



# The Foundation COME Collaboration Onlus

## Research Report 2017

The Foundation COME Collaboration Onlus  
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10. *“Multi-sensor assessment of dynamic balance during gait in patients with subacute stroke”* – E. Bergamini, M. Rosa, V. Belluscio, G. Morone, M. Tramontano, G. Vannozzi - J Biomech. 2017 Aug 16; 61:208-215.
11. *“Effects of Osteopathic Manipulative Therapy on Pain and Mood Disorders in Patients With High-Frequency Migraine”* – M. D'Ippolito, M. Tramontano, M.G. Buzzi - J Am Osteopath Assoc. 2017 Jun 1; 117(6):365-369.
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13. *“Maintaining gait stability during dual walking task: effects of age and neurological disorders”* – M. Tramontano, G. Morone, A. Curcio, G. Temperoni, - A. Medici, D. Morelli, C. Caltagirone, S. Paolucci, M. Iosa.

## Introduction

The following report presents the most relevant publications, papers, articles and book chapters issued on several medical and scientific journals (at national and international level) as well as published on books and websites on 2017. Papers were written and published by COME Collaboration's members, doing research for and collaborating with the Foundation.

COME Collaboration main theme of the year was "*Innovation and multidisciplinary thinking*". The following publications and the researches are in line with this main topic.

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1. *“Osteopathic manipulative treatment showed reduction of length of stay and costs in preterm infants: A systematic review and meta-analysis”* - Diego Lanaro, Nuria Ruffini, Andrea Manzotti, Gianluca Lista - Journal: Medicine (2017) 96:12 (e6408)

## Abstract

### Background

Prematurity is a serious health care problem. Compared to full-term new-borns, the likelihood of being affected by poor health, developmental and cognitive delays within the first year of life is higher in premature babies. This in turn will result in extensive psychological, physical, and economic costs. One of the main factor contributing to costs is length of hospital stay (LOS), [4] also considered a proxy of health infant status. Osteopathic medicine is a non-invasive, drug-free manual medicine, classified as a complementary and alternative medicine and works through manual manipulation techniques, which has been shown to be one emerging strategy to improve new-born's health outcomes. The aim of the present systematic review was to assess the extent to which osteopathic medicine is effective compared to the control group in reducing LOS, hospital costs, and adverse events in premature infants.

### Methods

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

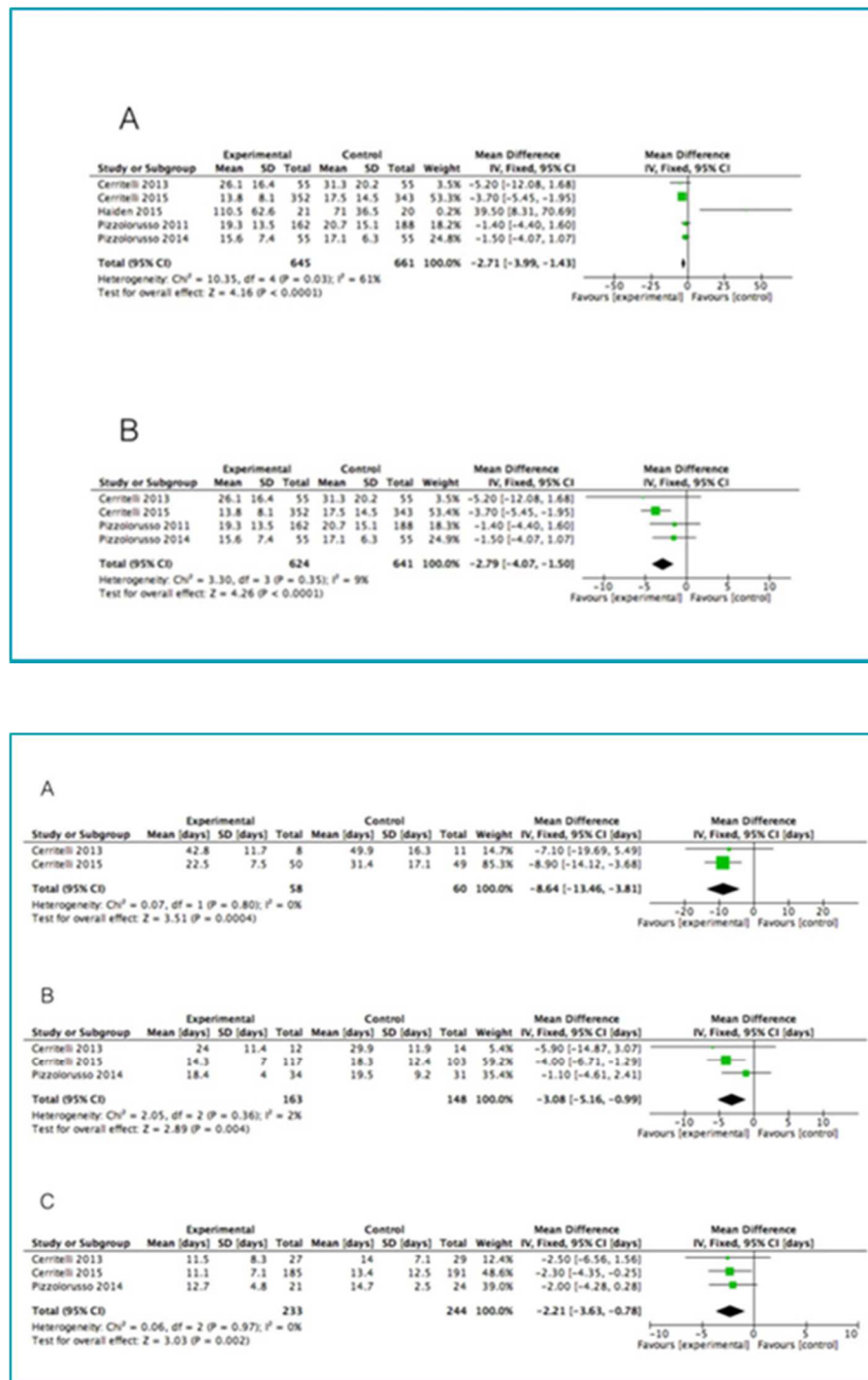
### Results

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

### Conclusions

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

## Tables



**Figure 1.** Forest plot showing meta-analysis of osteopathic intervention on LOS. (A) Comprehensive analysis including all studies. (B) Sensitivity analysis. Sensitivity analysis by gestational age (GA). (A) Very preterm infant with GA < 32 w; (B) moderate preterm infants with 32 > GA < 34 w; (C) late preterm infants with GA > 34 w. LOS = length of stay, GA = gestational age.

**Table 2****Summary of results of meta-analysis.**

Outcome	No of studies included in the meta-analysis (no of patients)	Mean effect of OMT on preterm infants versus usual care group (95% CI)	P
LOS (days)	5 (1306)	Decrease in preterm infants treated by OMT by 2.71 (95% CI -3.99, -1.43)	<0.001
Cost (Euros)	3 (915)	Preterm infants costs decreased in the OMT group (-1545.66 €; -1888.03, -1203.29€)	<0.0001
Subgroup analysis: LOS (days) <32 weeks	2 (118)	Decrease in preterm infants with severe prematurity treated with OMT (-8.64 days; 95% CI -13.46, -3.81 days)	<0.001
Subgroup analysis: LOS (days) >32; <35 weeks	3 (311)	Shorten in moderate preterm infants allocated to OMT group (-3.08 days; 95% CI -5.16, -0.99 days)	<0.01
Subgroup analysis: LOS (days) >35; <37 weeks	3 (477)	Diminish in late preterm infants treated by OMT (-2.21 days; 95% CI -3.63, -0.78 days)	<0.01

LOS=length of stay, OMT=osteopathic manipulative treatment.



2. *“Effect of Continuous Touch on Brain Functional Connectivity Is Modified by the Operator’s Tactile Attention”* - Francesco Cerritelli, Piero Chiacchiaretta, Francesco Gambi and Antonio Ferretti - Journal: Front. Hum. Neurosci. 2017. 11:368.

**Abstract**

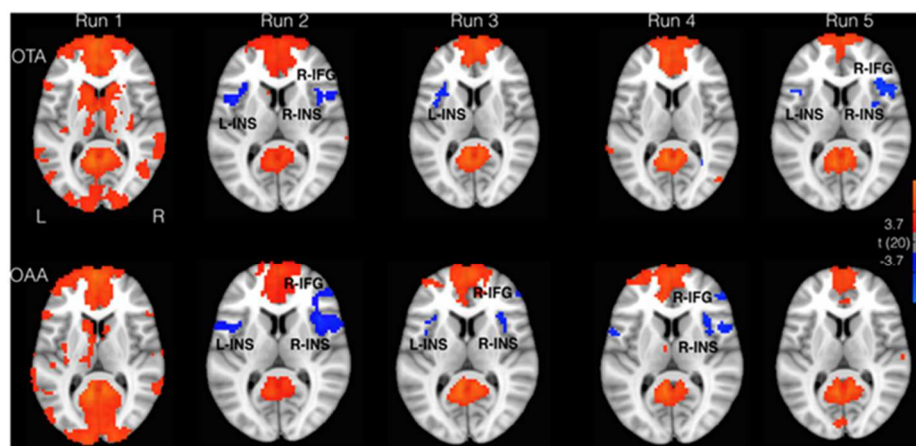
Touch has been always regarded as a powerful communication channel playing a key role in governing our emotional wellbeing and possibly perception of self.

Several studies demonstrated that the stimulation of C-tactile afferent fibers, essential neuroanatomical elements of affective touch, activates specific brain areas and the activation pattern is influenced by subject’s attention. However, no research has investigated how the cognitive status of who is administering the touch produces changes in brain functional connectivity of touched subjects.

In this functional magnetic resonance imaging (fMRI) study, we investigated brain connectivity while subjects were receiving a static touch by an operator engaged in either a tactile attention or auditory attention task. This randomized-controlled single-blinded study enrolled 40 healthy right-handed adults and randomly assigned to either the operator tactile attention (OTA) or the operator auditory attention (OAA) group.

During the five fMRI resting-state runs, the touch was delivered while the operator focused his attention either: (i) on the tactile perception from his hands (OTA group); or (ii) on a repeated auditory stimulus (OAA group).

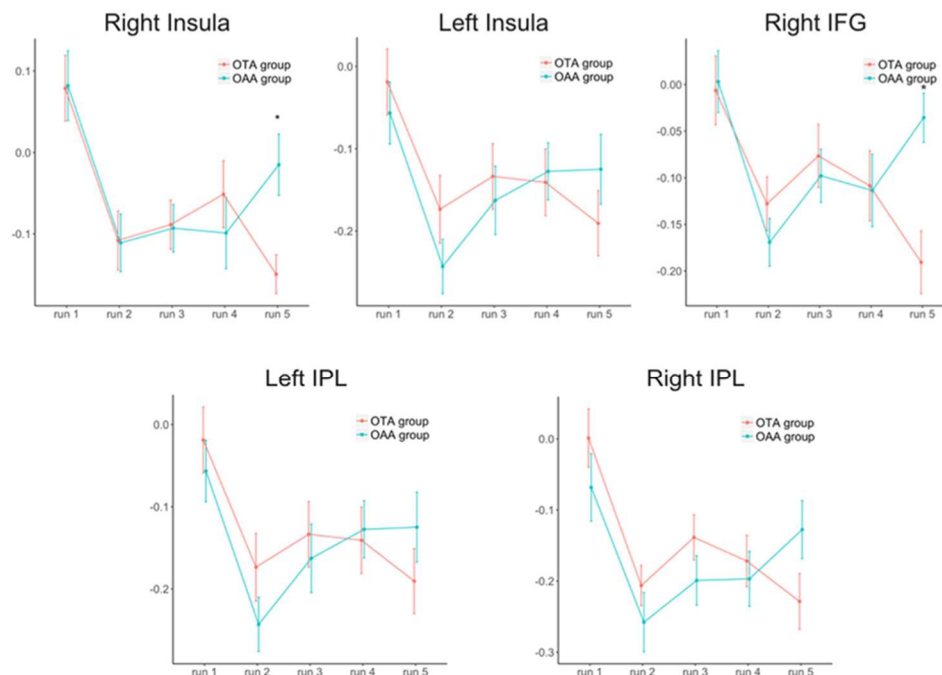
Functional connectivity analysis revealed that prolonged sustained static touch applied by an operator engaged with focused tactile attention produced a significant increase of anticorrelation between posterior cingulate cortex (PCC-seed) and right insula (INS) as well as right inferior- frontal gyrus but these functional connectivity changes are markedly different only after 15 min of touching across the OTA and OAA conditions (Figure 1).



**FIGURE 1 |** Areas correlated (red) and anticorrelated (blue) with posterior cingulate cortex (PCC;  $p < 0.05$ , false discovery rate (FDR) corrected). Insular cortex (INS) and inferior frontal gyrus (IFG) showed greater anticorrelation for the operator tactile attention (OTA) compared to operator auditory attention (OAA) group.

Interestingly, data also showed anti-correlation between PCC and left INS with a distinct pattern over time (Figure 1, 2). Indeed, the PCC-left INS anti-correlation is showed to start and end earlier compared to that of PCC-right INS (Figure 1, 2).

Taken together, the results of this study showed that if a particular cognitive status of the operator is sustained over time, it is able to elicit significant effects on the subjects' functional connectivity patterns involving cortical areas processing the interceptive and attentional value of touch.



**FIGURE 3 |** Trend of the anticorrelation (z-Fisher values  $\pm$  SEM) over time for the two groups and the different regions of interest. IFG, inferior frontal gyrus; IPL, inferior parietal lobe. \*Statistically significant values between groups after Bonferroni-Holm correction.

3. “Osteopathy for primary headache patients: a systematic review” – Francesco Cerritelli, Eleonora Lacorte, Nuria Ruffini, Nicola Vanacore - *J Pain Res.* 2017 Mar 14;10:601-611.

**Abstract**

Objective

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

Background

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

Methods

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

Results

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

Conclusion

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

**Tables**

First author, Outcome measures year	Description of interventions	Time to outcome measurement	Population	Type of headache	Relevant outcome results
Hoyt et al, 1979 <sup>27</sup>	Effects of OMT in terms of the following: 1) headache pain intensity and 2) EMG  OMT (n=10): Description: protocol, 1 session (same day, 10 min) Concomitant treatments: NA Control 1 (n=6): OE Description: protocol, 1 session (same day, 10 min) Concomitant treatments: NA Control 2 (n=6): rest Description: supine Concomitant treatments: NA	IAT	N=22, age = NA; male = NA	Chronic muscle tension headache	Decrease in headache intensity (worst headache improvement): OMT vs control (p=0.07) Pain intensity, among 3 groups: F=17.16 (p<0.001); reduction within OMT group compared to baseline (p<0.001)

**Abbreviations:** OMT, osteopathic manipulative treatment; HIT-6, headache impact test-6; NBT, need-based treatment; PMR, progressive muscular relaxation exercises; OE, osteopathic evaluation; HD, headache diary; HDI, headache disability index; HI, headache index; EMG, electromyography; IAT, immediately after treatment; NA, not available; TTH, tension type headache; ICHD, International Classification of Headache Disorders; ICD, International Classification of Diseases IHS, International Headache Society; Y, yes; mo, months; w, weeks; min, minutes; MIDAS, Migraine Disability Assessment questionnaire; SF-36, Short Form-36.

Table 1 Main characteristics of the included studies

Author (year)	Outcome measures	Description of interventions	Time to outcome measurement	Population	Type of headache	Relevant outcome results
Cerritelli et al, 2015 <sup>28</sup>	Effectiveness of OMT in terms of the following: 1) HIT-6 score, 2) days/mo with migraine, 3) severity of pain, 4) amount of rescue medication, 5) functional disability, and 6) adverse effects of OMT	OMT (n=35): Description: NBT, 8 sessions (4 weekly, 2 bimonthly, 2 monthly, 30 min) Concomitant treatments: Y, triptans at need Control 1 (n=35): sham OMT Description: sham OMT, 8 sessions (4 weekly, 2 bimonthly, 2 monthly, 30 min) Concomitant treatments: Y, triptans at need Control 2 (n=35): usual care Description: triptans at need	6 mo	N=105; age =38.7±9.3 years; male =34%	Migraine (according to ICHD-II)	Decrease of HIT-6 score for OMT vs controls ( $p<0.001$ ) Decrease in days of migraine for OMT vs controls ( $p<0.001$ ) Decrease in pain intensity for OMT vs controls ( $p<0.001$ ) Decrease in drug consumption for OMT vs controls ( $p<0.001$ ) Adverse events: none
Rollea et al, 2014 <sup>29</sup>	Efficacy of OMT in terms of the following: 1) headache frequency, 2) headache pain intensity, 3) over-the-counter medication use, and 4) HDI	OMT (n=21): Description: NBT, 4 sessions (weekly) Concomitant treatments: Y, not specific Control (n=19): sham OMT Description: sham OMT, 4 sessions (4 weekly) Concomitant treatments: Y, not specific	4 w; follow-up at 1 and 3 mo	N=40; age =34.5±12 years; male =14%	Frequent episodic TTH (according to ICHD-III)	Headache frequency: OMT vs control: 33% decrease ( $p<0.001$ ) Pain intensity: 20% reduction within OMT group compared to baseline ( $p<0.001$ ) Drug consumption: 45% reduction within OMT group compared to baseline ( $p<0.001$ ) Adverse events: none
Voigt et al, 2011 <sup>29</sup>	Effectiveness of OMT in terms of the following: 1) HRQoL, 2) pain intensity, 3) days of migraine headache, 4) working disability, 5) German "Pain Questionnaire", and 6) MIDAS and 7) SF-36	OMT (n=21): Description: NBT, 5 sessions (bimonthly, 50 min) Concomitant treatments: Y, not specific Control (n=21): no intervention Description: not specific	6 mo	N=42; age =45±11 years; male =0%	Migraine (according to ICD-10)	Decrease in pain intensity (within group): OMT ( $p<0.05$ ); control ( $p=0.87$ ) Decrease in days of migraine (within group): OMT ( $p=0.31$ ); control ( $p=0.89$ ) Decrease in working disability (within group): OMT ( $p=0.06$ ); control ( $p=0.47$ ) Decrease in MIDAS (within group): OMT ( $p=0.04$ ); control ( $p=0.76$ )
Anderson and Saniscal, 2006 <sup>28</sup>	Effects of OMT in terms of the following: 1) headache frequency, 2) headache intensity, 3) HD, and 4) HI	OMT (n=14): Description: protocol, 3 sessions (weekly) Concomitant treatments: Y, FMR Control (n=12): FMR Description: relaxation exercise (1/day, 20 min)	6 w	N=26; age = NA; male = NA	Any type of TTH (according to IHS2004)	Decrease in headache frequency (free days/w): OMT vs control ( $p=0.016$ )

(Continued)

4. *"The role of gentle touch in perinatal osteopathic manual therapy"* – F. McGlone, F. Cerritelli, S. Walker, J. Esteves (2017). *Neuroscience & Biobehavioral Reviews*, 72: 1-9.

**Abstract**

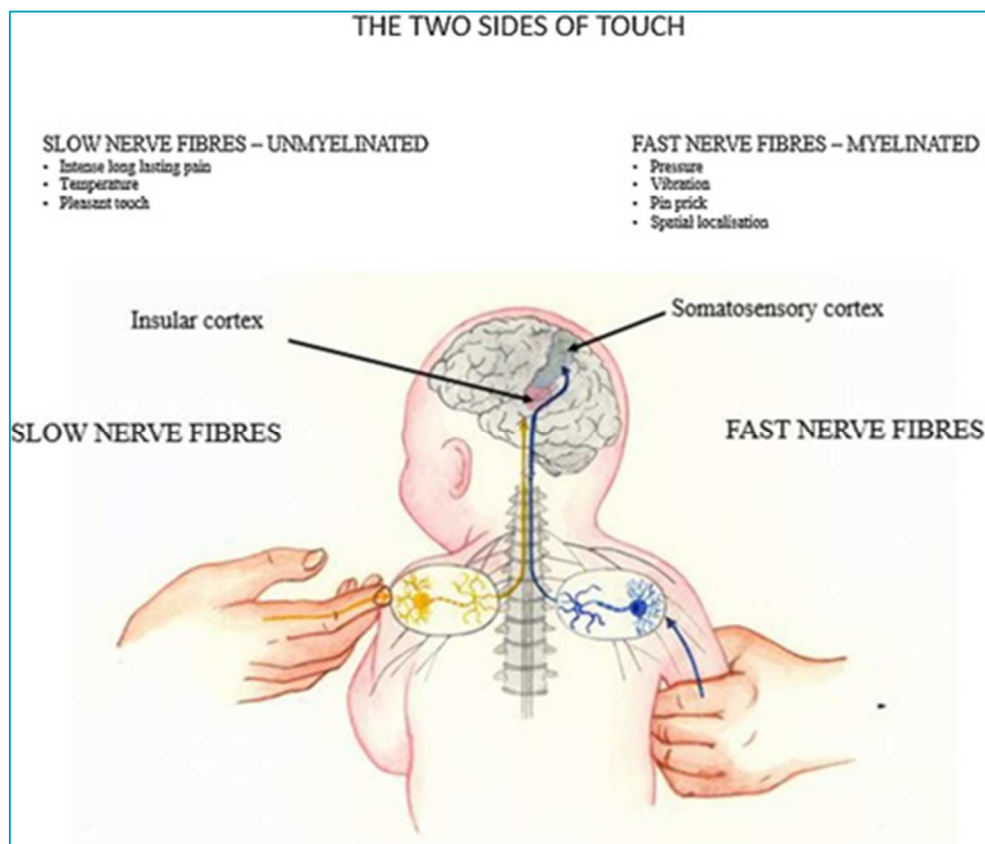
Osteopathic medicine is a system of manual diagnosis and treatment. While there is growing evidence that osteopathy is effective in a range of clinical conditions, the underlying biological basis of its therapeutic effects remain largely unknown.

Given that the sense of touch plays a critical role in osteopathy, in this perspective article, with a particular focus on perinatal care, we explore the potential mechanisms by which stimulation of the skin senses can exert beneficial physiological and psychological effects, aiding growth and development.

We propose that a class of low threshold mechano-sensitive c-fibre, named c-tactile afferents, which respond optimally to gentle, slow moving touch are likely to play a direct and significant role in the efficacy of manual therapies.

A greater understanding of the impact the type and quality of touch plays in therapeutic tactile interventions and in particular, the neuroscience underpinning these effects will aid the development of more targeted, population specific interventions.

**Tables**





5. “A systematic review of randomised controlled trials using Acceptance and commitment therapy as an intervention in the management of non-malignant, chronic pain in adults”- P.A. Simpson, T. Mars, J. Esteves (2017) - International Journal of Osteopathic Medicine (2017), 24(2): 18-31.

## Abstract

### Context

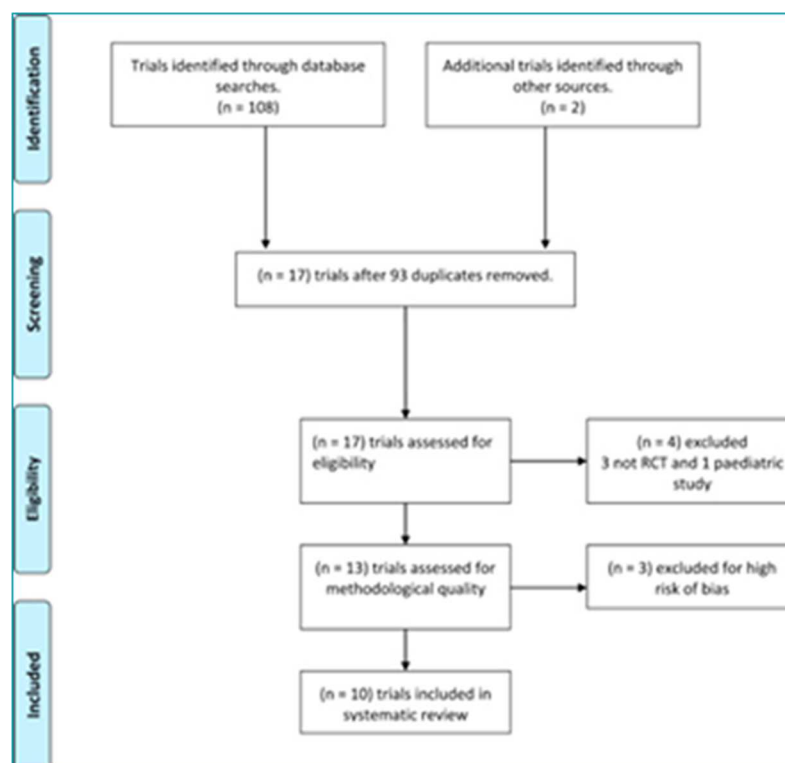
Acceptance and Commitment Therapy (ACT) is a psychological, behavioural based intervention used in the management of chronic pain (CP). CP represents a significant challenge for health care professionals including osteopaths. Whilst support for ACT's effectiveness is present in peer reviewed literature, the validity and generalizability of reported findings is negatively affected by methodological flaws and trial heterogeneity. A systematic review of randomised controlled trials (RCTs) of ACT as an intervention in the management of non-malignant, CP in adults was conducted to evaluate the effectiveness of ACT.

### Method

Systematic online searches for RCTs and evaluation using methodological quality criteria.

### Literature search

110 trials were identified of which 93 were duplicates, 17 were assessed for eligibility, 4 were excluded according to criteria and 3 for high risk of bias. 10 trials were reviewed.



### Results

Evidence exists in support of the effectiveness of ACT in managing CP. Evidence regarding process mediators of behavioural change in ACT is insufficient and conflicting. Meta-analysis was precluded due to heterogeneity in the sample.

### Conclusions

ACT demonstrates promise as a therapeutic intervention for non-malignant, CP populations. Evidence regarding mediation of behavioural change is conflicting. Heterogeneity in the sample precludes meta-analysis. Generalizability was supported by corroborating evidence across numbers of trials. Further research is indicated to develop the utilisation of ACT in conjunction with manual therapies as an intervention for CP.



**6. “Influence of perceived difficulty of cases on student osteopaths’ diagnostic reasoning: a cross sectional study” – A. Noyer, J. Esteves, O.P. Thomson (2017) - Chiropractic & Manual Therapies 2017: 25-32**

**Abstract**

Background

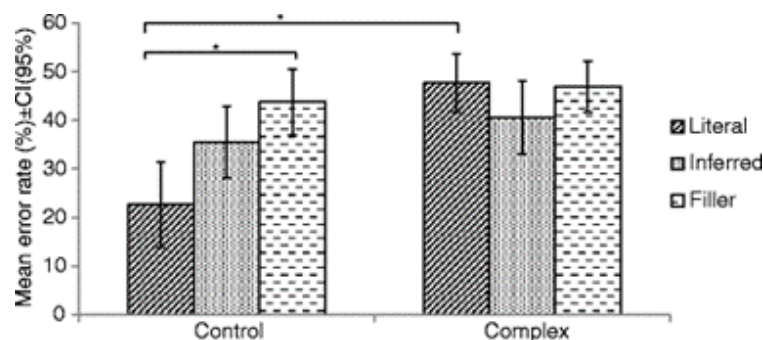
Diagnostic reasoning refers to the cognitive processes by which clinicians formulate diagnoses. Despite the implications for patient safety and professional identity, research on diagnostic reasoning in osteopathy remains largely theoretical. The aim of this study was to investigate the influence of perceived task difficulty on the diagnostic reasoning of students osteopaths.

Methods

Using a single-blinded, cross sectional study design, sixteen final year pre-registration osteopathy students diagnosed two standardized cases under two context conditions (complex versus control). Context difficulty was manipulated via verbal manipulation and case order was randomized and counterbalanced across subjects to ensure that each case was diagnosed evenly under both conditions (i.e. half of the subjects performed either case A or B first). After diagnosis, participants were presented with items (literal, inferred and filler) designed to represent analytical and non-analytical reasoning. Response time and error rate for each item were measured. A repeated measures analysis of variance (concept type x context) was performed to identify differences across conditions and make inferences on diagnostic reasoning.

Results

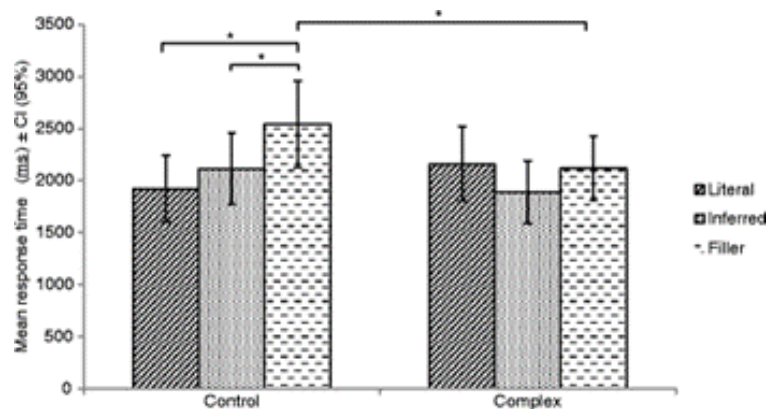
Participants made significantly more errors when judging literal concepts and took significantly less time to recognize filler concepts in the complex context. No significant difference in ability to judge inferred concepts across contexts was found.



Conclusions

Although speculative and preliminary, our findings suggest the perception of complexity led to an increased reliance on analytical reasoning at the detriment of non-analytical reasoning. To reduce the associated cognitive load, osteopathic educational institutions could consider developing the intuitive diagnostic capabilities of pre-registration students. Postgraduate mentorship opportunities could be considered to enhance the diagnostic reasoning of professional osteopaths,

particularly recent graduates. Further research exploring the influence of expertise is required to enhance the validity of this study.



7. *“Use of pressure dynamometer in the assessment of the pressure pain threshold in trigger points in the craniocervical muscles in women with unilateral migraine and tension-type headache: An observational study”* - RCCK Pires, NS Rocha, J Esteves, M Rodrigues (2017) - International Journal of Osteopathic Medicine (2017), 26(4):28-35.

## Abstract

### Background

Tension type headache (TTH) and migraine are the most prevalent types of primary headaches with central sensitization and myofascial dysfunction linked to their chronicity. Osteopathic manipulative treatment (OMT) is used in the care of headache sufferers; however, there is a scarcity of high-quality evidence to determine the effectiveness of this intervention, and its underpinning biological correlates.

### Objective

The objectives of this observational study were four-fold. Firstly, to estimate the PPT in diagnosed trigger points in craniocervical muscles in women with unilateral migraine or tension-type headache compared to asymptomatic women. Secondly, to assess between-group differences in PPT and pain intensity. Thirdly, to assess the impact of headache on quality of life (QoL) using the Headache Impact Test 6 (HIT-6) questionnaire on unilateral migraine and tension-type headache sufferers. Finally, to assess links between QoL, PPT, VAS and the score in the temporomandibular disorder screening questionnaire (TMDSQ).

### Method

A sample of 60 women comprising of 20 patients with unilateral migraine, 20 patients with TTH and 20 asymptomatic were assessed using a portable digital dynamometer for PPT of trigger points found in the Temporalis (4 points), Sternocleidomastoid (6 points), Suboccipital (2 points), and Upper Trapezius (1 point) muscles. VAS was applied when pain was referred on a TP. All participants completed the TMDSQ questionnaire, and the migraine and TTH groups completed the HIT-6 questionnaire.

### Results

Migraine and TTH groups presented lower PPT levels in all trigger points studied compared to the Control group ( $p < 0.01$ ), except for the ECM clavicular TP<sub>2L</sub> trigger point ( $p = 0.27$ ). No statistically significant difference between migraine and TTH groups in PPT was found. Migraine and TTH groups showed higher pain intensity in all trigger points compared to Control group ( $p < 0.01$ ). In the Migraine group, there was a positive association ( $r = 0.47$ ,  $p < 0.05$ ) between TMDSQ and HIT-6 scores.

### Conclusion

Despite a greater impact on the QoL of women with unilateral migraine, there was no statistical difference in the PPT values for both unilateral migraine and TTH groups.

In future studies, PPT might be used to monitor the effectiveness of OMT or other therapies in women suffering from unilateral migraine and TTH.

8. “Outpatient Satisfaction With Osteopathic Manipulative Treatment in a Hospital Center: A Survey” – M. Tramontano, M. Cinnera, M Petracca, Gaeta A, F. Tamburella, M. Audouard, C. Caltagirone. - *Altern Ther Health Med.* 2017 Oct 28. pii: AT5540. [Epub ahead of print]

## Abstract

### Context

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

### Objectives

The study intended to assess outpatients' satisfaction with OMT carried out at a hospital.

### Design

The research team conducted a survey from January 2015 to January 2016 using 3 questionnaires.

### Setting

The study took place the *Fondazione Santa Lucia* Hospital (Rome, Italy), an institute for research and health care. Participants • Participants were 101 patients with musculoskeletal (MSK) disorders undergoing OMT at the hospital. Interventions • The OMT was performed by 3 osteopathic practitioners who had completed the 6-y, part-time training program recognized by the Italian Register of Osteopaths.

### Outcome Measures

To measure the level of their satisfaction, the research team had patients complete the modified patient satisfaction questionnaire (mPSQ), the patient satisfaction with outpatient physical therapy (PSOPT) instrument, and the visual analog scale for satisfaction (VASS). Parametric and nonparametric analyses were performed to correlate the questionnaires and the demographic variables using the Pearson and Spearman tests.

### Results

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

### Conclusions

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

9. *“Assessing and treating primary headaches and cranio-facial pain in patients undergoing rehabilitation for neurological diseases”* – C. Tassorelli, M. Tramontano, M Berlangieri, V Schweiger, M D'Ippolito, V Palmerini, S. Bonazza, R. Rosa, R. Cerbo, M.G. Buzzi. - J Headache Pain. 2017 Sep 29;18(1):99. doi: 10.1186/s10194-017-0809-z.

## Abstract

### Background

Pain is a very common condition in patient undergoing rehabilitation for neurological disease; however, the presence of primary headaches and other cranio-facial pains, particularly when they are actually or apparently independent from the disability for which patient is undergoing rehabilitation, is often neglected. Diagnostic and therapeutic international and national guidelines, as well as tools for the subjective measure of head pain are available and should also be applied in the neurorehabilitation setting. This calls for searching the presence of head pain, independently from the rehabilitation needs, since pain, either episodic or chronic, interferes with patient performance by affecting physical and emotional status. Pain may also interfere with sleep and therefore hamper recovery.

### Methods

In our role of task force of the Italian Consensus Conference on Pain in Neurorehabilitation (ICCPN), we have elaborated specific recommendations for diagnosing and treating head pains in patients undergoing rehabilitation for neurological diseases.

### Results and conclusions

In this narrative review, we describe the available literature that has been evaluated in order to define the recommendations and outline the needs of epidemiological studies concerning headache and other cranio-facial pain in neurorehabilitation.

### Keywords

ICCPN; cranio-facial pain; invasive treatment; manual therapy; neurorehabilitation patients; non-pharmacological treatment; primary headaches; psychological therapy.

10. “Multi-sensor assessment of dynamic balance during gait in patients with subacute stroke” – E. Bergamini, M. Rosa, V. Belluscio, G. Morone, M. Tramontano, G. Vannozzi - J Biomech. 2017 Aug 16; 61:208-215.

## Abstract

The capacity to maintain upright balance by minimising upper body oscillations during walking, also referred to as gait stability, has been associated with a decreased risk of fall.

Although it is well known that fall is a common complication after stroke, no study considered the role of both trunk and head when assessing gait stability in this population.

The primary aim of this study was to propose a multi-sensor protocol to quantify gait stability in patients with subacute stroke using gait quality indices derived from pelvis, sternum, and head accelerations. Second, the association of these indices with the level of walking ability, with traditional clinical scale scores, and with fall events occurring within the six months after patients' dismissal was investigated.

The accelerations corresponding to the three abovementioned body levels were measured using inertial sensors during a 10-Meter Walk Test performed by 45 inpatients and 25 control healthy subjects.

A set of indices related to gait stability were estimated and clinical performance scales were administered to each patient. The amplitude of the accelerations, the way it is attenuated/amplified from lower to upper body levels, and the gait symmetry provide valuable information about subject-specific motor strategies, discriminate between different levels of walking ability, and correlate with clinical scales. In conclusion, the proposed multi-sensor protocol could represent a useful tool to quantify gait stability, support clinicians in the identification of patients potentially exposed to a high risk of falling, and assess the effectiveness of rehabilitation protocols in the clinical routine.

### Keywords

Acceleration; Fall risk; Gait stability; Inertial sensors; Locomotion; Stroke



**11. “Effects of Osteopathic Manipulative Therapy on Pain and Mood Disorders in Patients With High-Frequency Migraine” – M. D'Ippolito, M. Tramontano, M.G. Buzzi - J Am Osteopath Assoc. 2017 Jun 1; 117(6):365-369**

**Abstract**

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 (To) and after 4 OMTh sessions (T1) were compared, significant improvement in scores were observed on STAI X-2 (To: 43.18 [2.47]; T1: 39.45 [2.52];  $P<.05$ ), HIT-6 (To: 63 [2.20]; T1: 56.27 [2.24];  $P<.05$ ), and HDI (To: 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.

**12. “The Effect of Vestibular Stimulation on Motor Functions of Children With Cerebral Palsy” – M. Tramontano, A. Medici, M. Iosa , A. Chiariotti, G. Fusillo, L. Manzari, D. Morelli - Motor Control. 2017 Jul; 21(3):299-311.**

#### **Abstract**

##### Background

Cerebral palsy (CP) has been defined as a nonprogressive disease of movement and posture development. Physical therapy techniques use different forms of sensory stimulation to improve neuromotor development.

##### Aim

The aim of this study was to assess the efficacy of a vestibular stimulation training in improving motor functions in cerebral palsy.

##### Population

Fourteen children with CP were randomly separated into two different groups in a cross-over trial.

##### Methods

Over a period of 10 weeks, each group performed 10 sessions of 50 min of neurodevelopmental treatment (NDT) and 10 sessions of vestibular training (VR). Children were evaluated with the Gross Motor Function Measurement-88 scale, the Goal Attainment Scale and the root mean square of head accelerations.

##### Results

A significant improvement in the GAS-score ( $p = .003$ ) was noted after NDT+VR.

##### Conclusions

Vestibular stimulation integrated with NDT proved to be an effective complementary strategy for facilitating motor functioning.

##### Keywords

cerebral palsy rehabilitation; neurodevelopmental physical therapy; postural dysfunction; vestibular rehabilitation

**13. “Maintaining gait stability during dual walking task: effects of age and neurological disorders” – M. Tramontano, G. Morone, A. Curcio, G. Temperoni, - A. Medici, D. Morelli, C. Caltagirone, S. Paolucci, M. Iosa.**

**Abstract**

Background

Dual task paradigm is a common mechanism of daily life, and it is often used for investigating the effect on cognitive processing of motor behavior.

Aim

In the present study, we investigate the dual task interference during walking on upright gait stability.

Design

Cross-sectional study.

Setting

Inpatient neurorehabilitation unit and children neurorehabilitation unit.

Population

Eighty-five subjects were enrolled, divided into five groups: healthy young, healthy elderly, children with typical development, and children with cerebral palsy and adults with stroke in subacute phase.

Methods

All subjects had to walk through a pathway during which they had to hear a sound, turn the head to watch a number and verbalize it. Subjects wore an accelerometer on their lumbar spine to measure upright gait stability have been assessed by means of the Root Mean Square (RMS) of the trunk acceleration.

Results

All subjects showed a reduced speed when performing a dual task with respect to single task. This reduction was significantly different among groups ( $F(4,81)=12.253$ ,  $P<0.001$ , effect size 0.377). The RMS appeared to be increased along the latero-lateral axis, and reduced along the antero-posterior and the cranio-caudal axes during the dual task walking.

Conclusions

These accelerations were significantly related to the changes in speed that were managed in a different way in subjects affected by cerebral palsy and stroke.

Clinical Rehabilitation Impact

The information obtained in this study may be used to support specific rehabilitation techniques in subjects with poor balance ability.



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