greater than that of the therapeutic exercises.

DOI: 10.3233/BMR-181355.



<https://www.ncbi.nlm.nih.gov/pubmed/31658037>

## Effects of manual cranial therapy on heart rate variability in children without associated disorders: Translation to clinical practice.

Bayo-Tallón V, Esquirol-Caussa J, Pàmias-Massana M, Planells-Keller K, Palao-Vidal DJ.

Complement Ther Clin Pract. 2019 Aug;36:125-141. doi: 10.1016/j.ctcp.2019.06.008. Epub 2019 Jul 2.

### BACKGROUND:

and purpose: Heart rate variability (HRV) represents a marker of autonomic activity, self-regulation and psychiatric illness. Few studies of manual therapy have investigated the neurophysiological effects of manual cranial therapy (MC-t). This study assessed the neurophysiological short/medium-term effects of two manual therapy interventions: massage therapy (Mss-t) and MC-t.

### MATERIALS AND METHODS:

A double-blind clinical trial was conducted with 50 healthy children, randomized into two groups who received a Mss-t intervention or MC-t. The variables analysed included vital signs (temperature, respiratory rate, heart rate, blood pressure) and HRV components, including the root mean square of successive differences (RMSSD), high frequency (HF), low frequency (LF) and LF/HF ratio.

### RESULTS:

Both interventions produced short-term parasympathetic effects, although the effects of MC-t were more persistent.

### CONCLUSION:

The persistence of the MC-t intervention suggested a prominent vagal control and better self-regulation. Autonomic imbalances in mental pathologies may benefit from the neurophysiological effects of MC-t.

DOI: 10.1016/j.ctcp.2019.06.008 | PMID: 31383430

 <https://www.ncbi.nlm.nih.gov/pubmed/31383430>

## Visceral osteopathic manipulative treatment reduces patient reported digestive toxicities induced by adjuvant chemotherapy in breast cancer: A randomized controlled clinical study.

Lagrange A, Decoux D, Briot N, Hennequin A, Coudert B, Desmoulins I, Bertaut A.

Eur J Obstet Gynecol Reprod Biol. 2019 Oct;241:49-55. doi: 10.1016/j.ejogrb.2019.08.003. Epub 2019 Aug 12.

### OBJECTIVE:

Breast cancer patients often benefit from adjuvant chemotherapy, a protocol whose effectiveness is accompanied by disabling adverse effects. The aim of this controlled clinical study was to determine the impact of visceral osteopathy on the incidence of nausea/vomiting, constipation and overall quality of life (QoL) in women operated for breast cancer and undergoing adjuvant chemotherapy in Centre Georges François Leclerc, CGFL.

### STUDY DESIGN:

Ninety-four women operated for a breast cancer stage 1-3, in complete resection and to whom a 3 FEC 100 chemotherapy was prescribed, were randomly allocated to experimental or placebo group. Experimental group underwent a visceral osteopathic technique and placebo group was subjected to a superficial manipulation after each chemotherapy cycle. Rate of grade  $\geq 1$  nausea/vomiting or constipation, on the first 3 cycles of FEC 100, were reported. QoL was evaluated using the EORTC QLQ-C30 questionnaire.

### RESULTS:

Rate of nausea/vomiting episodes of grade  $\geq 1$  was high in both experimental and placebo group. Constipation episodes of grade  $\geq 1$  were also frequent. No significant differences were found between the two groups concerning the rate of nausea/vomiting ( $p = 0.569$ ) or constipation ( $p = 0.204$ ) according to clinician reported side-effects but patient reported impact of constipation and diarrhoea on quality of life was significantly lower in experimental group ( $p = 0.036$  and  $p = 0.038$ , respectively).

## CONCLUSION:

Osteopathy does not reduce the incidence of nausea/vomiting in women operated for breast cancer and undergoing adjuvant chemotherapy. In contrast, patient reported digestive quality of life was significantly ameliorated by osteopathy. Clinicaltrials.gov Identifier: NCT02840890.

DOI: 10.1016/j.ejogrb.2019.08.003.



<https://www.ncbi.nlm.nih.gov/pubmed/31430616>

## Visceral Origin: An Underestimated Source of Neck Pain. A Systematic Scoping Review.

Oliva-Pascual-Vaca Á, González-González C, Oliva-Pascual-Vaca J, Piña-Pozo F, Ferragut-Garcías A, Fernández-Domínguez JC, Heredia-Rizo AM.

Diagnostics (Basel). 2019 Nov 12;9(4). pii: E186. doi: 10.3390/diagnostics9040186.

### ABSTRACT

The diagnosis of neck pain is challenging. Many visceral disorders are known to cause it, and clinical practice guidelines recommend to rule them out during neck pain diagnosis. However, the absence of suspicion of any cause impedes one from establishing that specific aetiology as the final diagnosis. To investigate the degree of consideration given to visceral aetiology, a systematic search of trials about neck pain was carried out to evaluate their selection criteria. The search yielded 309 eligible articles, which were screened by two independent reviewers. The PEDro scale score was used to assess the methodological quality of the studies. The following information was retrieved: number of authors affiliated to a clinical or non-clinical institution, number of citations in the Web of Science, study aims, characteristics of participants, and eligibility criteria. The top 15 most cited trials, and the 15 most recent studies about treatment efficacy in neck pain, published in first quartile journals of the Journal Citation Reports, were selected. Females represented 67.5% of participants. A single study was of poor methodological quality (4/10). Based on the eligibility criteria of the articles that were systematically reviewed, it would appear that visceral aetiology was not considered in eighty percent of the trials on neck pain, showing a low level of suspicion both in research and clinical settings.

DOI: 10.3390/diagnostics9040186.



<https://www.ncbi.nlm.nih.gov/pubmed/31726685>



<http://www.sefitma.com/>