Collected Scientific Research Relating to the Use of Osteopathy with Women

Important:

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

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

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

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

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

These studies are from peer-reviewed journals

Number of studies: 27

Clinically and statistically significant results

Number of studies: 24

Systematic reviews

Number of studies: 1

Franke Helge, Hoesele Klaus, 2013 **Osteopathic manipulative treatment (OMT) for lower urinary tract symptoms (LUTS) in women** Journal of Bodywork and Movement Therapies Vol 17 (1) pages 11-18 *http://www.sciencedirect.com/science/article/pii/S1360859212001283*

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

Other reviews

Number of studies: 1

Lavelle JM 2012 **Osteopathic manipulative treatment in pregnant women.** J Am Osteopath Assoc Jun;112(6):343-6 *http://www.ncbi.nlm.nih.gov/pubmed/22707643*

> "Pregnant women experience extensive physiologic and structural changes during pregnancy that affect their daily functioning. The addition of osteopathic manipulative treatment (OMT) to the standard care of pregnant women has been hypothesized to enhance homeostasis and improve quality of life as the body adapts to these changes. Specifically, it has been postulated that OMT can ease pain in pregnant women by eliminating somatic dysfunction and maintaining proper structure. Also, through the viscerosomatic connection, the hemodynamic changes of the maternal body can be controlled, the duration of labor reduced, and the complications of labor avoided. The author reviews the available literature on the use and effectiveness of OMT during pregnancy."

Randomised controlled trials

Number of studies: 12

Herzhaft-Le Roy J, Xhignesse M, Gaboury I. 2016 **Efficacy of an Osteopathic Treatment Coupled With Lactation Consultations for Infants' Biomechanical Sucking Difficulties.** J Hum Lact Dec 1:890334416679620 *https://www.ncbi.nlm.nih.gov/pubmed/28027445/*

> "Abstract
> BACKGROUND:
> Despite well-known recommendations from national and international bodies including the World Health Organization, few mothers achieve the goal of breastfeeding exclusively for 6 months. Half of mothers stop breastfeeding due to biomechanical issues in the first month, despite increasing support from lactation consultants. Osteopaths worldwide work with these babies, but there is little empirical evidence for this type of treatment. Research aim: This study aimed to determine the efficacy of an osteopathic treatment coupled with usual lactation consultations on infants' ability to latch. Secondary objectives included assessment of nipple pain and mothers' perceptions of the effect of treatment.
> METHODS:
> We conducted a single blind, randomized controlled trial at a mother-to-mother support group between January and December 2015. Data were collected at four different times over a 10-day period (T0-T10) from 97 mother-infant dyads using the LATCH assessment tool, a visual analog scale (VAS) to document mothers' nipple pain, and a de novo questionnaire for breastfeeding management and potential treatment side effects.
> RESULTS:
> There were consistent statistical and clinical differences in the mean LATCH scores between the treatment and the control groups (p < .001). However, no significant differences in the VAS scores were reported over time (p = .713). Mothers reported no serious or unexpected side effects during the follow-up period.
> CONCLUSION:
> This study is one of the first to bring together lactation consultants and osteopaths to address infants with biomechanical sucking difficulties. Findings support the hypothesis that the addition of osteopathy to regular lactation consultations is beneficial and safe."

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*

> "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)."

Bertelli DF, de Oliveira P, Gimenes AS, Moreno MA. 2013 **Postural drainage and manual lymphatic drainage for lower limb edema in women with morbid obesity after bariatric surgery: a randomized controlled trial.** Am J Phys Med Rehabil Aug;92(8):697-703 *http://www.ncbi.nlm.nih.gov/pubmed/23370584*

> "The treatment protocols promoted reductions in volume values, suggesting that both techniques could be used to help reduce lower limb edema"
> "Nevertheless, the best results were obtained with MLD. [manual lymphatic drainage]"

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 fo life]."

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."

Cleary C, Fox JP 1994 **Menopausal symptoms: an osteopathic investigation** Complementary Therapies in Medicine Volume 2, Issue 4, October , Pages 181–186 *http://www.sciencedirect.com/science/article/pii/0965229994900175*

> "The aim of this placebo controlled osteopathic study was to investigate the effect of ‘Fox's low-force’ osteopathic techniques on 30 subjects with menopausal symptoms. The results showed a significant reduction of symptoms in the treated group. An unexpected finding was that testosterone levels were lowered (p=0.028) in the treated group whereas the control group levels were unaffected."

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, par- ticipants were not allowed to receive any additional treat- ment 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 Review Group criteria.** J Am Osteopath Assoc Oct;113(10):728-36 *http://www.ncbi.nlm.nih.gov/pubmed/24084800*

"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."

Dugaill P, Fassin S, Maroye L, Evers L, Klein P, Feipel V, 2014 **Effect of a general osteopathic treatment on body satisfaction, global self perception and anxiety: A randomized trial in asymptomatic female students** International Journal of Osteopathic Medicine Volume 17, Issue 2, June , Pages 94–101 *http://www.sciencedirect.com/science/article/pii/S1746068913001260*

"Thirty-four asymptomatic female volunteers completed baseline auto-questionnaires about anxiety, body satisfaction and global self-perception. Then, they were randomly assigned to OG or to control group (restful state)."
"At baseline, characteristics were comparable between groups. Following the intervention, we observed improvements in psychological state in both OG [general osteopathic treatment] and control groups. Nevertheless, OG had a significant larger effect over restful state for anxiety and global self-perception ($p < 0.02$)."
"The present study suggests that an osteopathic approach using articular and soft tissue mobilisations has an effect, at least in the short term, on anxiety and global body perception. Further investigation is needed to confirm the relevance and broaden the scope of the present study."

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."

Guthrie RA, Martin RH 1982 **Effect of pressure applied to the upper thoracic (placebo) versus lumbar areas (osteopathic manipulative treatment) for inhibition of lumbar myalgia during labor** J Am Osteopath Assoc 82(4):247-251 *http://jaoa.org/article.aspx?articleid=2097814*

"In a study of five hundred women during labor, 352 experienced pain in the lumbar area during labor, an incidence of 70.4 percent. One of the most interesting findings of the study was the association of back pain during labor and abnormal fetal presentation. Application of pressure to the lumbar area to inhibit lumbar pain reduced the need for major narcotic pain medication and minor tranquilizing medication. The placebo treatment project was compared to lumbar treatment for pain relief of lumbar myalgia."
"Concerning back pressure, the technique had no significant effect on length of labor. However, the subjective evaluation of the technique by the patient noted its effectiveness at an average of 81 percent. Also subjectively, 88 percent of those women who used back pressure for back pain during labor stated that they needed less pain medication than anticipated during labor because they were given the back pressure technique. Objectively, there was a marked decrease in pain medication given to women with back pain during labor who were given the back pressure technique. Less than one-half of the minor tran- quilizing medication (Vistaril) and almost one-third less major narcotic pain medication was used when back pain during labor was treated with back pressure in the lumbar area."

Other controlled clinical trials

Number of studies: 3

Daraï C, Deboute O, Zacharopoulou C, Laas E, Canlorbe G, Belghiti J, Zilberman S, Ballester M, Daraï E 2015 **Impact of osteopathic manipulative therapy on quality of life of patients with deep infiltrating endometriosis with colorectal involvement: results of a pilot study** European Journal of Obstetrics & Gynecology and Reproductive Biology Volume 188, May, Pages 70–73 *http://www.sciencedirect.com/science/article/pii/S030121151500072X*

> "After a mean period of 24 days (15–53), a significant improvement in PCS [physical component summary] (p = 0.03) and MCS [mental component summary] (p = 0.0009) compared to pre-OMT [osteopathic manipulative therapy] values was observed giving a success rate of 80% and 60% in intention-to-treat, respectively."
> "Our results support that OMT can improve QOL [quality fo life] of patients with DIE [deep infiltrating endometriosis] and colorectal involvement."

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 ≤ 0.001; Wilcoxon test) and also in 'pain interference' score between baseline and all subsequent time points (p ≤ 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."

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: 1

King HH, Tettambel MA, Lockwood MD, Johnson KH, Arsenault DA, Quist R 2003 **Osteopathic manipulative treatment in prenatal care: a retrospective case control design study** J Am Osteopath Assoc 103(12):577-582 *http://www.ncbi.nlm.nih.gov/pubmed/14740980*

> "The use of osteopathic manipulative treatment (OMT) during pregnancy has a long tradition in osteopathic medicine. A retrospective study was designed to compare a group of women who received prenatal OMT with a matched group that did not receive prenatal OMT. The medical records of 160 women from four cities who received prenatal OMT were reviewed for the occurrence of meconium-stained amniotic fluid, preterm delivery, use of forceps, and cesarean delivery. The randomly selected records of 161 women who were from the same cities, but who did not receive prenatal OMT, were reviewed for the same outcomes. The results of a logistic regression analysis were statistically reliable, chi2 (4, N = 321) = 26.55; P < .001, indicating that the labor and delivery outcomes, as a set, were associated with whether OMT was administered during pregnancy."
> "The case control study found evidence of improved outcomes in labor and delivery for women who received prenatal OMT, compared with women who did not. A prospective study is proposed as the next step in evaluating the effects of prenatal OMT."

Case series

Number of studies: 2

Gitlin RS, Wolf DL 1992 **Uterine contractions following osteopathic cranial manipulation–a pilot study** J Am Osteopath Assoc 92(9):1183

Hart LM 1918 **Obstetrical practice** J Am Osteopath Assoc 609-614

Case reports

Number of studies: 3

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*

> "Abnormal uterine bleeding is characterized by painful and/or excessive menorrhea, 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)."

Liao SF, Huang MS, Chou YH, Wei TS. 2003 **Successful complex decongestive physiotherapy for lymphedema and lymphocutaneous reflux of the female external genitalia after radiation therapy.** J Formos Med Assoc Jun;102(6):404-6. *http://www.ncbi.nlm.nih.gov/pubmed/12923593*

> "Lymphatic discharge and folliculitis were markedly improved after a 3-week course of treatment."

Smallwood CR, Borgerding CJ, Cox MS, Berkowitz MR, 2013 **Osteopathic manipulative treatment (OMT) during labor facilitates a natural, drug-free childbirth for a primigravida patient: A case report** International Journal of Osteopathic Medicine Vol 16 (3) pages 170-177 *http://www.sciencedirect.com/science/article/pii/S1746068912001010*

> "This paper reports the use of osteopathic manipulative treatment (OMT) as an aid to labor and delivery in a woman desiring a natural childbirth."
> "The patient was able to undergo labor and delivery completely without the use of medication via any route for pain or labor augmentation as the patient desired. Stage two of labor for a primiparous female was on the quicker end of the spectrum. OMT for the laboring woman should be considered as a treatment modality to facilitate a natural childbirth."

Non-human studies

Number of studies: 1

Sucher BM, Hinrichs RN, Welcher RL, Quiroz LD, St Laurent BF, Morrison BJ. 2005 **Manipulative treatment of carpal tunnel syndrome: biomechanical and osteopathic intervention to increase the length of the transverse carpal ligament: part 2. Effect of sex differences and manipulative "priming".** J Am Osteopath Assoc Mar;105(3):135-43 *http://www.ncbi.nlm.nih.gov/pubmed/15863733*

> "As a theoretical basis for treatment of carpal tunnel syndrome (CTS) and expanding upon part 1 of this study, the authors investigated the effects of static loading (weights) and dynamic loading (osteopathic manipulation [OM]) on 20 cadaver limbs (10 male, 10 female). This larger study group allowed for comparative analysis of results by sex and reversal of sequencing for testing protocols. In static loading, 10-newton loads were applied to metal pins inserted into carpal bones. In dynamic loading, the OM maneuvers used were those currently used in clinical settings to treat patients with CTS. Transverse carpal ligament (TCL) response was observed by measuring changes in the width of the transverse carpal arch (TCA) with three-dimensional video analysis and precision calipers. Results demonstrated maximal TCL elongation of 13% (3.7 mm) with a residual elongation after recovery of 9% (2.6 mm) from weight loads in the female cadaver limbs, compared to less than 1 mm as noted in part 1, which used lower weight loads and combined results from both sexes. Favorable responses to all interventions were more significant among female cadaver limbs. Higher weight loads also caused more linear translatory motion through the metal pins, resulting in TCA widening equal to 63% of the increases occurring at skin level, compared to only 38% with lower loads. When OM was performed first, it led to greater widening of the TCA and lengthening of the TCL during the weight loading that followed. Both methods hold promise to favorably impact the course of management of CTS, particularly in women."

Mixed results (significant for some outcomes, not others)

Number of studies: 3

Systematic reviews

Number of studies: 1

Ruffini N, D'Alessandro G, Cardinali L, Frondaroli F, Cerritelli F, 2016 **Osteopathic manipulative treatment in gynecology and obstetrics: A systematic review** Complementary Therapies in Medicine Volume 26, June, Pages 72-78 *https://www.sciencedirect.com/science/article/pii/S0965229916300309*

> "Objective
> The aim of the review was to evaluate the effects of the osteopathic manipulative treatment (OMT) on women with gynaecological and obstetric disorders.
> Materials and methods
> An extensive search from inception to April 2014 was conducted on MEDLINE, Embase, the Cochrane library using MeSH and free terms. Clinical studies investigating the effect of OMT in gynaecologic and obstetric conditions were included as well as unpublished works. Reviews and personal contributions were excluded. Studies were screened for population, outcome, results and adverse effects by two independent reviewers using an ad-hoc data extraction form. The high heterogeneity of the studies led to a narrative review.
> Results
> 24 studies were included (total sample = 1840), addressing back pain and low back functioning in pregnancy, pain and drug use during labor and delivery, infertility and subfertility, dysmenorrhea, symptoms of (peri)menopause and pelvic pain. Overall, OMT can be considered effective on pregnancy related back pain but uncertain in all other gynaecological and obstetrical conditions. Only three studies (12.5%) mentioned adverse events after OMT.
> Conclusions
> Although positive effects were found, the heterogeneity of study designs, the low number of studies and the high risk of bias of included trials prevented any indication on the effect of osteopathic care. Further investigation with more pragmatic methodology, better and detailed description of interventions and systematic reporting of adverse events are recommended in order to obtain solid and generalizable results."

Randomised controlled trials

Number of studies: 2

Hensel KL, Buchanan S, Brown SK, Rodriguez M, Cruser dA 2015 **Pregnancy Research on Osteopathic Manipulation Optimizing Treatment Effects: the PROMOTE study** American Journal of Obstetrics and Gynecology Volume 212, Issue 1, January , Pages 108.e1–108.e9 *http://www.sciencedirect.com/science/article/pii/S0002937814007923*

> "Pregnancy research on osteopathic manipulation optimizing treatment effects was a randomized, placebo-controlled trial of 400 women in their third trimester. Women were assigned randomly to usual care only (UCO), usual care plus OMT [ostoepathic manipulative therapy], or usual care plus placebo ultrasound treatment (PUT). The study included 7 treatments over 9 weeks. The OMT protocol included specific techniques that were administered by board-certified OMT specialists. Outcomes were assessed with the use of self-report measures for pain and back-related functioning and medical records for delivery outcomes."
> "OMT was effective for mitigating pain and functional deterioration compared with UCO; however, OMT did not differ significantly from PUT. This may be attributed to PUT being a more active treatment than intended. There was no higher likelihood of conversion to high-risk status based on treatment group. Therefore, OMT is a safe, effective adjunctive modality to improve pain and functioning during the third trimester."

Hensel KL, Pacchia CF, Smith ML, 2013 **Acute improvement in hemodynamic control after osteopathic manipulative treatment in the third trimester of pregnancy** Complementary Therapies in Medicine Volume 21, Issue 6, December , Pages 618–626 *http://www.sciencedirect.*

"Summary
Objectives
The physiological changes that occur during pregnancy, including increased blood volume and cardiac output, can affect hemodynamic control, most profoundly with positional changes that affect venous return to the heart. By using Osteopathic Manipulative Treatment (OMT), a body-based modality theorized to affect somatic structures related to nervous and circulatory systems, we hypothesized that OMT acutely improves both autonomic and hemodynamic control during head-up tilt and heel raise in women at 30 weeks gestation.
Design
One hundred subjects were recruited at 30 weeks gestation.
Setting
The obstetric clinics of UNTHealth in Fort Worth, TX.
Intervention
Subjects were randomized into one of three treatment groups: OMT, placebo ultrasound, or time control. Ninety subjects had complete data (N = 25, 31 and 34 in each group respectively).
Main outcome measures
Blood pressure and heart rate were recorded during 5 min of head-up tilt followed by 4 min of intermittent heel raising.
Results
No significant differences in blood pressure, heart rate or heart rate variability were observed between groups with tilt before or after treatment ($p > 0.36$), and heart rate variability was not different between treatment groups ($p > 0.55$). However, blood pressure increased significantly ($p = 0.02$) and heart rate decreased ($p < 0.01$) during heel raise after OMT compared to placebo or time control.
Conclusions
These data suggest that OMT can acutely improve hemodynamic control during engagement of the skeletal muscle pump and this was most likely due to improvement of structural restrictions to venous return."