

Collected Scientific Research Relating to the Use of Osteopathy with Joint range of motion

Important:

1) Osteopathy involves helping people's own self-healing abilities to work better, rather than focussing primarily on particular conditions.

2) Each person is different, and osteopathy treats them differently.

Therefore people respond to osteopathic treatment in different ways. Treatments that work for one person cannot be guaranteed to work for another person in the same way. The fact that there is scientific research supporting a treatment in a group of people does not mean that it will always work in the same way (which is probably true of all research).

A number of things make research into osteopathy challenging. These include the two aspects of osteopathy mentioned above, and also the lack of major commercial interests to provide funding in expectation of financial returns. At the same time, there is an emerging body of research demonstrating the usefulness of osteopathic treatment.

Please note: there is room for debate about the classifications used for these studies. Please let John Smartt know if you believe that any of these classifications are incorrect.

These studies are from peer-reviewed journals

Number of studies: 16

Clinically and statistically significant results

Number of studies: 15

Systematic reviews

Number of studies: 1

Galindez-Ibarbengoetxea X, Setuain I, Andersen LL, Ramírez-Velez R, González-Izal M, Jauregi A, Izquierdo M 2017 **Effects of Cervical High-Velocity Low-Amplitude Techniques on Range of Motion, Strength Performance, and Cardiovascular Outcomes: A Review.** *J Altern Complement Med Sep;23(9):667-675* <https://www.ncbi.nlm.nih.gov/pubmed/28731832>

"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."

Snider KT, Redman CL, Edwards CR, Bhatia S, Kondrashova T 2018 **Ultrasonographic Evaluation of the Effect of Osteopathic Manipulative Treatment on Sacral Base Asymmetry** J Am Osteopath Assoc March 2018 <http://jaoa.org/article.aspx?articleid=2673880>

"Context: Patients with low back pain (LBP) may receive osteopathic manipulative treatment (OMT) to resolve or manage their pain. The indication for OMT for patients with LBP is the presence of somatic dysfunction, diagnosed using palpatory examination. Because palpatory findings commonly have poor interexaminer reliability, the current study used ultrasonography (US) to establish pre-OMT and post-OMT musculoskeletal measurements of relative asymmetry between pelvic and sacral bony landmarks.

Objective: To document objective musculoskeletal changes that occur in response to OMT using US and to compare palpatory assessment of landmark asymmetry with US assessment. Methods: Sixty men and women aged 20 to 55 years with at least 1 episode of LBP in the past 2 weeks were assigned to a seated control, walking control, or OMT group (20 participants per group). Participants received an initial, bilateral US measurement of the skin to posterior superior iliac spine (SPSIS), skin to sacral base position (SBP), and sacral sulcus depth (SSD). Participants in seated control and OMT groups received a palpatory assessment of SBP and SSD prior to initial US assessment. After assessment, the seated control group sat in a waiting room for 30 minutes, the walking control group walked for 5 minutes, and the OMT group received OMT to address sacral base asymmetry using predominantly direct techniques for a maximum of 20 minutes. Participants then received a second US assessment of the same structures.

Results: Body mass index (BMI) was correlated with SPSIS ($r=0.5$, $P=.001$) and SBP ($r=0.6$, $P<.001$). More participants in seated control (75%) and OMT (65%) groups had an increase in asymmetry from first to second US assessment for SPSIS compared with participants in the walking control group (35%, $P=.05$). No significant differences were found between groups for absolute asymmetry or total change in asymmetry (all $P>.10$). The κ was -0.1 (95% CI, -0.2 to 0.03) for SBP and -0.01 (95% CI, -0.1 to 0.1) for SSD.

Conclusion: Musculoskeletal changes in SPSIS and SBP measurements related to OMT could not be readily identified using US. The SPSIS and SBP measurements were dependent on BMI, which may have affected the accuracy of US to detect small changes in asymmetry. Qualitative palpatory assessments did not correlate with US measurements. Further study is needed to identify US measurements that demonstrate change with OMT. (ClinicalTrials.gov number NCT02820701)"

Castro-Martín E, Ortiz-Comino L, Gallart-Aragón T, Esteban-Moreno B, Arroyo-Morales M, Galiano-Castillo N. 2017 **Myofascial Induction Effects on Neck-Shoulder Pain in Breast Cancer Survivors: Randomized, Single-Blind, Placebo-Controlled Crossover Design.** Arch Phys Med Rehabil May;98(5):832-840 <https://www.ncbi.nlm.nih.gov/pubmed/28003133>

"OBJECTIVES:

To (1) investigate the immediate effects of myofascial induction (MI), with placebo electrotherapy as a control, on perceived pain, cervical/shoulder range of motion (ROM), and mood state in breast cancer survivors (BCSs) with shoulder/arm morbidity; and (2) examine the relationships between pain modifications and cervical/shoulder ROM on the side affected by breast cancer.

DESIGN:

Randomized, single-blind, placebo-controlled crossover study.

SETTING:

Physical therapy laboratory.

PARTICIPANTS:

BCSs (N=21) who had a diagnosis of stage I-IIIa breast cancer and had completed adjuvant therapy (except hormonal treatment).

INTERVENTION:

During each session, the BCSs received either an MI (fascial unwinding) intervention focused

on the upper limb area following the Pilat approach or placebo pulsed shortwave therapy (control group). Each session lasted 30 minutes, and an adequate washout period of 4 weeks between sessions was established.

MAIN OUTCOME MEASURES:

The visual analog scale (VAS) for pain and anxiety, shoulder-cervical goniometry for ROM, the Profile of Mood States for psychological distress, and the Attitudes Towards Massage Scale were used.

RESULTS:

An analysis of covariance (ANCOVA) revealed significant time × group interactions for VAS affected arm (P=.031) but not for VAS cervical (P=.332), VAS nonaffected arm (P=.698), or VAS anxiety (P=.266). The ANCOVA also revealed significant interactions for affected shoulder flexion (P<.001), abduction (P<.001), external rotation (P=.004), and internal rotation (P=.001). Significant interactions for affected cervical rotation (P=.022) and affected cervical lateral flexion (P=.038) were also found. A significant negative correlation was found between changes in VAS affected arm and shoulder/arm internal rotation ROM (r=-.46; P=.03).

CONCLUSIONS:

A single MI session decreases pain intensity and improves neck-shoulder ROM to a greater degree than placebo electrotherapy for BCSs experiencing pain.

TRIAL REGISTRATION:

ClinicalTrials.gov NCT02859168."

Martínez-Segura R, Fernández-de-las-Peñas C, Ruiz-Sáez M, López-Jiménez C, Rodríguez-Blanco C, 2006 **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** Journal of Manipulative and Physiological Therapeutics Volume 29, Issue 7, September , Pages 511–517 <http://www.ncbi.nlm.nih.gov/pubmed/16949939>

"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 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."

"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."

Ballantyne F, Fryer G, McLaughlin P 2003 **The effect of muscle energy technique on hamstring extensibility: the mechanism of altered flexibility** Journal of Osteopathic Medicine Volume 6, Issue 2, October , Pages 59–63 <http://www.sciencedirect.com>

"40 asymptomatic subjects were randomly allocated to control or experimental groups. Subjects lay supine with their thigh fixed at 90° flexion, and the hamstring muscle stretched to the onset of discomfort by passive knee extension. Knee range of motion was recorded with digital photography and passive torque recorded with a hand-held dynamometer. The experimental group received muscle energy technique to the hamstring muscle, after which the resistance to

stretch and the range of motion were again measured. The knee was extended to the original passive torque and the angle at the knee recorded. If the onset of discomfort was not produced at this angle, the knee was further extended and the new angle was recorded. Results: A significant increase in range of motion was observed at the knee ($p < 0.019$) following a single application of MET to the experimental group. No change was observed in the control group."

Lenehan KL, Fryer G, McLaughlin P 2003 **The effect of muscle energy technique on gross trunk range of motion** Journal of Osteopathic Medicine Volume 6, Issue 1, April, Pages 13–18 <http://www.sciencedirect.com>

"Muscle Energy Technique (MET) is used commonly by osteopaths and other musculoskeletal therapists, however despite its widespread use there is little evidence to support its effectiveness in the treatment of spinal dysfunction. This study examined whether a single application of thoracic MET could significantly increase the range of motion in asymptomatic volunteers with restricted active trunk rotation. Fifty-nine volunteers were randomly assigned to either treatment (MET) or control groups and blinded pre- and post-active trunk rotation measures were recorded using a reliable measuring device. Volunteers in the treatment group received a single application of thoracic MET to correct their rotation restriction. MET applied to the thoracic spine in the direction of restricted rotation significantly produced increased range of active trunk rotation ($p < 0.0005$), but not on the non-restricted side or in the untreated controls. This study supports the use of MET to increase restricted spinal rotation range of motion."

Knebl JA, Shores JH, Gamber RG, Gray WT, Herron KM. 2002 **Improving functional ability in the elderly via the Spencer technique, an osteopathic manipulative treatment: a randomized, controlled trial.** J Am Osteopath Assoc Jul;102(7):387-96 <http://www.ncbi.nlm.nih.gov/pubmed/12138953>

"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."

Yeo HK, Wright A 2011 **Hypoalgesic effect of a passive accessory mobilisation technique in patients with lateral ankle pain.** Manual Therapy Aug;16(4):373-7 <https://www.ncbi.nlm.nih.gov/pubmed/21285003>

"A randomised, double blind, repeated measures study was conducted to investigate the initial effects of an accessory mobilisation technique applied to the ankle joint in 13 patients with a unilateral sub-acute ankle supination injury. Ankle dorsiflexion range of motion, pressure pain threshold, visual analogue scale rating of pain during functional activity and ankle functional scores were assessed before and after application of treatment, manual contact control and no contact control conditions. There were significant improvements in ankle dorsiflexion range of motion ($p = 0.000$) and pressure pain threshold ($p = 0.000$) during the treatment condition. However no significant effects were observed for the other measures. These findings demonstrate that mobilisation of the ankle joint can produce an initial hypoalgesic effect and an improvement in ankle dorsiflexion range of motion."

Monaco A, Cozzolino V, Cattaneo R, Cutilli T, Spadaro A 2008 **Osteopathic manipulative treatment (OMT) effects on mandibular kinetics: kinesiographic study.** Eur J Paediatr Dent

"The study was conducted on 28 children with non-specific TMD [temporo-mandibular dysfunction] 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."

"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."

"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."

Case controlled studies

Number of studies: 1

Burns DK, Wells MR 2006 **Gross range of motion in the cervical spine: the effects of osteopathic muscle energy technique in asymptomatic subjects.** J Am Osteopath Assoc Mar;106(3):137-42 <http://www.ncbi.nlm.nih.gov/pubmed/16585381>

"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."

"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."

Suoh S, Donoyama N, Ohkoshi N 2016 **Anma massage (Japanese massage) therapy for patients with Parkinson's disease in geriatric health services facilities: Effectiveness on limited range of motion of the shoulder joint.** *Journal of Bodywork and Movement Therapies* Apr;20(2):364-72 <https://www.ncbi.nlm.nih.gov/pubmed/27210855>

"METHODS:

(1) Immediate treatment effects: 10 PD patients, in the intervention period with Hoehn and Yahr (H&Y) scale at stage 5, received 30-40 min sessions of Anma massage therapy. In the non-intervention period, six PD patients did not undergo this therapy. The shoulder joint range of motion (ROM) was measured before and after each session. (2) Continuous treatment effects: Six PD patients in the intervention period received the same massage sessions once a week continuously for seven weeks. One week after the completion of the treatment, the ROM of the shoulder joints was measured.

RESULTS:

(1) Shoulder abduction on the more affected side showed immediate significant improvements. (2) Shoulder abduction on the more affected side and less affected side showed notable effects of continuous treatment procedure leading to significant improvement.

CONCLUSION:

The above results suggested the efficacy of successive Anma massage therapy."

Yu IY, Jung IG, Kang MH, Lee DK, Oh JS 2015 **Immediate effects of an end-range mobilization technique on shoulder range of motion and skin temperature in individuals with posterior shoulder tightness.** *J Phys Ther Sci* Jun;27(6):1723-5 <https://www.ncbi.nlm.nih.gov/pubmed/26180306>

"This study investigated the effects of an end-range mobilization technique on the range of motion of the glenohumeral internal rotation and the skin temperature of the shoulder in individuals with posterior shoulder tightness. [Subjects] Thirteen subjects with posterior shoulder tightness who had glenohumeral internal rotation deficit $\geq 15^\circ$ participated. [Methods] All subjects underwent glenohumeral joint end-range mobilization intervention. The internal rotation range of motion of the glenohumeral joint was measured by a goniometer and the shoulder skin temperature was measured by a digital infrared thermographic imaging device before and immediately after the intervention. Paired t-tests were used to analyze the differences in these parameter pre and post-intervention. [Results] The glenohumeral internal rotation range of motion and skin temperature of the posterolateral shoulder increased significantly post-intervention. [Conclusion] The end-range mobilization technique is effective for increasing the glenohumeral internal rotation range of motion and skin temperature of the shoulder in individuals with posterior shoulder tightness."

McGregor C, Boyles R, Murahashi L, Sena T, Yarnall R 2014 **The immediate effects of thoracic transverse mobilization in patients with the primary complaint of mechanical neck pain: a pilot study.** *J Man Manip Ther* Nov;22(4):191-8 <https://www.ncbi.nlm.nih.gov/pubmed/25395827>

"A single-blinded quasi-experimental study with a one-group pretest-posttest design. A transverse group consisted of 21 participants whose neck pain increased with active movements. A non-intervention group of 20 asymptomatic participants was included simply to ensure rater blinding. The treatment group received Grades IV to IV+ transverse mobilizations at T1 through T4 bilaterally. Measurements taken immediately after intervention included pre/post cervical ROM, distant pressure pain threshold (PPT), and a numerical pain rating scale (NPRS). Analysis utilized t-tests and ordinal counterparts."

"The transverse group demonstrated significant gains in extension and bilateral rotation ($P \leq 0.005$) but not flexion or side-bend. A total of 57% of mobilized participants reported clinically meaningful decreased pain ($P < 0.001$). Seven participants exceeded the PPT MDC95 of 0.36 kg/cm². The non-intervention group had no significant changes in ROM or NPRS scores.

DISCUSSION: After 8 minutes of transverse mobilization to the upper thoracic spine, significant gains in cervical extension and bilateral rotation, and decreased pain scores were found. There were no adverse effects. Unlike other mobilization studies, PPT changes at a remote site were statistically but not clinically meaningful. Findings suggest that transverse mobilization would be a productive topic for controlled clinical trials."

Case series

Number of studies: 2

Fernández-de-las-Peñas C, Palomeque-del-Cerro L, Rodríguez-Blanco C, Gómez-Conesa A, Miangolarra-Page JC 2007 **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** Journal of Manipulative and Physiological Therapeutics Volume 30, Issue 4, May , Pages 312–320 <http://www.ncbi.nlm.nih.gov/pubmed/17509440>

"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."

"A significant ($P < .001$) decrease, with large within-group effect sizes ($d > 1$), in neck pain at rest were found after the thoracic spinal manipulation. 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."

"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."

Fernández-de-las-Peñas C, Downey C, Miangolarra-Page JC, 2005 **Immediate changes in radiographically determined lateral flexion range of motion following a single cervical HVLA manipulation in patients presenting with mechanical neck pain: A case series** International Journal of Osteopathic Medicine Volume 8, Issue 4, December , Pages 139–145 <http://www.sciencedirect.com>

"The aim of this case series was to describe the immediate changes of inter-vertebral motion at an identified dysfunctional cervical segment, as measured by functional X-rays in lateral flexion, following a supine cervical rotation manipulation in patients presenting with mechanical neck pain."

"Fifteen patients who presented with mechanical neck pain and who exhibited inter-vertebral joint dysfunction at C3–C4 or C4–C5 levels were recruited to participate in this case series. The radiological distance between the transverse process of the identified hypomobile vertebra and the transverse process of the subjacent vertebra, was measured pre- and 5 min post-manipulation during contralateral side flexion."

"Analysis of the pre-post-intervention radiographs showed a significant increase ($P = 0.01$) of the distance between the transverse process on the dysfunctional side following cervical manipulation. The mean pre-manipulative inter-vertebral radiological measurement was 18.9 mm (SD 2.1), and 20.6 mm (SD 2.1) at the post-manipulative assessment."

"These preliminary results demonstrated a trend toward an increase in inter-vertebral motion at the hypomobile segment, measured by functional radiography."

Number
of studies:
1

No clinically and/or statistically significant results

Randomised controlled trials

Number of studies: 1

Fryer GA, Mudge JM, McLaughlin PA. 2002 **The effect of talocrural joint manipulation on range of motion at the ankle.** *J Manipulative Physiol Ther* Jul-Aug;25(6):384-90 <https://www.ncbi.nlm.nih.gov/pubmed/12183696>

This study showed that gapping an ankle in asymptomatic subjects did not increase its range of dorsiflexion

OBJECTIVE:

To determine whether a single high-velocity, low-amplitude thrust manipulation to the talocrural joint altered ankle range of motion.

DESIGN:

A randomized, controlled and blinded study.

SUBJECTS:

Asymptomatic male and female volunteers (N = 41).

METHODS:

Subjects were randomly assigned into either an experimental group (n = 20) or a control group (n = 21). Both ankles of subjects in the experimental group were manipulated by using a single high-velocity, low-amplitude thrust to the talocrural joint. Pretest and posttest measurements of passive dorsiflexion range of motion were taken.

RESULTS:

No significant changes in dorsiflexion range of motion were detected between manipulated ankles and those of control subjects. A significantly greater pretest dorsiflexion range of motion existed in those ankles in which manipulation produced an audible cavitation.

CONCLUSION:

Manipulation of the ankle does not increase dorsiflexion range of motion in asymptomatic subjects. Ankles that displayed a greater pretest range of dorsiflexion were more likely to cavitate, raising the possibility that ligament laxity may be associated with the tendency for ankles to cavitate."