

Collected Scientific Research Relating to the Use of Osteopathy with Pain generally

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.

More research is being done all of the time. I am not aware of any research which shows that osteopathic treatment, delivered by a qualified osteopath, is ineffective in relation to this area. If you are aware of any studies that show that, please bring them to my attention.

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.

About pain:

Pain is a complex phenomenon, with a lot of different, individual causes. Because osteopathy looks at causes on an individual-by-individual basis, it is a particularly appropriate manual modality for use with people who have chronic pain.

These studies are from peer-reviewed journals

Number
of studies:
97

Clinically and statistically significant results

Number
of studies:
91

Systematic reviews

Number of studies: 8

Saracutu M, Davies H, Edwards DJ 2018 **The effects of osteopathic treatment on psychosocial factors in people with persistent pain: A systematic review** The effects of osteopathic treatment on psychosocial factors in people with persistent pain: A systematic review March, Volume 27, Pages 23–33 [https://www.journalofosteopathicmedicine.com/article/S1746-0689\(16\)30116-X/abstract](https://www.journalofosteopathicmedicine.com/article/S1746-0689(16)30116-X/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."

"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."

Calixtre LB, Moreira RF, Franchini GH, Albuquerque-Sendín F, Oliveira AB. 2015 **Manual therapy for the management of pain and limited range of motion in subjects with signs and symptoms of temporomandibular disorder: a systematic review of randomised controlled trials.** J Oral Rehabil Nov;42(11):847-61 <https://www.ncbi.nlm.nih.gov/pubmed/26059857>

"There is a lack of knowledge about the effectiveness of manual therapy (MT) on subjects with temporomandibular disorders (TMD). The aim of this systematic review is to synthesise evidence regarding the isolated effect of MT in improving maximum mouth opening (MMO) and pain in subjects with signs and symptoms of TMD. MEDLINE(®) , Cochrane, Web of Science, SciELO and EMBASE(™) electronic databases were consulted, searching for randomised controlled trials applying MT for TMD compared to other intervention, no intervention or placebo. Two authors independently extracted data, PEDro scale was used to assess risk of bias, and GRADE (Grading of Recommendations Assessment, Development and Evaluation) was applied to synthesise overall quality of the body of evidence. Treatment effect size was calculated for

pain, MMO and pressure pain threshold (PPT). Eight trials were included, seven of high methodological quality. Myofascial release and massage techniques applied on the masticatory muscles are more effective than control (low to moderate evidence) but as effective as toxin botulinum injections (moderate evidence). Upper cervical spine thrust manipulation or mobilisation techniques are more effective than control (low to high evidence), while thoracic manipulations are not. There is moderate-to-high evidence that MT techniques protocols are effective. The methodological heterogeneity across trials protocols frequently contributed to decrease quality of evidence. In conclusion, there is widely varying evidence that MT improves pain, MMO and PPT in subjects with TMD signs and symptoms, depending on the technique. Further studies should consider using standardised evaluations and better study designs to strengthen clinical relevance."

Miller J, Gross A, D'Sylva J, Burnie SJ, Goldsmith CH, Graham N, Haines T, Brønfort G, Hoving JL 2010 **Manual therapy and exercise for neck pain: A systematic review**. *Manual Therapy* Jun 1 <https://www.ncbi.nlm.nih.gov/pubmed/20593537>

"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."

Clinical Guideline Subcommittee on Low Back Pain; American Osteopathic Association. 2010 **American Osteopathic Association guidelines for osteopathic manipulative treatment (OMT) for patients with low back pain**. *J Am Osteopath Assoc* Nov;110(11):653-66 <http://jaoa.org/article.aspx?articleid=2093924>

"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 weighted by the inverse variance of individual comparisons"

"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. "

"Significant pain reductions were also observed during short-, inter mediate-, and long-term follow-up."

"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."

Walser RF, Meserve BB, Boucher TR 2009 **The effectiveness of thoracic spine manipulation for the management of musculoskeletal conditions: a systematic review and meta-analysis of randomized clinical trials**. *J Man Manip Ther* 17(4):237-46 <http://www.maneyonline>.

"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."

Licciardone JC, Brimhall AK, King LN 2005 **Osteopathic manipulative treatment for low back pain: a systematic review and meta-analysis of randomized controlled trials.** BMC Musculoskelet Disord Aug 4;6:43 <http://www.ncbi.nlm.nih.gov/pubmed/16080794>

"Overall, OMT [osteopathic manipulative therapy] 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."

"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."

Bronfort G, Assendelft WJ, Evans R, Haas M, Bouter L 2001 **Efficacy of spinal manipulation for chronic headache: a systematic review.** Journal of Manipulative and Physiological Therapeutics Sep;24(7):457-66 <http://www.ncbi.nlm.nih.gov/pubmed/11562654>

"Randomized clinical trials on chronic headache (tension, migraine and cervicogenic) were included in the review if they compared SMT [spinal manipulative therapy] with other interventions or placebo. The trials had to have at least 1 patient-rated outcome measure such as pain severity, frequency, duration, improvement, use of analgesics, disability, or quality of life."

"Nine trials involving 683 patients with chronic headache were included. The methodological quality (validity) scores ranged from 21 to 87 (100-point scale)."

"SMT appears to have a better effect than massage for cervicogenic headache. It also appears that SMT has an effect comparable to commonly used first-line prophylactic prescription medications for tension-type headache and migraine headache."

Bronfort G, Haas M, Evans RL, Bouter LM. 2004 **Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis.** The Spine Journal May-Jun;4(3):335-56 <http://www.ncbi.nlm.nih.gov/pubmed/15125860>

"Our data synthesis suggests that recommendations can be made with some confidence regarding the use of SMT (spinal manipulation therapy) and/or MOB (mobilisation) as a viable

Randomised controlled trials

Number of studies: 59

Martí-Salvador M, Hidalgo-Moreno L, Doménech-Fernández J, Lisón JF, Arguisuelas MD. 2018 **Osteopathic manipulative treatment including specific diaphragm techniques improves pain and disability in chronic non-specific low back pain: a randomized trial.** Arch Phys Med Rehabil May 19 <https://www.ncbi.nlm.nih.gov/pubmed/29787734>

"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 non-specific low back pain (NS-CLBP).

DESIGN:

Parallel group randomized controlled trial SETTING: private and institutional health centers.

PARTICIPANTS:

Sixty-six subjects (18-60 yrs.) 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 five sessions provided during 4 weeks.

MAIN OUTCOME MEASURE:

The primary outcomes were pain [evaluated with the Short-Form McGill Pain Questionnaire (SF-MPQ) and the Visual Analogue 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 (MD -6.2;95%CI: -8.6 to -3.8); VAS (MD -2.7;95%CI: -3.6 to -1.8); RMQ (MD -3.8;95%CI: -5.4 to -2.2); ODI (MD -10.6;95%CI: -14.9 to 6.3)]. Moreover, improvements in pain and disability were clinically relevant.

CONCLUSION:

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.

Tamer S, Öz M, Ülger Ö 2017 **The effect of visceral osteopathic manual therapy applications on pain, quality of life and function in patients with chronic nonspecific low back pain.** J Back Musculoskelet Rehabil 30(3):419-425 <https://www.ncbi.nlm.nih.gov/pubmed/27858681>

"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."

Carnes D, Marsa T, Plunkett L, Nankeeb N, Abbey H 2017 **A mixed methods evaluation of a third wave cognitive behavioural therapy and osteopathic treatment programme for chronic pain in primary care (OsteoMAP)** International Journal of Osteopathic Medicine Volume 24, June 2017, Pages 12-17 <http://www.sciencedirect.com/science/article/pii/S1746068916300839>

"This evaluation included a non-randomised before-and-after patient reported outcomes study with an embedded fidelity evaluation. Patients were seen for 1 h per week for six weeks. They received a questionnaire prior to receiving treatment and six months later. A purposive sample of patients were interviewed and clinical sessions were observed to evaluate competence and adherence to the intervention manual.

Results

208 patients were enrolled and 86% attended 3 or more OsteoMAP sessions. 82 students were trained to deliver the intervention under supervision. They were >90% adherent to the manual in 8 of the 12 domains measured. At baseline ($n = 147$), 69% of patients were female, 64% white and 77% reported pain for more than one year. At 6 months (matched pairs $n = 63$), there were clinically important changes of 58% in a composite score for pain, function, mood and coping (Bournemouth Questionnaire) and significantly higher psychological flexibility scores (difference in means 6.98 (95% CI 4.2,9.8)) (Acceptance and Action Questionnaire). No statistically significant change was seen in mindfulness (Freiburg Mindfulness Inventory), 30% of patients reported temporary symptom increases during the course but 95% were satisfied or very satisfied with their overall experience and outcomes.

Conclusions

OsteoMAP was feasible, well received with some beneficial effects. Integrating psychological and osteopathic care shows promise and further research is warranted to assess effectiveness."

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."

Dunning JR, Butts R, Mourad F, Young I, Fernandez-de-Las Peñas C, Hagins M, Stanislawski T, Donley J, Buck D, Hooks TR, Cleland JA 2016 **Upper cervical and upper thoracic manipulation versus mobilization and exercise in patients with cervicogenic headache: a multi-center randomized clinical trial.** BMC Musculoskelet Disord Feb 6;17(1):64 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4744384/>

"One hundred and ten participants ($n = 110$) with CH were randomized to receive both cervical and thoracic manipulation ($n = 58$) or mobilization and exercise ($n = 52$). The primary outcome was headache intensity as measured by the Numeric Pain Rating Scale (NPRS). Secondary outcomes included headache frequency, headache duration, disability as measured by the Neck Disability Index (NDI), medication intake, and the Global Rating of Change (GRC). The treatment period was 4 weeks with follow-up assessment at 1 week, 4 weeks, and 3 months after initial treatment session."

"The 2X4 ANOVA demonstrated that individuals with CH who received both cervical and thoracic manipulation experienced significantly greater reductions in headache intensity ($p < 0.001$) and disability ($p < 0.001$) than those who received mobilization and exercise at a 3-month follow-up. Individuals in the upper cervical and upper thoracic manipulation group also experienced less frequent headaches and shorter duration of headaches at each follow-up period ($p < 0.001$ for all). Additionally, patient perceived improvement was significantly greater at 1 and 4-week follow-up periods in favor of the manipulation group ($p < 0.001$)."

"Six to eight sessions of upper cervical and upper thoracic manipulation were shown to be more effective than mobilization and exercise in patients with CH, and the effects were maintained at 3 months."

Castro-Sánchez AM, Lara-Palomo IC, Matarán-Peñarrocha GA, Saavedra-Hernández M, Pérez-Mármol JM, Aguilar-Ferrándiz ME 2016 **Benefits of Craniosacral Therapy in Patients with Chronic Low Back Pain: A Randomized Controlled Trial.** The Journal of Alternative and Complementary Medicine Aug;22(8):650-7 <https://www.ncbi.nlm.nih.gov/pubmed/27347698>

"Abstract

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 ± SD, 50 ± 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."

Gesslbauer C, Vavti N, Keilani M, Mickel M, Crevenna R 2016 **Effectiveness of osteopathic manipulative treatment versus osteopathy in the cranial field in temporomandibular disorders - a pilot study**. *Disabil Rehabil* Dec 28:1-6 <https://www.ncbi.nlm.nih.gov/pubmed/28029069>

"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."

Crisóstomo RS, Costa DS, Martins L, Fernandes TI, Armada-da-Silva PA. 2015 **Influence of manual lymphatic drainage on health-related quality of life and symptoms of chronic venous insufficiency: a randomized controlled trial**. *Arch Phys Med Rehabil* Feb;96(2):283-91 <https://www.ncbi.nlm.nih.gov/pubmed/25308883>

"OBJECTIVE:

To evaluate the efficacy of manual lymphatic drainage (MLD) in improving health-related quality of life (HRQOL), symptomatology, and physical status in patients with chronic venous insufficiency (CVI).

DESIGN:

Single-blind randomized controlled trial.

SETTING:

Health community attendant service.

PARTICIPANTS:

Subjects with CVI (N=41) were randomly assigned to an experimental group (n=20; mean age, 54.6±11.3y) or control group (n=21; mean age, 46.8±11.1y).

INTERVENTIONS:

The experimental group completed 10 lower extremity MLD sessions over 4 weeks and 1 educational session. The control group only attended the educational session. Outcome measures were taken at baseline (t0), at the end of 4 weeks (t1), and after 2 months for follow-up (t2).

MAIN OUTCOME MEASURES:

HRQOL was assessed with the Chronic Venous Insufficiency Quality of Life Questionnaire-20, symptoms (fatigue, heaviness) were assessed with a visual analog scale, severity of the disease was assessed with the Venous Clinical Severity Score (VCSS) (total score, score for each item), leg volumetry was assessed with perimeters, and plantar/dorsiflexion strength and ankle range of motion (ROM) were assessed with dynamometry.

RESULTS:

A significant interaction group×time effect was found for pain on HRQOL ($F_{2,78}=3.507$; $P=.035$; partial $\eta^2=.087$), clinical severity ($F_{2,78}=5.231$; $P=.007$; partial $\eta^2=.118$), especially for venous edema (assessed with the VCSS), fatigue ($F_{1.67,65.21}=4.690$; $P=.012$; partial $\eta^2=.107$), and heaviness ($F_{1.57,61.32}=9.702$; $P=.001$; partial $\eta^2=.199$), with the experimental group improving from t0 to t1 and t0 to t2 in all of these outcomes. No effect of MLD treatment could be found for ankle muscle strength, ankle ROM, and leg volume.

CONCLUSIONS:

Short-term MLD treatment ameliorates CVI severity and related edema, symptoms, and pain HRQOL in patients with CVI."

Trivedi P, Sathiyavani D, Nambi G, Khuman R, Shah K, Bhatt P 2014 **Comparison of active release technique and myofascial release technique on pain, grip strength & functional performance in patients with chronic lateral epicondylitis** Int J Physiother Res 2(3) http://www.ijmhr.org/ijpr_articles_vol2_3/IJPR-2014-616.pdf

"The study included thirty-six patients with Chronic Lateral Epicondylitis of age group range between 30 to 45 years. Patients were randomly divided into three groups: Control Group (A), Active Release Technique Group (B) and Myofascial Release Technique Group (C). The patients were treated for 4 weeks and three outcome measures: 0-10 NPRS, Hand Dynamometer and PRTEE were taken for assessment and analysis at baseline and after 4th weeks was done.

Result: In this study the result showed that Active Release Technique and Myofascial Release Technique were effective in all three outcome measures when compared to Control Group. Myofascial Release Technique was more effective in improving grip strength & reducing pain & disability when compared to Active Release Technique.($p<0.05$)"

Licciardone JC, Kearns CM, Crow WT 2014 **Changes in biomechanical dysfunction and low back pain reduction with osteopathic manual treatment: Results from the OSTEOPATHIC Trial** Manual Therapy Vol 19 (4) pages 324-330 <http://www.sciencedirect.com/science/article/pii/S1356689X14000381>

"Significant improvements in each biomechanical dysfunction were observed with OMT [osteopathic manipulative therapy]."

Licciardone JC, Aryal S, 2014 **Clinical response and relapse in patients with chronic low back pain following osteopathic manual treatment: Results from the OSTEOPATHIC Trial** Manual Therapy Volume 19, Issue 6, December, Pages 541–548 <http://www.sciencedirect.com/science/article/pii/S1356689X14001143>

"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 (≥ 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)."
"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."

Schwerla F, Wirthwein P, Rütz M, Resch K-L 2014 **Osteopathic treatment in patients with primary dysmenorrhoea: A randomised controlled trial** *International Journal of Osteopathic Medicine* 17 (4), pp. 222-231 [http://www.journalofosteopathicmedicine.com/article/S1746-0689\(14\)00028-5/fulltext](http://www.journalofosteopathicmedicine.com/article/S1746-0689(14)00028-5/fulltext)

"Design and settings: Multi-centered randomised controlled trial with an osteopathic intervention group and an untreated ("waiting list") control group. Subjects: Women aged 14 years and older with a regular menstrual cycle, diagnosed with primary dysmenorrhoea. Intervention: Six osteopathic treatments over a period of three menstrual cycles or no osteopathic treatment. At each treatment session, dysfunctional structures were tested and treated based on osteopathic principles. In both groups, pain medication on demand was allowed, but was documented. Outcome measures: Primary outcome measures were average pain intensity (API) during menstruation, assessed by the Numeric Rating Scale (NRS), and days of dysmenorrhoeal pain exceeding 50% of NRS maximum (DDP). Main secondary outcome measure was health-related quality of life. Results: A total of 60 individuals (average age 33 years) were randomised, seven patients dropped out. API decreased in the intervention group from 4.6 to 1.9 (95%CI=-1.9 to -3.5), and from 4.3 to 4.2 in controls (95%CI=-0.7 to 0.5); between group difference of means (BGDoM): 2.6, 95%CI=1.7 to 3.6; $p < 0.005$. DDP decreased from 2.2 to 0.2 days in the intervention group (95%CI=-2.5 to -1.3), and from 2.3 to 1.9 in controls (95%CI=-1.0 to 0.2); BGDoM 1.5; 95%CI=0.6 to 2.3; $p = 0.002$. A positive impact on quality of life (physical component score) could be observed in the osteopathic treatment group only. Conclusions: A series of osteopathic treatments might be beneficial for women suffering from primary dysmenorrhoea."
"The most frequent osteopathic dysfunctions were observed in the area of the pelvic floor (100% of patients) and respiratory diaphragm (92% of patients) as well as within the lumbar spine (80% of patients) and the association of the bones of the head (76% of patients)."

Vieira-Pellenz F, Oliva-Pascual-Vaca A, Rodriguez-Blanco C, Heredia-Rizo AM, Ricard F, Almazán-Campos G 2014 **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**. *Arch Phys Med Rehabil* Sep;95(9):1613-9 <http://www.ncbi.nlm.nih.gov/pubmed/24862763>

"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)."
"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."
"A single L5-S1 SM technique (pull-move) was performed in the TG, whereas the CG received a single placebo intervention."
"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."
"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 ($P < .001$)"

"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."

Ajimsha MS, Binsu D, Chithra S 2014 **Effectiveness of myofascial release in the management of plantar heel pain: a randomized controlled trial.** Foot (Edinb) Jun;24(2):66-71 <http://www.ncbi.nlm.nih.gov/pubmed/24703512>

"Previous studies have reported that stretching of the calf musculature and the plantar fascia are effective management strategies for plantar heel pain (PHP). However, it is unclear whether myofascial release (MFR) can improve the outcomes in this population.

OBJECTIVE:

To investigate whether myofascial release (MFR) reduces the pain and functional disability associated with plantar heel pain (PHP) in comparison with a control group receiving sham ultrasound therapy (SUST).

DESIGN:

Randomized, controlled, double blinded trial.

SETTING:

Nonprofit research foundation clinic in India.

METHOD:

Sixty-six patients, 17 men and 49 women with a clinical diagnosis of PHP were randomly assigned into MFR or a control group and given 12 sessions of treatment per client over 4 weeks. The Foot Function Index (FFI) scale was used to assess pain severity and functional disability. The primary outcome measure was the difference in FFI scale scores between week 1 (pretest score), week 4 (posttest score), and follow-up at week 12 after randomization. Additionally, pressure pain thresholds (PPT) were assessed over the affected gastrocnemii and soleus muscles, and over the calcaneus, by an assessor blinded to the treatment allocation.

RESULTS:

The simple main effects analysis showed that the MFR group performed better than the control group in weeks 4 and 12 ($P < 0.001$). Patients in the MFR and control groups reported a 72.4% and 7.4% reduction, respectively, in their pain and functional disability in week 4 compared with that in week 1, which persisted as 60.6% in the follow-up at week 12 in the MFR group compared to the baseline. The mixed ANOVA also revealed significant group-by-time interactions for changes in PPT over the gastrocnemii and soleus muscles, and the calcaneus ($P < 0.05$).

CONCLUSIONS:

This study provides evidence that MFR is more effective than a control intervention for PHP"

Saban B, Deutscher D, Ziv T 2014 **Deep massage to posterior calf muscles in combination with neural mobilization exercises as a treatment for heel pain: a pilot randomized clinical trial.** Manual Therapy Apr;19(2):102-8 <http://www.ncbi.nlm.nih.gov/pubmed/24090993>

"Plantar heel pain syndrome (PHPS) is a common foot disorder; however, there is limited clinical evidence on which to base treatment. Repeated clinical observations indicating heel pain during heel rise and mini squat on the affected leg, involving activation of posterior calf muscles, formed the basis of this study.

OBJECTIVE:

To compare deep massage therapy to posterior calf muscles and neural mobilization with a self-stretch exercise program (DMS) to a common treatment protocol of ultrasound therapy to the painful heel area with the same self-stretch exercises (USS).

METHODS:

Patients with PHPS were assigned to a program of 8 treatments over a period of 4-6 weeks in a single-blind randomized clinical trial. Functional status (FS) at admission and discharge from therapy as measured by the Foot & Ankle Computerized Adaptive Test was the main outcome measure.

RESULTS:

Sixty-nine patients were included in the trial (mean age 53, standard deviation (SD) 13, range 25-86, 57% women), 36 received DMS treatment and 33 with USS. The overall group-by-time

interaction for the mixed-model analysis of variance (ANOVA) was found statistically significant ($p=0.034$), with a change of (mean (confidence interval, CI)) 15 (9-21) and 6 (1-11) FS points for the DMS and USS groups, respectively.

CONCLUSIONS:

Data indicated that both treatment protocols resulted in an overall short-term improvement, however, DMS treatment was significantly more effective in treating PHPS than USS treatment."

Salom-Moreno J, Ortega-Santiago R, Cleland JA, Palacios-Ceña M, Truyols-Domínguez S, Fernández-de-las-Peñas C. 2014 **Immediate changes in neck pain intensity and widespread pressure pain sensitivity in patients with bilateral chronic mechanical neck pain: a randomized controlled trial of thoracic thrust manipulation vs non-thrust mobilization.** J Manipulative Physiol Ther Jun;37(5):312-9 <https://www.ncbi.nlm.nih.gov/pubmed/24880778>

"OBJECTIVE:

The purpose of this study was to compare the effects of thoracic thrust manipulation vs thoracic non-thrust mobilization in patients with bilateral chronic mechanical neck pain on pressure pain sensitivity and neck pain intensity.

METHODS:

Fifty-two patients (58% were female) were randomly assigned to a thoracic spine thrust manipulation group or of thoracic non-thrust mobilization group. Pressure pain thresholds (PPTs) over C5-C6 zygapophyseal joint, second metacarpal, and tibialis anterior muscle and neck pain intensity (11-point Numerical Pain Rate Scale) were collected at baseline and 10 minutes after the intervention by an assessor blinded to group allocation. Mixed-model analyses of variance (ANOVAs) were used to examine the effects of the treatment on each outcome. The primary analysis was the group * time interaction.

RESULTS:

No significant interactions were found with the mixed-model ANOVAs for any PPT (C5-C6: $P>.252$; second metacarpal: $P>.452$; tibialis anterior: $P>.273$): both groups exhibited similar increases in PPT (all, $P<.01$), but within-group and between-group effect sizes were small (standardized mean score difference [SMD] <0.22). The ANOVA found that patients receiving thoracic spine thrust manipulation experienced a greater decrease in neck pain (between-group mean difference: 1.4; 95% confidence interval, 0.8-2.1) than did those receiving thoracic spine non-thrust mobilization ($P<.001$). Within-group effect sizes were large for both groups (SMD >2.1), and between-group effect size was also large (SMD = 1.3) in favor of the manipulative group.

CONCLUSIONS:

The results of this randomized clinical trial suggest that thoracic thrust manipulation and non-thrust mobilization induce similar changes in widespread PPT in individuals with mechanical neck pain; however, the changes were clinically small. We also found that thoracic thrust manipulation was more effective than thoracic non-thrust mobilization for decreasing intensity of neck pain for patients with bilateral chronic mechanical neck pain."

Licciardone JC, Kearns CM, Hodge LM, Minotti DE. 2013 **Osteopathic manual treatment in patients with diabetes mellitus and comorbid chronic low back pain: subgroup results from the OSTEOPATHIC Trial.** J Am Osteopath Assoc Jun;113(6):468-78 <http://jaoa.org/article.aspx?articleid=2094659>

"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 [osteopathic manipulative therapy] had significant reductions in LBP [low back pain] severity during the 12-week period. Decreased circulating levels of TNF- α may represent a possible mechanism for OMT effects in patients with diabetes mellitus."

Licciardone JC, Kearns CM, Minotti DE 2013 **Outcomes of osteopathic manual treatment for chronic low back pain according to baseline pain severity: results from the OSTEOPATHIC Trial.** Manual Therapy Dec;18(6):533-40 <http://www.ncbi.nlm.nih.gov/pubmed/23759340>

"The OSTEOPATHIC Trial used a randomized, double-blind, sham-controlled, 2x2 factorial design to study OMT [osteopathic manual treatment] for chronic LBP [low back pain]. 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."

"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."

"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."

von Heymann W, Schloemer P, Timm J, Muehlbauer B 2013 **Spinal High-Velocity Low Amplitude Manipulation in Acute Nonspecific Low Back Pain: A Double-Blinded Randomized Controlled Trial in Comparison With Diclofenac and Placebo** Spine Issue: Volume 38(7), 01 April, p 540–548 <http://www.ncbi.nlm.nih.gov/pubmed/23026869>

"Objective. To investigate in acute nonspecific low back pain (LBP) the effectiveness of spinal high-velocity low-amplitude (HVLA) manipulation compared with the nonsteroidal anti-inflammatory drug diclofenac and with placebo.

Summary of Background Data. LBP is an important economical factor in all industrialized countries. Few studies have evaluated the effectiveness of spinal manipulation in comparison to nonsteroidal anti-inflammatory drugs or placebo regarding satisfaction and function of the patient, off-work time, and rescue medication.

Methods. A total of 101 patients with acute LBP (for <48 hr) were recruited from 5 outpatient practices, exclusion criteria were numerous and strict. The subjects were randomized to 3 groups: (1) spinal manipulation and placebo-diclofenac; (2) sham manipulation and diclofenac; (3) sham manipulation and placebo-diclofenac. Outcomes registered by a second and blinded investigator included self-rated physical disability, function (SF-12), off-work time, and rescue medication between baseline and 12 weeks after randomization.

Results. Thirty-seven subjects received spinal manipulation, 38 diclofenac, and 25 no active treatment. The placebo group with a high number of dropouts for unsustainable pain was closed *praecox*. Comparing the 2 active arms with the placebo group the intervention groups were significantly superior to the control group. Ninety subjects were analyzed in the collective intention to treat. Comparing the 2 intervention groups, the manipulation group was significantly better than the diclofenac group (Mann-Whitney test: P = 0.0134). No adverse effects or harm was registered.

Conclusion. In a subgroup of patients with acute nonspecific LBP, spinal manipulation was significantly better than nonsteroidal anti-inflammatory drug diclofenac and clinically superior to placebo."

Küçükşen S, Yılmaz H, Sallı A, Uğurlu H 2013 **Muscle energy technique versus corticosteroid injection for management of chronic lateral epicondylitis: randomized controlled trial with 1-year follow-up.** Arch Phys Med Rehabil Nov;94(11):2068-74 <http://www.ncbi.nlm.nih.gov/pubmed/23796685>

"OBJECTIVE:

To determine the short- and long-term effectiveness of the muscle energy technique (MET) compared with corticosteroid injections (CSIs) for chronic lateral epicondylitis (LE).

DESIGN:

Randomized controlled trial with 1 year of follow-up.

SETTING:

Outpatient clinic of a university's department of physical medicine and rehabilitation.

PARTICIPANTS:

Patients with chronic LE (N=82; 45 women, 37 men).

INTERVENTIONS:

Eight sessions of MET, or a single CSI was applied.

MAIN OUTCOME MEASURES:

Grip strength, pain intensity, and functional status were assessed using the pain-free grip strength (PFGS), a visual analog scale (VAS), and the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, respectively. Measurements were performed before beginning treatment and at 6, 26, and 52 weeks afterward.

RESULTS:

When the baseline PFGS, VAS, and DASH scores were compared with the scores at the 52-week follow-up, statistically significant improvements were observed in both groups over time. The patients who received a CSI showed significantly better effects at 6 weeks according to the PFGS and VAS scores, but declined thereafter. At the 26- and 52-week follow-ups, the patients who received the MET were statistically significantly better in terms of grip strength and pain scores. At 52 weeks, the mean PFGS score in the MET group was significantly higher (75.08 ± 26.19 vs 62.24 ± 21.83 ; $P = .007$) and the mean VAS score was significantly lower (3.28 ± 2.86 vs 4.95 ± 2.36 ; $P = .001$) than those of the CSI group. Although improvements in the DASH scores were more pronounced in the MET group, the differences in DASH scores between the groups were not statistically significant.

CONCLUSIONS:

This study showed that while both MET and CSI improved measures of strength, pain, and function compared with baseline, subjects receiving MET had better scores at 52 weeks for PFGS and the VAS for pain. We conclude that MET appears to be an effective intervention in the treatment of LE."

Licciardone JC, Minotti DE, Gatchel RJ, Kearns CM, Singh KP. 2013 **Osteopathic manual treatment and ultrasound therapy for chronic low back pain: a randomized controlled trial.** *Ann Fam Med* Mar-Apr;11(2):122-9 <http://www.ncbi.nlm.nih.gov/pubmed/23508598>

"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."

Vismara L, Cimolin V, Menegonia F, Zaina F, Galli M, Negrini S, Villa V, Capodaglio P, 2012 **Osteopathic manipulative treatment in obese patients with chronic low back pain: A pilot study** *Manual Therapy* Volume 17, Issue 5, October, Pages 451–455 <http://www.sciencedirect.com/science/article/pii/S1356689X12000987>

"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 [chronic low back pain]."

"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."

"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. "

Tozzi P, Bongiorno D, Vitturinia C, 2012 **Low back pain and kidney mobility: local osteopathic fascial manipulation decreases pain perception and improves renal mobility** *Journal of Bodywork and Movement Therapies* Volume 16, Issue 3, July, Pages 381–391 <http://www.sciencedirect.com/science/article/pii/S1360859212000605>

"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 ± 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 ± 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 tension.

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

Cruser dA, Maurer D, Hensel K, Brown SK, White K, Stoll ST. 2012 **A randomized, controlled trial of osteopathic manipulative treatment for acute low back pain in active duty military personnel.** *J Man Manip Ther* Feb;20(1):5-15 <http://www.ncbi.nlm.nih.gov/pubmed/23372389>

"Sixty-three male and female soldiers ages 18 to 35 were randomly assigned to a group receiving OMT [osteopathic manipulative treatment] plus usual care or a group receiving usual care only (UCO)."

"The primary outcome measures were pain on the quadruple visual analog scale, and functioning on the Roland Morris Disability Questionnaire. Outcomes were measured immediately preceding each of four treatment sessions and at four weeks post-trial. "

"Analysis found significantly greater post-trial improvement in 'Pain Now' for OMT compared to UCO ($P=0.026$). Furthermore, the OMT group reported less 'Pain Now' and 'Pain Typical' at all visits ($P=0.025$ and $P=0.020$ respectively). Osteopathic manipulative treatment subjects also tended to achieve a clinically meaningful improvement from baseline on 'Pain at Best' sooner than the UCO subjects. With similar baseline expectations, OMT subjects reported significantly greater satisfaction with treatment and overall self-reported improvement ($P<0.01$)."

"This study supports the effectiveness of OMT in reducing ALBP [acute low back pain] pain in active duty military personnel."

Parker J, Heinking KP, Kappler RE 2012 **Efficacy of osteopathic manipulative treatment for low back pain in euhydrated and hypohydrated conditions: a randomized crossover trial.** *J Am Osteopath Assoc* May;112(5):276-84 <http://www.ncbi.nlm.nih.gov/pubmed/22582197>

"Both euhydrated and hypohydrated conditions were achieved in each participant by modifying water consumption for 36 hours before OMT [osteopathic manipulative therapy] sessions. received 2 sessions of OMT, each in a different hydration condition and with a 1-week washout period in between."

"Improvements in total and severe number of lumbar somatic dysfunction ($P=.001$ and $P=.013$, respectively) and number of asymmetric landmarks on standing structural examination ($P=.002$) were found to be greater in the euhydrated vs the hypohydrated condition. PARTICIPANTS had a mean of 2 fewer areas of posttreatment somatic dysfunction when euhydrated than when hypohydrated, and they had a mean decrease of 2 asymmetric landmarks on the standing structural examination when euhydrated but none when hypohydrated. Osteopathic manipulative treatment improved self-reported pain immediately after treatment regardless of hydration status. Outcome measures improved for all participants, with greater improvement observed after participants were treated in the euhydrated condition than when in the hypohydrated condition. It is reasonable for clinicians to recommend that patients increase their hydration to optimize treatment."

Kalamir A, Bonello R, Graham P, Vitiello AL, Pollard H 2012 **Intraoral myofascial therapy for chronic myogenous temporomandibular disorder: a randomized controlled trial** *Journal of Manipulative and Physiological Therapeutics* 35(1):26-37 <http://jaoa.org/article.aspx?articleid=2094255>

"Studies investigating the efficacy of intraoral myofascial therapies (IMTs) for chronic temporomandibular disorder (TMD) are rare. The present study was an expansion of a previously published pilot study that investigated whether chiropractic IMT and the addition of education and self-care were superior to no-treatment or IMT alone for 5 outcome measures- interincisal opening range, jaw pain at rest, jaw pain upon opening, jaw pain upon clenching, and global reporting of change-over the course of 1 year.

METHODS:

Ninety-three participants with myogenous TMD between the ages of 18 and 50 years experiencing chronic jaw pain of longer than 3 months in duration were recruited for the study. Successful applicants were randomized into 1 of 3 groups: (1) IMT consisting of 2 treatment

interventions per week for 5 weeks, (2) IMT plus education and "self-care" exercises (IMTESC), and (3) wait-list control. The main outcome measures were used. Range of motion findings were measured by vernier callipers in millimeters, and pain scores were quantified using an 11-point self-reported graded chronic pain scale. Global reporting of change was a 7-point self-reported scale, balanced positively and negatively around a zero midpoint.

RESULTS:

There were statistically significant differences in resting, opening and clenching pain, opening scores, and global reporting of change ($P < .05$) in both treatment groups compared with the controls at 6 months and 1 year. There were also significant differences between the 2 treatment groups at 1 year."

McSweeney TP, Thomson OP, Johnston R 2012 **The immediate effects of sigmoid colon manipulation on pressure pain thresholds in the lumbar spine.** *Journal of Bodywork and Movement Therapies* Oct;16(4):416-23 [http://www.bodyworkmovementtherapies.com/article/S1360-8592\(12\)00063-0/abstract?cc=y=](http://www.bodyworkmovementtherapies.com/article/S1360-8592(12)00063-0/abstract?cc=y=)

"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 interosseus 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."

Castro-Sánchez AM, Matarán-Peñarrocha GA, Sánchez-Labraca N, Quesada-Rubio JM, Granero-Molina J, Moreno-Lorenzo C 2011 **A randomized controlled trial investigating the effects of craniosacral therapy on pain and heart rate variability in fibromyalgia patients.** *Clin Rehabil* Jan;25(1):25-35 <http://www.ncbi.nlm.nih.gov/pubmed/20702514>

"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."

"Craniosacral therapy improved medium-term pain symptoms in patients with fibromyalgia."

Voigt K, Liebnitzky J, Burmeister U, Sihvonen-Riemenschneider H, Beck M, Voigt R, Bergmann A, 2011 **Efficacy of Osteopathic Manipulative Treatment of Female Patients with Migraine: Results of a Randomized Controlled Trial** *The Journal of Alternative and Complementary Medicine* March 17(3): 225-230 <http://online.liebertpub.com/doi/abs/10.1089/acm.2009.0673>

"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."

"The total MIDAS [migraine disability assessment] 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."

"This study affirms the effects of OMT [osteopathic manipulative therapy] 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 [health related quality of life]."

Arienti C, Daccò S, Piccolo I, Redaelli T 2011 **Osteopathic manipulative treatment is effective on pain control associated to spinal cord injury**. *Spinal Cord* Apr;49(4):515-9 <http://www.ncbi.nlm.nih.gov/pubmed/21135862>

"We enrolled 47 patients with SCI [spinal cord injury], 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."

"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."

"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."

Duman I, Ozdemir A, Tan AK, Dincer K. 2009 **The efficacy of manual lymphatic drainage therapy in the management of limb edema secondary to reflex sympathetic dystrophy**. *Rheumatol Int* May;29(7):759-63 <http://www.ncbi.nlm.nih.gov/pubmed/19030864>

"The objective of this study is to investigate the efficacy of manual lymphatic drainage (MLD) therapy in edema secondary to the reflex sympathetic dystrophy (RSD). A total of 34 patients were allocated randomly into two groups. All of the patients undertook nonsteroidal anti-inflammatory drug, physical therapy and therapeutic exercise program for 3 weeks. Patients in study group undertook MLD therapy additionally. Then the patients continued 2-month maintenance period with recommended home programs. Volumetric measurements pain scores and functional measurements were assessed at baseline, after treatment and 2 months after the treatment. After treatment, improvement in edema was statistically significant in the study group but not in the control group. At follow-up, with respect to baseline, improvements were not significant in both of the groups. Between the groups, difference of the percentage improvements in edema was statistically significant with superiority of MLD group after treatment, but not significant at follow-up. In this pilot study, MLD therapy was found to be beneficial in the management of edema resulted from RSD. Although the long-term results showed tendency towards improvement, the difference was not significant."

Duman I, Ozdemir A, Tan AK, Dincer K. 2009 **The efficacy of manual lymphatic drainage therapy in the management of limb edema secondary to reflex sympathetic dystrophy**. *Rheumatol Int* May;29(7):759-63 <http://www.ncbi.nlm.nih.gov/pubmed/19030864>

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Schwerla F, Bischoff A, Nurnberger A, Genter P, Guillaume JP, Resch KL. 2008 **Osteopathic treatment of patients with chronic non-specific neck pain: a randomised controlled trial of efficacy.** *Forsch Komplementmed* Jun;15(3):138-45 <https://www.ncbi.nlm.nih.gov/pubmed/18617745>

"OBJECTIVE:

Chronic non-specific neck pain (CNP) is a common, often disabling condition which still lacks a reliable therapeutic standard. Empiric evidence suggests that osteopathic interventions might be effective in alleviating CNP symptoms. A randomized controlled clinical trial of efficacy was performed to test this hypothesis.

MATERIALS AND METHODS:

135 CNP sufferers were identified through advertisements, and 41 patients who met all relevant predefined criteria were recruited. All participants received a 12-min session of sham ultrasound once a week for an average of 10 weeks. In addition, a test-dependent osteopathic intervention of 45 min was given to 24 participants every other week. 40 participants could be followed up for 12 weeks after the end of therapy. The main outcome parameter was pain intensity measured on a numeric rating scale (NRS, range: 0-10).

RESULTS:

There were 2 dropouts in the intervention group and 2 in the control group. Average pain intensity decreased from 4.7 to 2.2 in the osteopathic group ($p < 0.0005$), and from 4.8 to 4.0 in the control group ($p = 0.09$). The intergroup difference of longitudinal changes was clearly significant, too ($p = 0.02$). Further slight but comparable reductions were observed at follow-up (0.3 and 0.4 NRS points, respectively). These changes seem to have a positive impact on quality of life, as assessed by generic and specific instruments such as the MOS SF-36 and the Northwick Park Pain Questionnaire.

CONCLUSIONS:

A series of test-dependent osteopathic interventions may be a promising therapeutic regimen for CNP sufferers. Further studies will have to demonstrate a) whether these findings are reproducible, and b) whether positive long-term outcomes can be achieved."

Degenhardt BF, Darmani NA, Johnson JC, Towns LC, Rhodes DC, Trinh C, McClanahan B, DiMarzo V. 2007 **Role of osteopathic manipulative treatment in altering pain biomarkers: a pilot study.** *J Am Osteopath Assoc* Sep;107(9):387-400 <http://www.ncbi.nlm.nih.gov/pubmed/17908831>

"In a prospective, blinded assessment, blood was collected from 20 subjects (10 with chronic low back pain [LBP], 10 controls without chronic LBP) for 5 consecutive days. On day 4, OMT was administered to subjects 1 hour before blood collection. Blood was analyzed for levels of beta-endorphin (betaE), serotonin (5-hydroxytryptamine [5-HT]), 5-hydroxyindoleacetic acid (5-HIAA), anandamide (arachidonylethanolamide [AEA]), and N-palmitoylethanolamide (PEA). A daily questionnaire was used to monitor confounding factors, including pain and stress levels, sleep patterns, and substance use."

"Increases from baseline in betaE and PEA levels and a decrease in AEA levels occurred immediately posttreatment. At 24 hours posttreatment, similar biomarker changes from baseline were observed. A decrease in stress occurred from baseline to day 5. The change in PEA from baseline to 24 hours posttreatment correlated with the corresponding changes in stress. Subgroup analysis showed that subjects with chronic LBP had significantly reduced 5-HIAA levels at 30 minutes posttreatment ($P=.05$) and 5-HT levels at 24 hours posttreatment ($P=.02$) when compared with baseline concentrations. The increase in PEA in subjects with chronic LBP at 30 minutes posttreatment was two times greater than the increase in control subjects."

"Concentrations of several circulatory pain biomarkers were altered after OMT. The degree and duration of these changes were greater in subjects with chronic LBP than in control subjects without the disorder."

Longo C, Rizzo R, Inzitari MT, Scumaci G, Caroleo S, Iocco M. 2006 **Chronic tension-type headache non conventional therapy with manual lymphatic drainage.** *Recenti Prog Med* Sep;97(9):462-5. <http://www.ncbi.nlm.nih.gov/pubmed/17017296>

"The aim of the present study was to evaluate the outcomes of patients undergoing manual lymphatic drainage treatment for CTHH [chronic tension-type headache]. The findings demonstrate that headache patients reported a reduction in pain frequency and intensity."

Bischoffa A, Nürnbergera A, Voigta P, Schwerla F, 2006 **Osteopathy alleviates pain in chronic non-specific neck pain: A randomized controlled trial** International Journal of Osteopathic Medicine Volume 9, Issue 1, March , Pages 45 <http://www.sciencedirect.com/science/article/pii/S1746068906000253>

"Empiric evidence suggests that osteopathic interventions might be effective in alleviating CNP symptoms. A randomized sham-controlled clinical trial was performed to test this hypothesis." "On a numeric rating scale (NRS, range: 0–10) average pain intensity decreased from 4.7 to 2.2 in the osteopathic group ($P < 0.0005$), and from 4.8 to 4.0 in the sham group ($P = 0.09$). The inter-group difference was highly significant ($P = 0.002$). Comparably further slight reductions were observed during follow-up (0.3 and 0.4 NRS points, respectively). These changes seem to have a positive impact on quality of life, as measured by means of the SF-36 and the Northwick Park Pain Questionnaire." "A series of osteopathic interventions seems a promising therapeutic regimen for [chronic neck pain] sufferers."

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."

McReynolds TM, Sheridan BJ. 2005 **Intramuscular ketorolac versus osteopathic manipulative treatment in the management of acute neck pain in the emergency department: a randomized clinical trial.** J Am Osteopath Assoc Feb;105(2):57-68 <http://www.ncbi.nlm.nih.gov/pubmed/15784928>

"Ketorolac tromethamine injected intramuscularly (IM) has been shown to be an effective analgesic in treating patients with acute musculoskeletal pain in the emergency department (ED). The authors compare the efficacy of a single dose of IM ketorolac to osteopathic manipulative treatment (OMT) as delivered in the ED for the management of acute neck pain. A

randomized clinical trial was conducted in three EDs. A convenience sample of 58 patients with acute neck pain of less than three weeks' duration were enrolled. Subjective measures of pain intensity on an 11-point numerical rating scale were gathered from patients immediately before treatment and one hour afterward. Subjects received either OMT or 30 mg, IM ketorolac. Subjects' perceived pain relief was also recorded at one hour after treatment on a subjective 5-point pain relief scale. Twenty-nine patients received IM ketorolac, and 29 patients received OMT. Although both groups showed a significant reduction in pain intensity, 1.7+/-1.6 (P <.001 [95% CI, 1.1-2.3]) and 2.8+/-1.7 (P <.001 [95% CI, 2.1-3.4]), respectively, patients receiving OMT reported a significantly greater decrease in pain intensity (P=.02 [95% CI, 0.2-1.9]). When comparing pain relief at one hour posttreatment, there was no significant difference between the OMT and ketorolac study groups (P=.10). The authors found that, at one hour posttreatment, OMT is as efficacious as IM ketorolac in providing pain relief and significantly better in reducing pain intensity. The authors conclude that OMT is a reasonable alternative to parenteral nonsteroidal anti-inflammatory medication for patients with acute neck pain in the ED setting."

Goldstein FJ, Jeck S, Nicholas AS, Berman MJ, Lerario M. 2005 **Preoperative intravenous morphine sulfate with postoperative osteopathic manipulative treatment reduces patient analgesic use after total abdominal hysterectomy.** J Am Osteopath Assoc Jun;105(6):273-9 <http://www.ncbi.nlm.nih.gov/pubmed/16118354>

"Administration of postoperative OMT enhanced pre- and postoperative morphine analgesia in the immediate 48-hour period following elective TAH, demonstrating that OMT can be a therapeutic adjunct in pain management following this procedure."

Cleland JA, Childs JD, McRae M, Palmer JA, Stowell T 2005 **Immediate effects of thoracic manipulation in patients with neck pain: a randomized clinical trial** Manual Therapy Volume 10, Issue 2, May , Pages 127–135 <http://www.ncbi.nlm.nih.gov/pubmed/15922233>

"Although the effectiveness of mobilization and manipulation of the cervical spine has been well documented, the small inherent risks associated with these techniques has led clinicians to frequently utilize manipulation directed at the thoracic spine in this patient population. It is hypothesized that thoracic spine manipulation may elicit similar therapeutic benefits as cervical spine manipulation while minimizing the magnitude of risk associated with the cervical technique. The purpose of this randomized clinical trial was to investigate the immediate effects of thoracic spine manipulation on perceived pain levels in patients presenting with neck pain. The results suggest that thoracic spine manipulation results in immediate analgesic effects in patients with mechanical neck pain."

Eisenhart AW, Gaeta TJ, Yens DP. 2003 **Osteopathic manipulative treatment in the emergency department for patients with acute ankle injuries.** J Am Osteopath Assoc Sep;103(9):417-21 <http://www.ncbi.nlm.nih.gov/pubmed/14527076>

"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."

"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."

"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."

"Data clearly demonstrate that a single session of OMT in the ED can have a significant effect in the management of acute ankle injuries."

Williams NH, Wilkinson C, Russell I, Edwards RT, Hibbs R, Linck P, Muntz R 2003 **Randomized osteopathic manipulation study (ROMANS): pragmatic trial for spinal pain in primary care** Family Practice Volume 20, Issue 6 pp 662-669 <http://fampra.oxfordjournals.org/content/20/6/662.full>

"A pragmatic randomized controlled trial was carried out in a primary care osteopathy clinic accepting referrals from 14 neighbouring practices in North West Wales. A total of 201 patients with neck or back pain of 2–12 weeks duration were allocated at random between usual GP care and an additional three sessions of osteopathic spinal manipulation. The primary outcome measure was the Extended Aberdeen Spine Pain Scale (EASPS). Secondary measures included SF-12, EuroQol and Short-form McGill Pain Questionnaire. Health care costs were estimated from the records of referring GPs"

"Results. Outcomes improved more in the osteopathy group than the usual care group. At 2 months, this improvement was significantly greater in EASPS [95% confidence interval (CI) 0.7–9.8] and SF-12 mental score (95% CI 2.7–10.7). At 6 months, this difference was no longer significant for EASPS (95% CI –1.5 to 10.4), but remained significant for SF-12 mental score (95% CI 1.0–9.9). Mean health care costs attributed to spinal pain were significantly greater by £65 in the osteopathy group (95% CI £32–£155). Though osteopathy also cost £22 more in mean total health care cost, this was not significant (95% CI –£159 to £142).

Conclusion. A primary care osteopathy clinic improved short-term physical and longer term psychological outcomes, at little extra cost. Rigorous multicentre studies are now needed to assess the generalizability of this approach."

Licciardone JC, Stoll ST, Fulda KG, Russo DP, Siu J, Winn W, Swift J Jr 2003 **Osteopathic manipulative treatment for chronic low back pain: a randomized controlled trial.** Spine (Phila Pa 1976) Jul 1;28(13):1355-62 <http://www.ncbi.nlm.nih.gov/pubmed/12838090>

"STUDY DESIGN: A randomized controlled trial was conducted. OBJECTIVE: To determine the efficacy of osteopathic manipulative treatment as a complementary treatment for chronic nonspecific low back pain."

"This trial was conducted in a university-based clinic from 2000 through 2001. Of the 199 subjects who responded to recruitment procedures, 91 met the eligibility criteria. They were randomized, with 82 patients completing the 1-month follow-up evaluation, 71 completing the 3-month evaluation, and 66 completing the 6-month evaluation. The subjects were randomized to osteopathic manipulative treatment, sham manipulation, or a no-intervention control group, and they were allowed to continue their usual care for low back pain. The main outcomes included the SF-36 Health Survey, a 10-cm visual analog scale for overall back pain, the Roland-Morris Disability Questionnaire, lost work or school days because of back pain, and satisfaction with back care."

"As compared with the no-intervention control subjects, the patients who received osteopathic manipulative treatment reported greater improvements in back pain, greater satisfaction with back care throughout the trial, better physical functioning and mental health at 1 month, and fewer cotreatments at 6 months. The subjects who received sham manipulation also reported greater improvements in back pain and physical functioning and greater satisfaction than the no-intervention control subjects. There were no significant benefits with osteopathic manipulative treatment, as compared with sham manipulation."

"Osteopathic manipulative treatment and sham manipulation both appear to provide some benefits when used in addition to usual care for the treatment of chronic nonspecific low back pain. It remains unclear whether the benefits of osteopathic manipulative treatment can be attributed to the manipulative techniques themselves or whether they are related to other aspects of osteopathic manipulative treatment, such as range of motion activities or time spent interacting with patients, which may represent placebo effects."

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."

Gamber RG, Shores JH, Russo DP, Jimenez C, Rubin BR 2002 **Osteopathic manipulative treatment in conjunction with medication relieves pain associated with fibromyalgia syndrome: results of a randomized clinical pilot project.** *J Am Osteopath Assoc Jun*;102(6):321-5 <http://www.ncbi.nlm.nih.gov/pubmed/12090649>

Osteopathic physicians caring for patients with fibromyalgia syndrome (FM) often use osteopathic manipulative treatment (OMT) in conjunction with other forms of standard medical care. Despite a growing body of evidence on the efficacy of manual therapy for the treatment of selected acute musculoskeletal conditions, the role of OMT in treating patients with chronic conditions such as FM remains largely unknown. Twenty-four female patients meeting American College of Rheumatology criteria for FM were randomly assigned to one of four treatment groups: (1) manipulation group, (2) manipulation and teaching group, (3) moist heat group, and (4) control group, which received no additional treatment other than current medication. Participants' pain perceptions were assessed by use of pain thresholds measured at each of 10 bilateral tender points using a 9-kg dolorimeter, the Chronic Pain Experience Inventory, and the Present Pain Intensity Rating Scale. Patients' affective response to treatment was assessed using the Self-Evaluation Questionnaire. Activities of daily living were assessed using the Stanford Arthritis Center Disability and Discomfort Scales: Health Assessment Questionnaire. Depression was assessed using the Center for Epidemiological Studies Depression Scale. Significant findings between the four treatment groups on measures of pain threshold, perceived pain, attitude toward treatment, activities of daily living, and perceived functional ability were found. All of these findings favored use of OMT. This study found OMT combined with standard medical care was more efficacious in treating FM than standard care alone. These findings need to be replicated to determine if cost savings are incurred when treatments for FM incorporate nonpharmacologic approaches such as OMT.

Hanten WP, Olson SL, Hodson JL, Imler VL, Knab VM, Magee JL 1999 **The effectiveness of CV-4 and resting position techniques on subjects with tension-type headaches** *J Man Manip Ther* 7(2) 64-70 <https://www.sciencedirect.com/science/article/pii/S1443846101800046>

"Sixty adults between the ages of 21 and 65 ($X=36$, $SD=12$) who were experiencing a TTH [tension-type headache] were randomly assigned to groups. Subjects in the first group received a 10-minute session wherein multiple still points were induced using the CV-4 craniosacral technique. Subjects in the second group were placed supine in a resting position with the head and neck positioned for ten minutes in the most comfortable points in the ranges of protraction-retraction and flexion-extension. Subjects in the third group received no treatment; they lay quietly for 10 minutes. Pain intensity and the affective component of pain were measured before and after the treatments using visual analog scales. To determine if significant differences existed between the groups, a one-way multivariate analysis of covariance (MANCOVA) was used, followed by univariate tests and post-hoc tests. The MANCOVA was significant ($F=3.59$; $df=4$, 108; $p<0.05$). Analysis of covariance for the variables of pain intensity and affect revealed significant differences among the groups ($F=5.38$; $df=2,56$; $p<0.05$ for intensity and $F=4.45$; $df=2,56$; $p<0.05$ for affect). Tukey tests revealed a significant improvement, in both intensity and affect scores, between the group receiving the CV-4 treatment and the no-treatment group and no significant difference between the group using only the resting position and the group

receiving no treatment. The CV-4 technique is an effective technique for treating patients with TTH."

Andersson GB, Lucente T, Davis AM, Kappler RE, Lipton JA, Leurgans S. 1999 **A comparison of osteopathic spinal manipulation with standard care for patients with low back pain.** NEJM Nov 4;341(19):1426-31 <http://www.nejm.org/doi/full/10.1056/NEJM199911043411903#t=articleTop>

"We performed a randomized, controlled trial that involved patients who had had back pain for at least three weeks but less than six months. We screened 1193 patients; 178 were found to be eligible and were randomly assigned to treatment groups; 23 of these patients subsequently dropped out of the study. The patients were treated either with one or more standard medical therapies (72 patients) or with osteopathic manual therapy (83 patients). We used a variety of outcome measures, including scores on the Roland–Morris and Oswestry questionnaires, a visual-analogue pain scale, and measurements of range of motion and straight-leg raising, to assess the results of treatment over a 12-week period."

"Patients in both groups improved during the 12 weeks. There was no statistically significant difference between the two groups in any of the primary outcome measures. The osteopathic-treatment group required significantly less medication (analgesics, antiinflammatory agents, and muscle relaxants) ($P < 0.001$) and used less physical therapy (0.2 percent vs. 2.6 percent, $P < 0.05$). More than 90 percent of the patients in both groups were satisfied with their care."

"Osteopathic manual care and standard medical care have similar clinical results in patients with subacute low back pain. However, the use of medication is greater with standard care."

Joan G. Turner DSN RN CIC1, Ann J. Clark PhD RN2, Dorothy K. Gauthier PhD RN3, Monica Williams BA MA4 1998 **The effect of therapeutic touch on pain and anxiety in burn patients** Journal of Advanced Nursing Jul;28(1):10-20 <https://www.ncbi.nlm.nih.gov/pubmed/9687125>

The purpose of this single-blinded randomized clinical trial was to determine whether therapeutic touch (TT) versus sham TT could produce greater pain relief as an adjunct to narcotic analgesia, a greater reduction in anxiety, and alterations in plasma T-lymphocyte concentrations among burn patients. Therapeutic touch is an intervention in which human energies are therapeutically manipulated, a practice conceptually supported by Rogers' (1970) theory of unitary human beings. Data were collected at a university burn centre in the south-eastern United States. The subjects were 99 men and women between the ages of 15 and 68 hospitalized for severe burns, and they received either TT or sham TT once a day for 5 days. Baseline data were collected on day 1, data were collected before and after treatment on day 3, and post-intervention data were collected on day 6. Instruments included the McGill Pain Questionnaire, Visual Analogue Scales for Pain, Anxiety and Satisfaction with Therapy, and an Effectiveness of Therapy Form. Blood was drawn on days 1 and 6 for lymphocyte subset analysis. Medication usage for pain in mean morphine equivalents, and mean doses per day of sleep, anxiety and antidepressant medications were recorded. Subjects who received TT reported significantly greater reduction in pain on the McGill Pain Questionnaire Pain Rating Index and Number of Words Chosen and greater reduction in anxiety on the Visual Analogue Scale for Anxiety than did those who received sham TT. Lymphocyte subset analyses on blood from 11 subjects showed a decreasing total CD8+lymphocyte concentration for the TT group. There was no statistically significant difference between groups on medication usage.

Boline PD, Kassak K, Bronfort G, Nelson C, Anderson AV 1995 **Spinal manipulation vs. amitriptyline for the treatment of chronic tension-type headaches: a randomized clinical trial** Journal of Manipulative and Physiological Therapeutics 18:148–54 <http://www.ncbi.nlm.nih.gov/pubmed/7790794>

"Patients in the spinal manipulation group were treated twice weekly for 6 wk. Each therapy session typically lasted 20 min. The spinal manipulation group received spinal manipulation of a type described as short-lever, low-amplitude, high-velocity thrust techniques. At each visit, the treating doctor determined, by manual palpation, the cervical, thoracic or lumbar spinal

segments to be manipulated. The investigative team thought that the greatest therapeutic effect would be achieved by paying particular attention to the upper three cervical segments. In preparation for the spinal manipulation, an average of 5-10 min of moist heat and 2 min of light massage were administered to the cervicothoracic musculature. "

"The results of this study show that spinal manipulative therapy is an effective treatment for tension headaches. Amitriptyline therapy was slightly more effective in reducing pain at the end of the treatment period but was associated with more side effects. Four weeks after the cessation of treatment, however, the patients who received spinal manipulative therapy experienced a sustained therapeutic benefit in all major outcomes in contrast to the patients that received amitriptyline therapy, who reverted to baseline values. The sustained therapeutic benefit associated with spinal manipulation seemed to result in a decreased need for over-the-counter medication."

Boesler D, Warner M, Alpers A, Finnerty EP, Kilmore MA. 1993 **Efficacy of high-velocity low-amplitude manipulative technique in subjects with low-back pain during menstrual cramping.** *J Am Osteopath Assoc* Feb;93(2):203-8, 213-4 <http://www.ncbi.nlm.nih.gov/pubmed/8432669>

"Previous studies have shown that dysmenorrhea produces low-back pain and an electromyographic (EMG) pattern typical of trauma-induced low-back pain. To determine the effects of high-velocity low-amplitude osteopathic manipulative treatment (OMT) on this type of low-back pain, 12 dysmenorrheic subjects were assigned to a group receiving OMT or to a group not receiving OMT (or both). Eight subjects participated in both groups, the other four being equally distributed between groups. Osteopathic manipulative treatment significantly decreased EMG activity during extension of the lumbar spinae erector muscles and abolished the spontaneous EMG activity. These EMG changes coincided with the patient's report of alleviated low-back pain and menstrual cramping. "

Schwerla F, Rother K, Rother D, Ruetz M, Resch KL 2015 **Osteopathic Manipulative Therapy in Women With Postpartum Low Back Pain and Disability: A Pragmatic Randomized Controlled Trial** *J Am Osteopath Assoc* Jul 1;115(7):416-25 <http://jaoa.org/article.aspx?articleID=2362399>

"A pragmatic randomized controlled trial was conducted among a sample of women with a history of pregnancy-related LBP [low back pain] for at least 3 months after delivery. "

"During 8 weeks, OMTh [osteopathic manipulative therapy] applied 4 times led to clinically relevant positive changes in pain intensity and functional disability in women with post-partum LBP."

"At each visit, OMTh was applied only to those structures with relevant osteopathic findings. Standard OMTh techniques were applied, including direct (high-velocity, low-amplitude; muscle energy; and myo-fascial release), indirect (functional techniques and balanced ligamentous tension), visceral, and cranial techniques. No predefined, standardized OMTh protocol was implemented; each osteopath was free to decide which techniques to use. Participants were not allowed to receive any additional treatment (ie, medication, physical therapy, or other sources of pain relief) during the study period. Participants in the control group did not receive OMTh, nor were they evaluated for somatic dysfunctions during the 8-week study period. At the first visit, control participants were required to fill out the VAS and ODI. The osteopath then told them that they would be placed on a waiting list for OMTh to be scheduled 2 months later. At 2 months, the control participants filled out the VAS and ODI for the second time. During the study period, participants were not allowed to receive any additional treatment for pain relief (eg, medication, physical therapy, or other sources of pain relief). After study completion, they were offered 2 free appointments for OMTh."

"During 8 weeks, OMTh applied 4 times led to clinically relevant positive changes in pain intensity and functional disability in women with post-partum LBP. "

Licciardone JC, Aryal S 2013 **Prevention of progressive back-specific dysfunction during pregnancy: an assessment of osteopathic manual treatment based on Cochrane Back**

"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)."

"A total of 144 patients were randomly assigned"

"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."

"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."

"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."

Ekici G, Bakar Y, Akbayrak T, Yuksel I. 2009 **Comparison of manual lymph drainage therapy and connective tissue massage in women with fibromyalgia: a randomized controlled trial.** Journal of Manipulative and Physiological Therapeutics Feb;32(2):127-33 <http://www.ncbi.nlm.nih.gov/pubmed/19243724>

"The score for FIQ-2 (feel good) (P = .036) was higher, the score for FIQ-9 (anxiety) (P = .019) was lower in the MLDT group than in the CTM group"

"For this particular group of patients, both MLDT [manual lymphatic drainage technique] and CTM [connective tissue massage] appear to yield improvements in terms of pain, health status, and HRQoL [health-related quality of life]."

"However, MLDT was found to be more effective than CTM according to some subitems of FIQ (morning tiredness and anxiety) and FIQ total score. Manual lymph drainage therapy might be preferred"

Licciardone JC, Buchanan S, Hensel KL, King HH, Fulda KG, Stoll ST, 2010 **Osteopathic manipulative treatment of back pain and related symptoms during pregnancy: a randomized controlled trial** American Journal of Obstetrics and Gynecology Volume 202, Issue 1, January , Pages 43.e1–43.e8 <http://www.sciencedirect.com/science/article/pii/S0002937809008436>

"A randomized, placebo-controlled trial was conducted to compare usual obstetric care and osteopathic manipulative treatment, usual obstetric care and sham ultrasound treatment, and usual obstetric care only. Outcomes included average pain levels and the Roland-Morris Disability Questionnaire to assess back-specific functioning."

"During pregnancy, back pain decreased in the usual obstetric care and osteopathic manipulative treatment group, remained unchanged in the usual obstetric care and sham ultrasound treatment group, and increased in the usual obstetric care only group, although no between-group difference achieved statistical significance."

"Osteopathic manipulative treatment slows or halts the deterioration of back-specific functioning during the third trimester of pregnancy."

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."

Krouwel O, Hebron C, Willett E 2010 **An investigation into the potential hypoalgesic effects of different amplitudes of PA mobilisations on the lumbar spine as measured by pressure pain thresholds (PPT)** *Manual Therapy* Volume 15, Issue 1, February , Pages 7–12 <https://www.ncbi.nlm.nih.gov/pubmed/19643656>

"Studies have shown that mobilisation to the spine can decrease pain. The optimum treatment dose for achieving this has not so far been investigated. Previous studies that demonstrate the pain relieving effects of mobilisations have used large amplitude of oscillations. The importance of amplitude on pain relief has not been established. The current study aims to: a) Investigate the importance of amplitude as part of the treatment dose. b) To explore the extent of any pain relieving effects seen following mobilisations."

"Results demonstrated a significant increase in PPT [an increase in pressure pain threshold means a decrease in pain sensitivity] following lumbar mobilisations ($p = 0.013$) at all measured sites. However, no significant difference was found between amplitude conditions ($p = 0.864$). This study suggests that in asymptomatic subjects a systemic hypoalgesic response is caused by lumbar mobilisation regardless of amplitude."

Fryer G, Carub J, McIver S 2004 **The effect of manipulation and mobilisation on pressure pain thresholds in the thoracic spine** *Journal of Osteopathic Medicine* Volume 7, Issue 1, April , Pages 8–14 <https://www.sciencedirect.com/science/article/pii/S1443846104800030>

"Background and Objectives: High velocity low amplitude thrust manipulation and mobilisation are commonly used by manual therapists to relieve spinal pain and improve mobility. The aim of this controlled, single blinded study was to investigate the effect of manipulation and mobilisation on pressure-pain thresholds in the thoracic spine in an asymptomatic population. Methods: Subjects ($n=96$) were screened for tender thoracic segments, and pressure-pain threshold measurements were made using an electronic pressure algometer immediately before and after treatment intervention. Subjects were randomly allocated into three intervention groups, and received either a single high velocity extension thrust, thirty seconds of extension mobilisation, or thirty seconds of sham treatment (control) consisting of simulated 'laser acupuncture'.

Analysis: Within-group pre- and post-intervention pressure-pain threshold values were analysed using dependent t-tests, revealing significant changes in the mobilisation ($P<0.01$) and manipulation ($P=0.04$) groups, but not the sham treatment group ($P=0.88$). Analysis of mean group changes using a one-way analysis of variance and post-hoc analysis revealed a significant difference between the mobilisation and control group ($P=0.01$), but no significant difference between the manipulation and control group ($P=0.67$). Pre-post effect sizes in the mobilisation group were medium to large ($d=0.72$), small to medium for manipulation ($d=0.32$), and small in the control group ($d=0.02$)

Conclusion: Both manipulation and mobilisation produced significantly increased pressure-pain thresholds (decreased sensitivity to pressure) in the thoracic spine, whereas the sham treatment did not. Mobilisation appeared to be more effective than manipulation for increasing pressure-

pain thresholds when applied to the thoracic spine in asymptomatic subjects."

Sterling M, Jull G, Wright A 2001 **Cervical mobilisation: concurrent effects on pain, sympathetic nervous system activity and motor activity**. *Manual Therapy* May;6(2):72-81
<https://www.ncbi.nlm.nih.gov/pubmed/11414776>

"Recent findings that spinal manual therapy (SMT) produces concurrent hypoalgesic and sympathoexcitatory effects have led to the proposal that SMT may exert its initial effects by activating descending inhibitory pathways from the dorsal periaqueductal gray area of the midbrain (dPAG). In addition to hypoalgesic and sympathoexcitatory effects, stimulation of the dPAG in animals has been shown to have a facilitatory effect on motor activity. This study sought to further investigate the proposal regarding SMT and the PAG by including a test of motor function in addition to the variables previously investigated. Using a condition randomised, placebo-controlled, double blind, repeated measures design, 30 subjects with mid to lower cervical spine pain of insidious onset participated in the study. The results indicated that the cervical mobilisation technique produced a hypoalgesic effect as revealed by increased pressure pain thresholds on the side of treatment ($P=0.0001$) and decreased resting visual analogue scale scores ($P=0.049$). The treatment technique also produced a sympathoexcitatory effect with an increase in skin conductance ($P<0.002$) and a decrease in skin temperature ($P<0.02$). There was a decrease in superficial neck flexor muscle activity ($P<0.0002$) at the lower levels of a staged cranio-cervical flexion test. This could imply facilitation of the deep neck flexor muscles with a decreased need for co-activation of the superficial neck flexors. The combination of all findings would support the proposal that SMT may, at least initially, exert part of its influence via activation of the PAG."

Haller H, Lauche R, Cramer H, Rampp T, Saha FJ, Ostermann T, Dobos G 2016 **Craniosacral Therapy for the Treatment of Chronic Neck Pain: A Randomized Sham-controlled Trial** *Clin J Pain* May;32(5):441-9 <http://www.ncbi.nlm.nih.gov/m/pubmed/26340656/#ft>

"**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."

Clark BC, Walkowski S, Conatser RR, Eland DC, Howell JN. 2009 **Muscle functional magnetic resonance imaging and acute low back pain: a pilot study to characterize lumbar muscle activity asymmetries and examine the effects of osteopathic manipulative treatment.** *Osteopathic medicine and primary care* Aug 27;3:7 <http://www.ncbi.nlm.nih.gov/pubmed/19712459>

"In the subjects with LBP [low back pain], psoas T2 asymmetry was significantly reduced immediately following OMT (25.3 +/- 6.9 to 6.1 +/- 1.8%, $p = 0.05$), and the change in LBP immediately following OMT was correlated with the change in psoas T2 asymmetry ($r = 0.75$, $p = 0.02$)."

"This pilot work provides insight into the mechanistic actions of OMT [osteopathic manipulative therapy] during acute LBP, as it suggests that it may attenuate muscle activity asymmetries of some of the intrinsic low back muscles."

Fritz JM, Brennan GP, Leaman H 2006 **Does the evidence for spinal manipulation translate into better outcomes in routine clinical care for patients with occupational low back pain? A case-control study** *The Spine Journal* Volume 6, Issue 3, May–June, Pages 289–295 <http://www.sciencedirect.com/science/article/pii/S1529943005010399>

"Physical therapy notes for the first two sessions were examined. Patients were categorized as having received thrust manipulation, nonthrust manipulation, or no manipulation. Pain intensity and disability were recorded at initial and final sessions. The number of sessions, length of stay, and costs of physical therapy were recorded. Comparisons were made between patients receiving manipulation versus no manipulation, and between those receiving thrust versus nonthrust manipulation."

"Two hundred fifteen patients were included (mean age 35.9 [± 10.1] years, 67.9% male). Thrust manipulation was received by 107 (49.8%) patients; 36 (16.7%) received nonthrust manipulation and 72 (33.5%) received no manipulation. Patients receiving manipulation (thrust or nonthrust) experienced greater reductions in pain and disability with treatment. Patients receiving thrust manipulation had fewer sessions, a shorter length of stay, and lower costs in physical therapy than patients receiving nonthrust manipulation."

"The evidence supporting superior clinical outcomes with the use of manipulation for a subgroup of patients was corroborated by this retrospective review of patients with occupational low back pain. The use of thrust manipulation appeared to be more efficient than the use of nonthrust manipulation for these patients."

Reis MS, Durigan JL, Arena R, Rossi BR, Mendes RG, Borghi-Silva A 2014 **Effects of posteroanterior thoracic mobilization on heart rate variability and pain in women with fibromyalgia.** *Rehabil Res Pract* 2014:898763 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4060169/>

"Fibromyalgia (FM) has been associated with cardiac autonomic abnormalities and pain. Heart rate variability (HRV) is reduced in FM with autonomic tone dominated by sympathetic activity. The purpose of this study was to evaluate the effects of one session of a posteroanterior glide technique on both autonomic modulation and pain in woman with FM. This was a controlled trial with immediate followup; twenty premenopausal women were allocated into 2 groups: (i) women diagnosed with FM ($n = 10$) and (ii) healthy women ($n = 10$). Both groups received one session of Maitland mobilization grade III posteroanterior central pressure glide, at 2 Hz for 60 s at each vertebral segment. Autonomic modulation was assessed by HRV and pain by a numeric pain scale before and after the intervention. For HRV analyses, heart rate and RR intervals were recorded for 10 minutes. FM subjects demonstrated reduced HRV compared to controls. Although the mobilization technique did not significantly reduce pain, it was able to improve HRV quantified by an increase in rMSSD and SD1 indices, reflecting an improved autonomic

profile through increased vagal activity. In conclusion, women with FM presented with impaired cardiac autonomic modulation. One session of Maitland spine mobilization was able to acutely improve HRV."

Jesus-Moraleida FR, Ferreira PH, Pereira LS, Vasconcelos CM, Ferreira ML 2011
Ultrasonographic analysis of the neck flexor muscles in patients with chronic neck pain and changes after cervical spine mobilization. Journal of Manipulative and Physiological Therapeutics Oct;34(8):514-24 <https://www.ncbi.nlm.nih.gov/pubmed/21978544>

"The purpose of this study was to analyze changes in the recruitment of the muscles longus colli (Lco) and sternocleidomastoid (SCM) as measured by ultrasonography in patients with chronic neck pain before and immediately after a single cervical Maitland's posterior-anterior central mobilization technique.

METHODS: This was a cross-sectional, case-control research design study. Ultrasonographic images of Lco and SCM were taken in 31 patients with chronic neck pain and matched controls during the 5 phases of the craniocervical flexion test before and after a Maitland's posterior-anterior central mobilization session at the cervical spine. Changes in muscle thickness during the test were calculated to infer muscle recruitment. Separate analysis of variance models for each muscle was built.

RESULTS: Both groups showed increases in Lco and SCM recruitment between phases ($F = 7.95, P < .001$; $F = 21.29, P < .001$), with patients with chronic neck pain demonstrating lesser increases for Lco changes in thickness compared with controls, mainly at phase 5 ($-0.09, P = .004$; 95% confidence interval [CI], 0.03-0.15). After the mobilization, Lco recruitment increased more significantly in patients with chronic neck pain, and previous difference between groups in phase 5 was no longer significant ($-0.07, P = .07$; 95% CI, -0.14 to 0.01). The SCM recruitment decreased in phase 1 for patients with chronic neck pain ($P = .01$; 95% CI, -0.06 to -0.01).

CONCLUSION: Cervical mobilization appeared to modulate neck muscles function by increasing deep muscle and reducing superficial muscles recruitment."

Hastings V, McCallister AM, Curtis SA, Valant RJ, Yao S. 2016 **Efficacy of Osteopathic Manipulative Treatment for Management of Postpartum Pain.** *J Am Osteopath Assoc* Aug 1;116(8):502-9 <https://www.ncbi.nlm.nih.gov/pubmed/27455099>

"Pain is one of the most common postpartum complaints by women in the United States, and the pain varies in its location. Research on intervention strategies for postpartum pain has focused primarily on the lower back, but pain management for other types of postpartum pain remains unclear.

OBJECTIVE:

To investigate the effects of osteopathic manipulative treatment (OMT) on postpartum pain; the location, quality, and timing of pain; and the difference in pain between vaginal and cesarean delivery.

METHODS:

Postpartum patients who reported having pain were recruited at St Barnabas Hospital in Bronx, New York. The short-form McGill Pain Questionnaire was administered along with a screening questionnaire. Second- or third-year residents in neuromusculoskeletal medicine and osteopathic manipulative medicine examined patients and then diagnosed and managed somatic dysfunction with OMT for approximately 25 minutes. The short-form McGill Pain Questionnaire was again administered after OMT. Paired t tests and McNemar tests were used to analyze changes before and after OMT for continuous and categorical variables, respectively. Differences in visual analog scale (VAS) pain scores between patients who had vaginal vs cesarean delivery were tested using analysis of variance, and group differences in pain location were tested using a Pearson χ^2 test.

RESULTS:

A total of 59 patients were included in the study. The mean VAS score for pain was 5.0 before OMT and 2.9 after OMT ($P < .001$). The VAS scores before OMT significantly differed between patients who had a vaginal delivery and those who had a cesarean delivery ($P < .001$), but the mean decrease in VAS score was similar in both groups. Decreases in low back pain (34 [57.6%] before and 16 [27.1%] after OMT), abdominal pain (32 [54.2%] before and 22 [37.3%] after OMT), and vaginal pain (11 [18.6%] before and 5 [8.5%] after OMT) were reported after OMT ($P < .05$).

CONCLUSION:

Preliminary results demonstrate that OMT is efficacious for postpartum pain management. The lack of a control group precludes the ability to make causal claims. Future studies are needed to solidify OMT efficacy and generalizability."

Sonberg M, Mullinger B, Rajendran D 2010 **Can osteopathy help women with a history of hypothyroidism and musculoskeletal complaints? Outcome of a preliminary, prospective, open investigation** *International Journal of Osteopathic Medicine* Vol 13 (1) pages 11-16 <http://www.sciencedirect.com/science/article/pii/S1746068909000510>

The study was a before-and-after study, with little or no external control.

"Post-menopausal women on medication for hypothyroidism, diagnosed at least 3 years previously, and suffering from musculoskeletal pain were recruited. Each received three identical osteopathic treatment sessions, approximately 1 week apart. Pain intensity and pain interference with aspects of daily living were assessed by subjects before each session and at follow-up (4–6 weeks later), using visual analogue scales."

"The 18 subjects (mean age 57 years) had suffered pain for an average of 17 years; pain was often generalised, with the shoulders/upper limb and head/neck being the sites of greatest pain. There were statistically significant improvements in 'Pain intensity' score from baseline to follow-up ($p \leq 0.001$; Wilcoxon test) and also in 'pain interference' score between baseline and all subsequent time points ($p \leq 0.001$)."

"This study provides preliminary evidence suggesting that osteopathic treatment may help alleviate musculoskeletal pain in post-menopausal women being pharmacologically treated for hypothyroidism."

Fryer G, Alvizatos J, Lamaro J 2005 **The effect of osteopathic treatment on people with chronic and sub-chronic neck pain: A pilot study** International Journal of Osteopathic Medicine Volume 8, Issue 2, June , Pages 41–48 <http://www.sciencedirect.com/science/article/pii/S1746068905000301>

There was no independent control used in this study

"Seventeen subjects (mean age 34.8 [SD = 11.9] years, 7 males, 10 females) with neck pain (mean duration of symptoms of 168.8 weeks [SD = 292, range = 4–1040]) were recruited and included in this study. The subjects were offered a 4-week course of osteopathic treatment at a university teaching clinic. McGill pain questionnaires (MPQ), visual analogue scales (VAS), and neck disability index (NDI) were completed prior to the initial treatment and after treatments on weeks 2 and 4."

"Analysis with repeated measures ANOVA revealed statistically significant differences between pre- and post-scores for the MPQ ($F_{2,32} = 17.35$, $P = 0.001$), VAS ($F_{1.62,25.92} = 36.01$, $P < 0.001$) and NDI ($F_{2,32} = 14.63$, $P < 0.001$). Pre/post effect sizes were large for MPQ ($d = 1.28$), VAS ($d = 1.57$) and NDI ($d = 1.12$) scores. Further testing using paired t-tests revealed these differences to be significant between all time periods for the MPQ, and between the pre-treatment and 2-week period and pre-treatment and 4-week period for the VAS and NDI, respectively. When the cohort was subdivided into a sub-chronic (symptom duration less than 52 weeks) and chronic group (symptoms longer than 52 weeks), similar significant differences were found in both groups."

"Self-rated pain and disability significantly reduced during the course of osteopathic treatment, and reductions were evident regardless of the chronicity of the pain. This pilot study suggests that osteopathic treatment may be effective for the management of neck pain."

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."

Norén L, Ostgaard S, Nielsen TF, Ostgaard HC 1997 **Reduction of sick leave for lumbar back and posterior pelvic pain in pregnancy** Spine 22(18):2157-2160 <http://www.ncbi.nlm.nih.gov/pubmed/9322326>

"In this prospective, consecutive, controlled cohort study, the authors analyzed the impact of a differentiated, individual-based treatment program on sick leave during pregnancy for women experiencing lumbar back or posterior pelvic pain during pregnancy."

"All pregnant women who attended a specific antenatal clinic and experienced lumbar back or posterior pelvic pain were included in an intervention group, and results were compared with women in a control group from another antenatal clinic."

"The intervention group comprised 54 women, compared with 81 women in the control group."

Thirty-three women were on sick leave for an average of 30 days in the intervention group versus 45 women for an average of 54 days in the control group ($P < 0.001$). The reduction in sick leave reduced insurance costs by approximately \$53,000 U.S."

"Sick leave for lumbar back and posterior pelvic pain in the intervention group was significantly reduced with the program, and the program was cost effective."

Cohort studies

Number of studies: 5

Edwards DJ, Toult C, 2018 **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** Health Psychology Open vol. 5, 1, First Published May 10. <http://journals.sagepub.com/doi/full/10.1177/2055102918774684>

"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."

Degenhardt BF, Johnson JC, Gross SR, Hagan C, Lund G, Curry WJ. 2014 **Preliminary findings on the use of osteopathic manipulative treatment: outcomes during the formation of the practice-based research network, DO-Touch.NET.** J Am Osteopath Assoc Mar;114(3):154-70 <http://www.ncbi.nlm.nih.gov/pubmed/24567269>

"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 [osteopathic manipulative treatment], 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."

"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 $P \leq .05$)."

Crow WT, Willis DR. 2009 **Estimating cost of care for patients with acute low back pain: a retrospective review of patient records.** J Am Osteopath Assoc Apr;109(4):229-33 <http://www.ncbi.nlm.nih.gov/pubmed/19369510>

"To estimate the cost of standard care compared to standard care plus osteopathic manipulative treatment (OMT) for acute LBP [low back pain] of less than 6 months' duration."

"A retrospective review of electronic medical records from patients who visited Florida Hospital East Orlando in Orlando. All patients had LBP of less than 6 months' duration and had received care between January 1, 2002, and December 31, 2005. The control group comprised patients who received standard care; the study group consisted of patients who received OMT in addition to standard care. Healthcare utilization (eg, radiologic scans, prescriptions) was determined by "episodes of care," and costs were averaged per patient."

"A total of 1556 patients and 2030 episodes of care met inclusion criteria. Compared with subjects in the control group, individuals in the OMT group had an average of 0.5 more office visits per EOC, resulting in 38% more office visits. However, OMT patients had 18.5% fewer prescriptions written, 74.2% fewer radiographs, 76.9% fewer referrals, and 90% fewer magnetic resonance imaging scans. In the OMT group, total average costs were \$38.26 lower ($P = .02$), and average prescription costs were \$19.53 lower ($P < .001$). Patients in the OMT group also had \$63.81 less average radiologic costs ($P < .0001$)."

"Osteopathic manipulative treatment may reduce costs for the management of acute LBP."

Ault B, Levy D 2015 **Osteopathic Manipulative Treatment Use in the Emergency Department: A Retrospective Medical Record Review** J Am Osteopath Assoc Vol. 115, 132-137 <http://jaoa.org/article.aspx?articleid=2211852>

"Objective: To determine the quantity and characteristics of OMT [Osteopathic Manipulative Treatment] performed in a single, community academic ED that houses an osteopathic emergency medicine residency."

"Main Outcome Measures: Medical record data were analyzed to determine patient demographics; treatment characteristics including number of procedures and patients per physician, OMT techniques used, night vs day procedure variation, and financial implication of future billing for OMT; chief complaints; primary discharge diagnoses; and length of stay in the ED."

"Results: Patients were aged 0 to 95 years (mean, 39 years) and were predominately female (1260 [60.69%]) and white (1300 [62.62%]). A mean of 0.74 patients received OMT per day, and a mean of 29.65 procedures were performed per physician. When data for residents were looked at separately, the mean was higher at 40.32 procedures per physician. The top 3 discharge diagnoses were low back pain (189 patients [9.10%]), muscle spasm (106 patients [5.11%]), and spasm: muscle, back (93 patients [4.48%]). Eleven different OMT techniques were recorded, with myofascial release being used most frequently (1150 of 2868 procedures [40.09%]), followed by muscle energy (672 [23.43%]). The average length of stay in the ED was 206 minutes. A total of 1663 OMT procedures (80%) were performed during the day, whereas 413 (20%) were performed at night. Potential procedural billing for all OMT performed during the study period was \$33.09 per day.

Conclusion: In contrast to perceptions that OMT use is declining, the authors found that OMT is being performed on a near daily basis in the ED. Additional research is needed to fully understand the impact of OMT in the ED."

"Technique: Balanced Ligamentous Tension, Counterstrain, Facilitated Positional Release, High-Velocity, Low-Amplitude, Lymphatic Pump, Muscle Energy, Myofascial Release, Myofascial Unwinding, Osteopathic Cranial Manipulative Medicine, Trigger Point, Visceral Manipulation. A total of 2868 procedures were performed on 2076 patients during the study period (2005-2013)."

"Osteopathic manipulative treatment has an active presence in the ED and is being incorporated by DOs in the treatment of patients of nearly all ages, sexes, and races, via myriad techniques. "

D'Ippolito M, Tramontano M, Buzzi MG. 2017 **Effects of Osteopathic Manipulative Therapy on Pain and Mood Disorders in Patients With High-Frequency Migraine.** J Am Osteopath Assoc Jun 1;117(6):365-369 <https://www.ncbi.nlm.nih.gov/pubmed/28556858>

"CONTEXT: The substantial functional impairment associated with migraine has both physical and emotional ramifications. Mood disorders are often comorbid in patients with migraine and are known to adversely affect migraine activity.

OBJECTIVES: To explore the effects of osteopathic manipulative therapy (OMTh; manipulative care provided by foreign-trained osteopaths) on pain and mood disorders in patients with high-frequency migraine.

METHODS: Retrospective review of the medical records of patients with high-frequency migraine who were treated with OMTh at the Headache Istituto di Ricovero e Cura a Carattere Scientifico Fondazione Santa Lucia from 2011 to 2015. Clinical assessments were made using the Headache Disability Inventory (HDI), the Headache Impact Test (HIT-6), the Hamilton Depression Rating Scale (HDRS), and the State-Trait Anxiety Inventory (STAI) forms X-1 and X-2.

RESULTS: Medical records of 11 patients (6 women; mean age, 47.5 [7.8] years) with a diagnosis of high-frequency migraine who participated in an OMTh program met the inclusion criteria and were included in the study. When the questionnaire scores obtained at the first visit (T0) and after 4 OMTh sessions (T1) were compared, significant improvement in scores were observed on STAI X-2 (T0: 43.18 [2.47]; T1: 39.45 [2.52]; P<.05), HIT-6 (T0: 63 [2.20]; T1: 56.27 [2.24]; P<.05), and HDI (T0: 58.72 [6.75]; T1: 45.09 [7.01]; P<.05).

CONCLUSION: This preliminary study revealed that patients with high-frequency migraine and comorbid mood disorders showed significant improvement after four 45-minute OMTh sessions.

Further investigation into the effects of OMTh on pain and mood disorders in patients with high-frequency migraine is needed."

Surveys

Number of studies: 1

Licciardone J, Gamber R, Cardarelli K. 2002 **Patient satisfaction and clinical outcomes associated with osteopathic manipulative treatment.** J Am Osteopath Assoc Jan;102(1):13-20 <http://www.ncbi.nlm.nih.gov/pubmed/11837337>

"A patient survey was used to measure and explain patient satisfaction and clinical outcomes associated with osteopathic manipulative treatment (OMT). Participating in the survey were 459 people who attended an ambulatory OMT specialty clinic from March 1998 through September 1998 and who had received OMT there at least twice previously."

"Subjects perceived OMT to be highly efficacious (0.74 +/- 0.34) and reported significant relief from pain or discomfort (P < .001) and improvement in mobility (P < .001). Of all the respondents, 8.6% attributed an adverse reaction to OMT. Perception of OMT efficacy was significantly associated with all dimensions of patient satisfaction (P values ranged from less than .001 to .003). Relief from pain or discomfort was significantly associated with overall satisfaction (P < .001). "

Case series

Number of studies: 2

Hidalgo-Lozano A, Fernández-de-las-Peñas C, Díaz-Rodríguez L, González-Iglesias J, Palacios-Ceña D, Arroyo-Morales M 2011 **Changes in pain and pressure pain sensitivity after manual treatment of active trigger points in patients with unilateral shoulder impingement: a case series.** Journal of Bodywork and Movement Therapies Oct;15(4):399-404 http://www.researchgate.net/publication/51670726_Changes_in_pain_and_pressure_pain_sensitivity_after_manual_treatment_of_active_trigger_points_in_patients_with_unilateral_shoulders_impingement_A_case_series

net/publication/51670726_Changes_in_pain_and_pressure_pain_sensitivity_after_manual_treatment_of_active_trigger_points_in_patients_with_unilateral_shoulders_impingement_A_case_series

"The aim of this case series was to investigate changes in pain and pressure pain sensitivity after manual treatment of active trigger points (TrPs) in the shoulder muscles in individuals with unilateral shoulder impingement. Twelve patients (7 men, 5 women, age: 25 ± 9 years) diagnosed with unilateral shoulder impingement attended 4 sessions for 2 weeks (2 sessions/week). They received TrP pressure release and neuromuscular interventions over each active TrP that was found. The outcome measures were pain during arm elevation (visual analogue scale, VAS) and pressure pain thresholds (PPT) over levator scapulae, supraspinatus infraspinatus, pectoralis major, and tibialis anterior muscles. Pain was captured pre-intervention and at a 1-month follow-up, whereas PPT were assessed pre- and post-treatment, and at a 1-month follow-up. Patients experienced a significant (P < 0.001) reduction in pain after treatment (mean ± SD: 1.3 ± 0.5) with a large effect size (d > 1). In addition, patients also experienced a significant increase in PPT immediate after the treatment (P < 0.05) and one month after discharge (P < 0.01), with effect sizes ranging from moderate (d = 0.4) to large (d > 1). A significant negative association (r(s) = -0.525; P = 0.049) between the increase in PPT over the supraspinatus muscle and the decrease in pain was found: the greater the decrease in pain, the greater the increase in PPT. This case series has shown that manual treatment of active muscle TrPs can help to reduce shoulder pain and pressure sensitivity in shoulder impingement. Current findings suggest that active TrPs in the shoulder musculature may contribute directly to shoulder complaint and sensitization in patients with shoulder impingement syndrome, although future randomized controlled trials are required."

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**

"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."

Case reports

Number of studies: 7

Goyal K, Goyal M, Narkeesh K, Samuel AJ, Sharma S, Arumugam N 2016 **The effectiveness of osteopathic manipulative treatment in an abnormal uterine bleeding related pain and health related quality of life (HR-QoL) - A case report** Journal of Bodywork and Movement Therapies <http://dx.doi.org/10.1016/j.jbmt.2016.08.010> [http://www.bodyworkmovementtherapies.com/article/S1360-8592\(16\)30180-2/fulltext?rss=yes](http://www.bodyworkmovementtherapies.com/article/S1360-8592(16)30180-2/fulltext?rss=yes)

"Abnormal uterine bleeding is characterized by painful and/or excessive menorrhagia, chronic pelvic pain due to the endometriosis (Em). Osteopathic treatment is commonly used in the gynecological dysfunctions. The aim of the present case study was to explore the effect of osteopathic treatment (OT) for a woman with abnormal uterine bleeding related pain and quality of life (QoL). We reported a case of 29 year old female who presented with chief complaints of increased flow during periods, lower abdominal pain, leukorrhoea, lower back pain and with occasional constipation for the last 3 years. Patient is a mother of 6 years old male child born with normal delivery. On diagnostic ultrasonography the uterus was found bulky with insignificant endometriosis and no other abnormality was detected. She did not have any relevant past medical and surgical history. The pre and post osteopathic treatment measurements were measured using Visual Analog Scale (VAS) and the health related quality of life (HR-QoL) questionnaire called short form Endometriosis Health Profile Questionnaire (EHP) – 5. In the present case the pain due to the endometriosis was treated with the osteopathic treatment consists of all the major diaphragms' release (release of pelvic diaphragm, abdominal diaphragm, thoracic outlet release and hyoid diaphragm) during the first session and in the second session gastro-esophageal (GE) junction release, sigmoid colon release, cranial therapy to the occiput, sacral release and dural tube rocking. Following that improvement of pain from VAS 8.3/10 to 3.9/10 and QoL improvement from EHP-5, 72/100 to 26/100 was noted. Osteopathic manipulative approach (OMA) in the patient with Em might improve the abnormal uterine bleeding related pain and health related quality of life (HR-QoL)."

Pellerin F, Guihéneuc P, Guihard G, 2015 **Can osteopathic manipulative treatment modify the posture in elderly people? – A single-case study** Journal of Bodywork and Movement Therapies Volume 19, Issue 2, April , Pages 380–388 <http://www.sciencedirect.com/science/article/pii/S1360859214001235>

"The patient was a 77 years old woman complaining of altered balance and low-back pain. OMS [osteopathic manipulative sessions] were delivered by a single practitioner. The pain level was self-rated by using a visual Borg scale. The posture was monitored on a force platform. Postural parameters were deduced from the analysis of the centre of foot pressure (CoP) displacement. The statistical significance of the observed differences was established by using an SCR-related effect size indicator (i.e. Taunovlap). Our results indicate that OMS decrease the patient's pain, modify CoP mean position and decreased the length and velocity of the CoP displacement. Furthermore, modifications of the body oscillations were observed after OMS. This work indicates that OMS can improve body balance."

Berkowitz MR 2014 **Application of osteopathy in the cranial field to treat left superior homonymous hemianopsia** International Journal of Osteopathic Medicine Vol 17 (2) pages 119-122 <http://www.sciencedirect.com/science/article/pii/S1746068913000370>

"This case involves a patient seen in the Osteopathic Manipulative Medicine (OMM) Clinic with sudden, painless onset of loss of visual field five weeks following craniotomy for meningioma removal."

"The patient's loss of visual field resolved completely immediately following the application of osteopathy in the cranial field. While the synchronicity may suggest that the two events are causally linked, further clinical evidence is required before such an effect can be attributed to osteopathic intervention."

LeBeau RT, Nho SJ 2014 **The use of manual therapy post-hip arthroscopy when an exercise-based therapy approach has failed: a case report.** J Orthop Sports Phys Ther Sep;44(9):712-21 <http://www.ncbi.nlm.nih.gov/pubmed/25098193>

"BACKGROUND: Although there is a growing body of literature on both surgical intervention and postsurgical rehabilitation of acetabular labral repairs and femoroacetabular impingement, there is a paucity of information on how to manage individuals who show a lack of progress postsurgery.

CASE DESCRIPTION: A 30-year-old woman underwent surgical labral repair with femoroacetabular impingement osteochondroplasty. Postsurgery, she was initially treated with an exercise-based approach, but experienced an increase in hip pain and further decline in function. Her primary functional deficits were difficulty standing and pain (6/10) with ambulation. A combination of soft tissue mobilization and trigger point dry needling was used to address perceived muscle dysfunction, and nonthrust manipulation was used to address perceived hip joint hypomobility.

OUTCOMES: Following 12 therapy sessions over 120 days, the patient returned to her demanding occupation with minimal residual symptoms. By the end of the period of care, the patient's Harris hip score had improved from 56 to 96 and her Lower Extremity Functional Scale score had improved from 26 to 70. DISCUSSION: This case describes a multimodal manual therapy approach and the health outcomes of a patient following labral repair with femoroacetabular impingement decompression who did not respond to an initial exercise-based postsurgical rehabilitation approach. Level of Evidence Therapy, level 4."

Genese JS 2013 **Osteopathic manipulative treatment for facial numbness and pain after whiplash injury.** J Am Osteopath Assoc Jul;113(7):564-7 <http://www.ncbi.nlm.nih.gov/pubmed/23843380>

"Whiplash injury is often caused by rear-end motor vehicle collisions. Symptoms such as neck pain and stiffness or arm pain or numbness are common with whiplash injury. The author reports a case of right facial numbness and right cheek pain after a whiplash injury. Osteopathic

manipulative treatment techniques applied at the level of the cervical spine, suboccipital region, and cranial region alleviated the patient's facial symptoms by treating the right-sided strain of the trigeminal nerve. The strain on the trigeminal nerve likely occurred at the upper cervical spine, at the nerve's cauda, and at the brainstem, the nerve's point of origin. The temporal portion of the cranium played a major role in the strain on the maxillary."

Berkowitz MR 2012 **Application of osteopathic manipulative treatment to a patient with unremitting chest pain and shortness of breath undergoing "Rule-Out Myocardial Infarction" protocol for one week** International Journal of Osteopathic Medicine June, Issue 2, pp 73-77 [http://www.journalofosteopathicmedicine.com/article/S1746-0689\(11\)00126-X/abstract](http://www.journalofosteopathicmedicine.com/article/S1746-0689(11)00126-X/abstract)

"Chest pain and shortness of breath are both common complaints of patients presenting to an emergency room (ER) or urgent care facility. A 67-year-old married white female was seen in the ER complaining of chest pain and shortness of breath. Our education and training has us admit these patients where they may be monitored and assessed according to protocols developed to rule-out serious etiologies. Accordingly, the patient was admitted to the cardiac care unit and placed on the "Rule-Out Myocardial Infarction" protocol. The patient's symptoms persisted despite adherence to rigorous diagnostic and therapeutic regimens and which stymied attempts to arrive at a definitive diagnosis and provide care. The case presented here demonstrates how an osteopathic approach can enable us to provide appropriate care and resolve some problems that appear to be otherwise unremitting. There is potential for savings in terms of actual costs and utilization of resources. The use of an osteopathic structural exam identified an abnormality that could be easily treated with Osteopathic Manipulative Treatment (OMT), which completely resolved the patient's presenting complaints. Had this been done earlier in the course of managing this patient, preferably as part of the admission work-up, the patient's confinement would have been drastically reduced, and repeated expensive tests would not have had to have been performed. The application of OMT to reducing patient morbidity is instructive of the efficacy of the osteopathic approach in this case and suggests that further research is warranted."

Dardzinski JA, Ostrov BE, Hamann LS. 2000 **Myofascial pain unresponsive to standard treatment: successful use of a strain and counterstrain technique with physical therapy.** J Clin Rheumatol Aug;6(4):169-74 <http://www.ncbi.nlm.nih.gov/pubmed>

"Chronic pain disorders, including fibromyalgia and myofascial pain syndrome often do not respond adequately to standard therapy. The cases reviewed herein suggest the strain and counterstrain (SCS) technique, described in 1981 by Jones, may be helpful in reducing pain and improving function in patients with localized myofascial pain syndromes. This was a case study and retrospective review of 20 patients who had had chronic pain for an average of 2.7 years and were treated with SCS for pain relief. For all these patients, prior medical treatment had failed to provide pain relief or return of function. The procedure is a fairly common osteopathic and chiropractic technique, which to our knowledge has not received any systematic evaluation. A reduction in pain and an increase in function of 50%-100% occurred in 19 of 20 patients immediately after SCS therapy. Partial improvement was maintained for 6 months in 11 of 20 patients, and 4 were still pain free. We believe that SCS techniques should be considered and evaluated further as adjunctive therapy for patients previously unresponsive to standard treatment for myofascial pain syndrome."

Mixed results (significant for some outcomes, not others)

Number
of studies:
6

Jäkel A, von Hauenschild P 2012 **A systematic review to evaluate the clinical benefits of craniosacral therapy**. *Complementary Therapies in Medicine* Dec;20(6):456-65

"OBJECTIVE:

Craniosacral therapy (CST) is an alternative treatment approach, aiming to release restrictions around the spinal cord and brain and subsequently restore body function. A previously conducted systematic review did not obtain valid scientific evidence that CST was beneficial to patients. The aim of this review was to identify and critically evaluate the available literature regarding CST and to determine the clinical benefit of CST in the treatment of patients with a variety of clinical conditions.

METHODS:

Computerised literature searches were performed in Embase/Medline, Medline(®) In-Process, The Cochrane library, CINAHL, and AMED from database start to April 2011. Studies were identified according to pre-defined eligibility criteria. This included studies describing observational or randomised controlled trials (RCTs) in which CST as the only treatment method was used, and studies published in the English language. The methodological quality of the trials was assessed using the Downs and Black checklist.

RESULTS:

Only seven studies met the inclusion criteria, of which three studies were RCTs and four were of observational study design. Positive clinical outcomes were reported for pain reduction and improvement in general well-being of patients. Methodological Downs and Black quality scores ranged from 2 to 22 points out of a theoretical maximum of 27 points, with RCTs showing the highest overall scores.

CONCLUSION:

This review revealed the paucity of CST research in patients with different clinical pathologies. CST assessment is feasible in RCTs and has the potential of providing valuable outcomes to further support clinical decision making. However, due to the current moderate methodological quality of the included studies, further research is needed."

Jäkel A, von Hauenschild P 2011 **Therapeutic effects of cranial osteopathic manipulative medicine: a systematic review**. *J Am Osteopath Assoc* Dec;111(12):685-93. <http://www.ncbi.nlm.nih.gov/pubmed/22182954>

"Of the 8 studies that met the inclusion criteria, 7 were randomized controlled trials and 1 was an observational study. A range of cranial OMM techniques used for the management of a variety of conditions were identified in the included studies. Positive clinical outcomes were reported for pain reduction, change in autonomic nervous system function, and improvement of sleeping patterns. Methodological Downs and Black quality scores ranged from 14 to 23 points out of a maximum of 27 points (overall median score, 16)."

Panagopoulos J, Hancock MJ, Ferreira P, Hush J, Petocz P 2015 **Does the addition of visceral manipulation alter outcomes for patients with low back pain? A randomized placebo controlled trial.** *Eur J Pain* Aug;19(7):899-907 <http://www.ncbi.nlm.nih.gov/m/pubmed/25378096/>

This study aimed to investigate whether the addition of visceral manipulation, to a standard physiotherapy algorithm, improved outcomes in patients with low back pain.

"Sixty-four patients with low back pain who presented for treatment at a private physiotherapy clinic were randomized to one of two groups: standard physiotherapy plus visceral manipulation (n = 32) or standard physiotherapy plus placebo visceral manipulation (n = 32). The primary outcome was pain (measured with the 0-10 Numerical Pain Rating Scale) at 6 weeks. Secondary outcomes were pain at 2 and 52 weeks, disability (measured with the Roland-Morris Disability Questionnaire) at 2, 6 and 52 weeks and function (measured with the Patient-Specific Functional Scale) at 2, 6 and 52 weeks. "

"The addition of visceral manipulation did not affect the primary outcome of pain at 6 weeks (-0.12, 95% CI = -1.45 to 1.21). There were no significant between-group differences for the secondary outcomes of pain at 2 weeks or disability and function at 2, 6 or 52 weeks. The group receiving addition of visceral manipulation had less pain than the placebo group at 52 weeks (mean 1.57, 95% CI = 0.32 to 2.82). Participants were adequately blinded to group status and there were no adverse effects reported in either group."

"Our study suggests that visceral manipulation in addition to standard care is not effective in changing short-term outcomes but may produce clinically worthwhile improvements in pain at 1 year."

Haller H, Lauche R, Cramer H, Gass F, Rampp T, Saha F, Dobos G 2012 **Craniosacral therapy in chronic neck pain patients—a randomised sham-controlled trial** *European Journal of Integrative Medicine* September; 28-29 http://www.researchgate.net/publication/257710444_Craniosacral_therapy_in_chronic_neck_pain_patients_a_randomised_sham-controlled_trial

"Preliminary intention-to-treat analysis revealed significant less pain intensity in the CST group compared to the sham group (p = 0.017). With time, group differences on neck-pain-specific disability and pressure pain thresholds showed a positive trend, but did not achieve the level of significance. CST patients reported also strong global improvement, while the sham group rated between "no change" and only "a little better"."

Castro-Sánchez AM, Matarán-Peñarrocha GA, Arroyo-Morales M, Saavedra-Hernández M, Fernández-Sola C, Moreno-Lorenzo C. 2011 **Effects of myofascial release techniques on pain, physical function, and postural stability in patients with fibromyalgia: a randomized controlled trial** *Clin Rehabil* Sep;25(9):800-13 <http://www.ncbi.nlm.nih.gov/pubmed/21673013>

"After 20 weeks of myofascial therapy, the experimental group showed a significant improvement (P < 0.05) in painful tender points, McGill Pain Score (20.6 ± 6.3, P < 0.032), physical function (56.10 ± 17.3, P < 0.029), and clinical severity (5.08 ± 1.03, P < 0.039). At six months post intervention, the experimental group had a significantly lower mean number of painful points, pain score (8.25 ± 1.13, P < 0.048), physical function (58.60 ± 16.30, P < 0.049) and clinical severity (5.28 ± 0.97, P < 0.043). At one year post intervention, the only significant improvements were in painful points at second left rib and left gluteal muscle, affective dimension, number of days feeling good and clinical severity."

"The results suggest that myofascial release techniques can be a complementary therapy for pain symptoms, physical function and clinical severity but do not improve postural stability in patients with fibromyalgia syndrome."

Schabert E, Crow WT. 2009 **Impact of osteopathic manipulative treatment on cost of care for patients with migraine headache: a retrospective review of patient records.** J Am Osteopath Assoc Aug;109(8):403-7 <http://www.ncbi.nlm.nih.gov/pubmed/19706829>

"To determine whether the use of osteopathic manipulative treatment (OMT) at an osteopathic family practice residency clinic affected the cost of treating patients with migraine headache, compared with non-OMT care at the osteopathic clinic and care at an allopathic family practice residency clinic."

"A retrospective review of electronic medical records from patients treated for migraine at two residency clinics within the Florida Hospital organization from July 1, 2002, to June 30, 2007. One of the clinics was osteopathic and offered OMT services, and the other clinic was allopathic and did not offer OMT. All costs compiled during the office visits and costs of prescribed medications were tabulated for each patient. Patients' pain-severity ratings, as reported in office visits in 2006 and 2007, were also tabulated."

"Electronic medical records from 631 patients, representing 1427 migraine-related office visits, were analyzed. Average cost per patient visit was approximately 50% less at the osteopathic clinic than at the allopathic clinic (\$195.63 vs \$363.84, respectively; $P < .001$). This observed difference was entirely attributable to the difference in the average number of medications prescribed per visit at the two clinics, with 0.696 prescriptions at the osteopathic clinic and 1.285 prescriptions at the allopathic clinic ($P < .001$). This difference in prescription number resulted in a lower average medication cost per visit at the osteopathic clinic than at the allopathic clinic (\$106.94 vs \$284.93, respectively; $P < .001$)."

"No statistically significant difference was observed between the two practices in patients' ratings of pain severity."

"The inclusion of OMT in a treatment regimen for patients with migraine headache may lower the cost of the treatment regimen."

It is unclear whether the following journals are peer-reviewed

Number of studies:
2

Clinically and statistically significant results

Number of studies:
2

Randomised controlled trials

Number of studies: 1

Farthing RJ, Gosling CM, Vaughan B 2005 **The effects of slow rib raising on heart rate, blood pressure, respiration rate and pain pressure threshold** Osteopathic Medicine, School of Health Sciences, Victoria University, Melbourne (unpublished thesis) http://vuir.vu.edu.au/795/1/Farthing_et.al_2005.pdf

"Objective To determine whether rib raising over the costotransverse joints at a slow rate (0.5hz, 30/min) can affect indicators of SNS [sympathetic nervous system] function by producing changes in heart rate, respiratory rate, blood pressure and pain pressure threshold.

Design Randomized, cross-over, single blind, placebo controlled design in which participants experienced all three treatment conditions (rib raising treatment, placebo treatment and control treatment).

Subjects Thirty asymptomatic and apparently healthy participants (age 22.4 ± 2.75 yrs) were voluntarily recruited from the Victoria University Osteopathic Medicine Student Clinic.

Method Participants were randomly allocated to receive a treatment condition for three sessions with weekly intervals between treatment sessions. All treatment modalities were experienced by the participants. Baseline measures for heart rate (HR), respiratory rate (RR), systolic blood pressure (SBP), diastolic blood pressure (DBP) and pain pressure threshold (PPT) were recorded initially and repeated after two treatment interventions and after two rest periods.

Results

Analysis with five separate one way analysis of variance (ANOVA) with a priori comparisons revealed statically significant interactions between groups for RR ($F(2,87) = 7.02$, $P = 0.001$), DBP ($F(2,87) = 3.51$, $P = 0.03$) and PPT ($F(2,87) = 3.51$, $P = 0.03$). Increases were also observed for HR and SBP although these results were not statically significant.

Conclusions

Mobilization of the ribs 1-6 at a slow rate (0.5hz, 30 cycles per minute) in asymptomatic patients produced statically significant increases in RR, DBP and PPT. These changes were compared to the control and placebo groups in which little to minimal changes were observed."

Other qualitative studies

Number of studies: 1

Haller H, Cramer H, Lauche R, Dobos G, Berger B 2015 **Patients' experiences of Craniosacral Therapy in the treatment of chronic neck pain: a qualitative analysis of health outcomes** ICCMR Poster Presentation Abstracts https://www.uni-due.de/naturheilkunde/files/haller_iccmr_cranios.pdf

This study used a sub-sample of a randomized control trial, but there was no control for this specific investigation.

"Methods: A subsample of chronic non-specific neck pain patients was selected from a randomized controlled trial examining the efficacy of CST in comparison to sham (NCT01526447). At baseline 19 patients (mean age 42.5 ± 10.4 ; 13 female) of the CST group were asked to complete drawings of their perceived body shape and pain areas. Drawings were repeated after 8 weekly treatments and were followed by a semi-structured interview. Data were analyzed using qualitative content analysis.

Results: Changes due to CST were reported at various levels of human experiencing. Most patients described positive changes in more than one of the following domains: physical (less intensity of pain, headache and dizziness, improved sleep and range of motion), perceptual (more upright and symmetrical posture, sustained deep relaxation), emotional (pain is less threatening, increased calm, confidence and hope), cognitive (increased body awareness and self-efficacy, extinction of pain memory, increased concentration and less mind cinema), spiritual (sense of basic trust and peace), behavioral (moving in action alternatives, actively avoid stress, sport is again possible), social (more social contacts and activities) and economic domain (less pain medication, improved work efficiency). Several patients reported initial aggravation of symptoms, but no persisting or serious adverse events."