



Physical modalities in cervicogenic headache

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Physical modalities

- Physical modalities or therapeutic modalities refer to any **therapeutic medium** that uses the transmission of energy to or through the patient.
- Physical forces such as heat, cold, pressure, water, light, sound, or electricity can be used as adjunctive treatment for the purpose of decreasing pain.
 - Electrical stimulation
 - Biofeedback
 - Thermotherapy
 - Infrared therapy
 - Tecar Therapy
 - Cryotherapy
 - Ultrasound
 - Extracorporeal Shockwave Therapy
 - Laser Therapy

Categories of Physical Agents

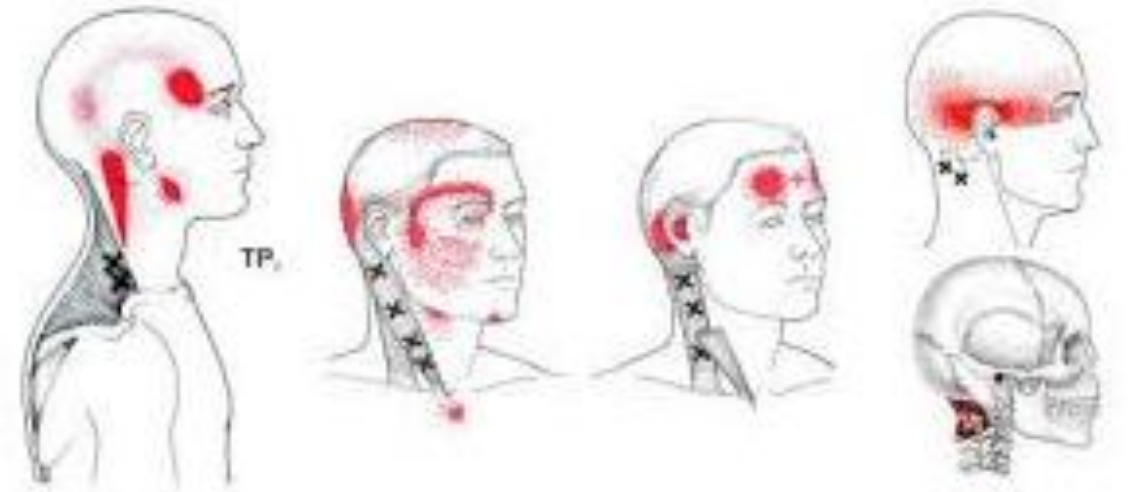
Category	Types	Examples
Thermal	Heating Cooling	Hot Pack Cold Pack
Mechanical	Water Sound	Whirlpool Ultrasound
Electromagnetic	Radiation Electrical Stimulation	Laser Infrared TENS

1. What is the diagnosis?

2. What is the etiology?

3. What are the treatment options?

4. What is the best modality?



Hierarchy of evidence



Systematic Review

Conservative physical therapy management for the treatment of cervicogenic headache: a systematic review

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Purpose: The purpose of this systematic review was to assess the effectiveness of conservative physical therapy management of cervicogenic headache (CGH).

Introduction: CGH affects 2.2–2.5% of the adult population with females being four times more affected than men. CGHs are thought to arise from musculoskeletal impairments in the neck with symptoms most commonly consisting of suboccipital neck pain, dizziness, and lightheadedness. Currently, both invasive and non-invasive techniques are available to address these symptoms; however, the efficacy of non-invasive treatment techniques has yet to be established.

Methods: Computerized searches of CINAHL, ProQuest, PubMed, MEDLINE, and SportDiscus, were performed to obtain a qualitative analysis of the literature. Inclusion criteria were: randomized controlled trial design, population diagnosed with CGH using the International Headache Society classification, at least one baseline measurement and one outcomes measure, and assessment of a conservative technique. Physiotherapy evidence-based database scale was utilized for quality assessment.

Efficacy of interventions used by physiotherapists for patients with headache and migraine—systematic review and meta-analysis

Kerstin Luedtke, Angie Allers, Laura H Schulte and Arne May

Abstract

Aim: We aimed to conduct a systematic review evaluating the effectiveness of interventions used by physiotherapists on the intensity, frequency and duration of migraine, tension-type (TTH) and cervicogenic headache (CGH).

Methods: We performed a systematic search of electronic databases and a hand search for controlled trials. A risk of bias analysis was conducted using the Cochrane risk of bias tool (RoB). Meta-analyses present the combined mean effects; sensitivity analyses evaluate the influence of methodological quality.

Results: Of 77 eligible trials, 26 were included in the RoB assessment. Twenty trials were included in meta-analyses. Nineteen out of 26 trials had a high RoB in >1 domain. Meta-analyses of all trials indicated a reduction of TTH ($p < 0.0001$; mean reduction -1.11 on a 0–10 visual analog scale (VAS); 95% CI -1.64 to -0.57) and CGH ($p = 0.0002$; mean reduction -2.52 on a 0–10 VAS; 95% CI -3.86 to -1.19) pain intensity, CGH frequency ($p < 0.00001$; mean reduction -1.34 days per month; 95% CI -1.40 to -1.28), and migraine ($p = 0.0001$; mean reduction -22.39 hours without relief; 95% CI -33.90 to -10.88) and CGH ($p < 0.00001$; mean reduction -1.68 hours per day; 95% CI -2.09 to -1.26) duration. Excluding high RoB trials increased the effect sizes and reached additional statistical significance for migraine pain intensity ($p < 0.00001$; mean reduction -1.94 on a 0–10 VAS; 95% CI -2.61 to -1.27) and frequency ($p < 0.00001$; mean reduction -9.07 days per month; 95% CI -9.52 to -8.62).

Discussion: Results suggest a statistically significant reduction in the intensity, frequency and duration of migraine, TTH and CGH. Pain reduction and reduction in CGH frequency do not reach clinically relevant effect sizes. Small sample sizes, inadequate use of headache classification, and other methodological shortcomings reduce the confidence in these results. Methodologically sound, randomized controlled trials with adequate sample sizes are required to provide information on whether and which physiotherapy approach is effective. According to Grading of Recommendations Assessment, Development and Evaluation (GRADE), the current level of evidence is low.

Keywords

Headache, migraine, physical therapy, manual therapy, exercise

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Efficacy of physiotherapy interventions for the management of adults with cervicogenic headache: A systematic review and meta-analyses

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Abstract

Objective: To update and appraise the efficacy of physiotherapy for adults with cervicogenic headache.

Literature Survey: Bibliographic searches were conducted up to October 2021 for randomized controlled trials (RCTs), assessing the efficacy of physiotherapy interventions for adults with cervicogenic headache, in five databases: CINAHL, Physiotherapy Evidence Database (PEDro), PubMed, Sage Journals, and Wiley Online Library.

Methodology: Data extraction of included trials was conducted by two reviewers according to a standardized extraction form. The PEDro tool and the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) approach were used for grading evidence. Results from trials with similar interventions and with similar outcome measures were pooled into separate meta-analyses. A qualitative synthesis was performed for studies that were not pooled into meta-analyses.

- Assessed physiotherapy interventions targeting the nociceptive sources from cervicothoracic region such as facet joints, cervical muscles, intervertebral disks, or nerve roots included manual therapy, exercise therapy, or a combination of manual and exercise therapy and dry needling therapy.
- Several manual therapy approaches were included in the review such as trigger points manual therapy, cervical spine joint mobilizations and/or cervical manipulations, thoracic joint manipulations, or mobilizations with movements.
- Fourteen trials were included.

- Moderate-certainty evidence indicates that manual therapy significantly reduces
 - headache frequency compared to sham manual therapy,
 - headache frequency and intensity compared to no treatment in the short term.
- **Conclusions: Manual therapy in the short term and neck exercise in the long term may be efficacious to treat adults with cervicogenic headache.**
- Globally, our results are based on very low to moderate quality of the evidence. All results were downgraded because of risk of bias that arises with studies with small sample sizes.

Study or Subgroup	Manual therapy			Sham			Weight	Mean Difference IV, Random, 95% CI
	Mean	SD	Total	Mean	SD	Total		

4.1.1 Headache Intensity (NPRS or VAS 0-10)

Bodes-Pardo 2013 TrP	5.4	1.678	10	0.2	0.28	10	34.1%	5.20 [4.15, 6.25]
Chaibi 2017 OMT	2.25	1.68	4	-0.125	1.559	4	31.0%	2.38 [0.13, 4.62]
Haas 2018 OMT	-3.83	1.26	193	-4.1	1.2	64	35.0%	0.27 [-0.07, 0.61]
Subtotal (95% CI)			207			78	100.0%	2.60 [-1.06, 6.27]

Heterogeneity: $\tau^2 = 9.98$; $\text{Chi}^2 = 77.91$, $\text{df} = 2$ ($P < 0.00001$); $I^2 = 97\%$

Test for overall effect: $Z = 1.39$ ($P = 0.16$)

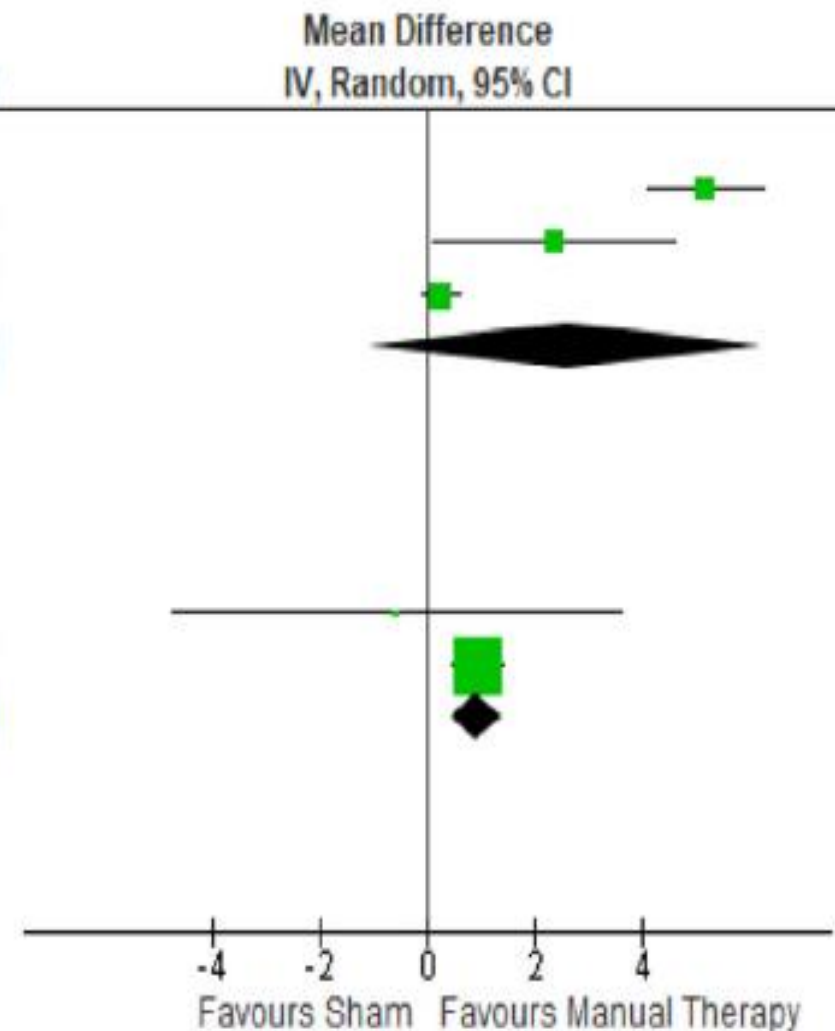
4.1.2 Headache Frequency (episode/week)

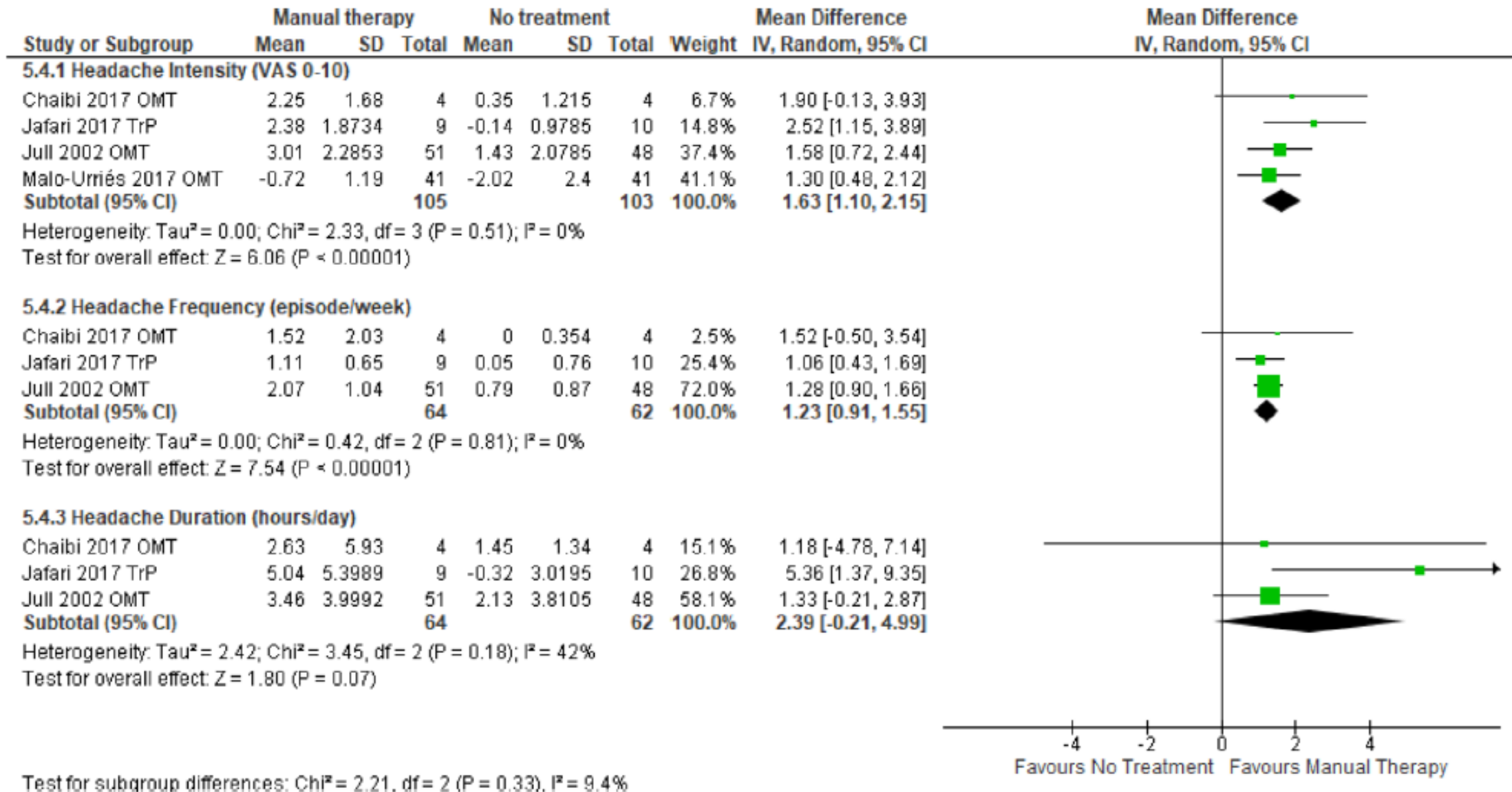
Chaibi 2017 OMT	1.5	2.03	4	2.06	3.74	4	1.3%	-0.56 [-4.73, 3.61]
Haas 2018 OMT	-2.83	1.97	193	-3.78	1.58	64	98.7%	0.95 [0.47, 1.43]
Subtotal (95% CI)			197			68	100.0%	0.93 [0.46, 1.40]

Heterogeneity: $\tau^2 = 0.00$; $\text{Chi}^2 = 0.50$, $\text{df} = 1$ ($P = 0.48$); $I^2 = 0\%$

Test for overall effect: $Z = 3.85$ ($P = 0.0001$)

Test for subgroup differences: $\text{Chi}^2 = 0.79$, $\text{df} = 1$ ($P = 0.38$), $I^2 = 0\%$





Study or Subgroup	Manual therapy			Sham			Weight	Mean Difference IV, Random, 95% CI
	Mean	SD	Total	Mean	SD	Total		
4.2.1 Headache Intensity (NPRS or VAS 0-10)								
Chaibi 2017 OMT	-0.5	2.53	4	0.05	1.28	4	1.8%	-0.55 [-3.33, 2.23]
Haas 2018 OMT	-3.97	1.43	193	-4.1	1.3	64	98.2%	0.13 [-0.25, 0.51]
Subtotal (95% CI)			197			68	100.0%	0.12 [-0.26, 0.49]

Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 0.23$, $\text{df} = 1$ ($P = 0.63$); $I^2 = 0\%$

Test for overall effect: $Z = 0.62$ ($P = 0.54$)

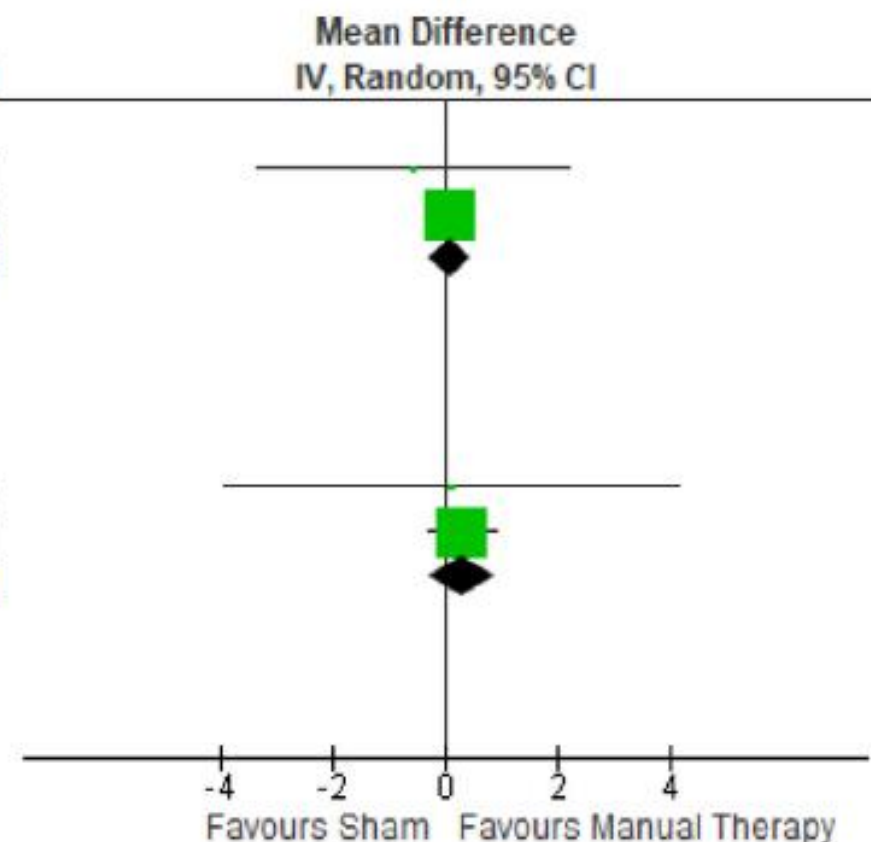
4.2.2 Headache Frequency (episode/week)

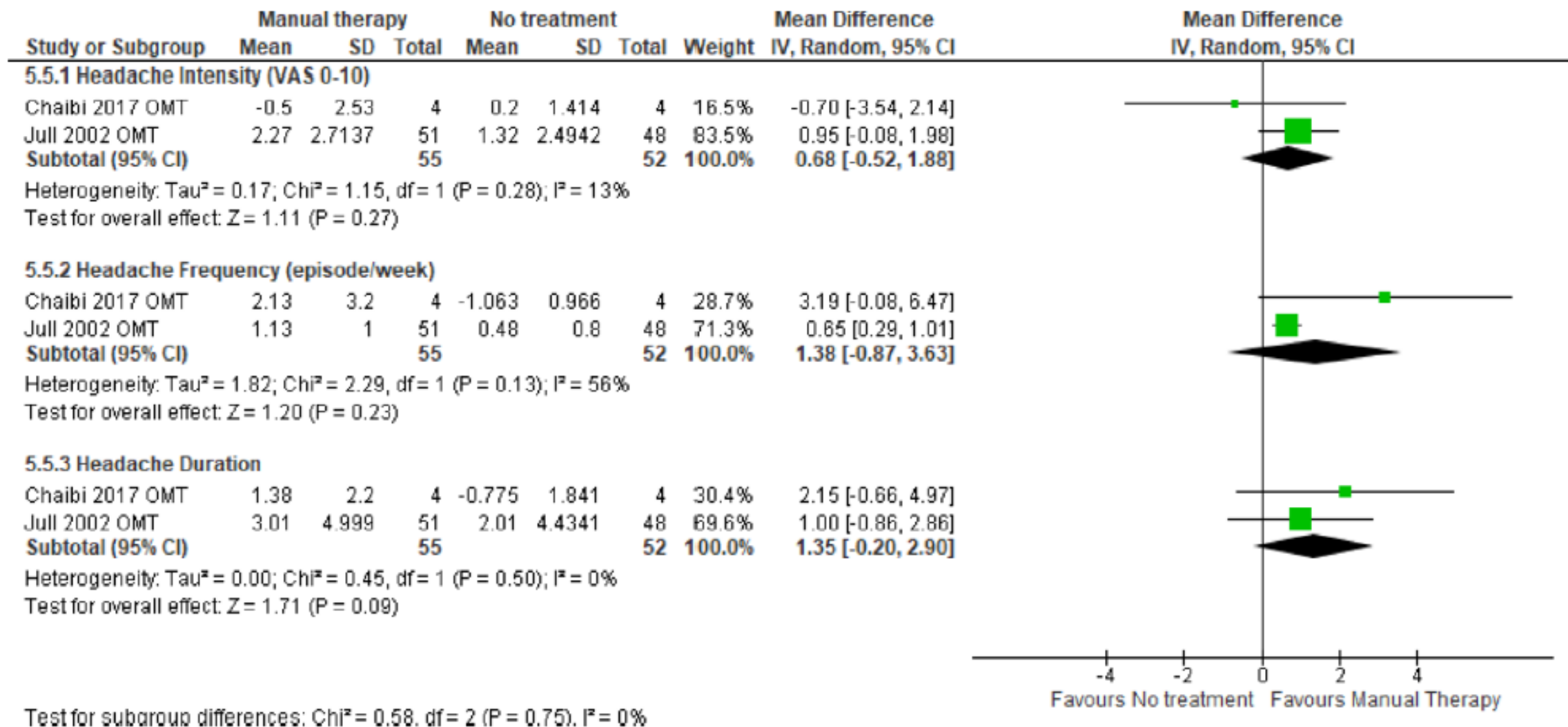
Chaibi 2017 OMT	2.13	3.2	4	2	2.61	4	2.2%	0.13 [-3.92, 4.18]
Haas 2018 OMT	-2.33	2.1	193	-2.65	2.13	64	97.8%	0.32 [-0.28, 0.92]
Subtotal (95% CI)			197			68	100.0%	0.32 [-0.28, 0.91]

Heterogeneity: $\text{Tau}^2 = 0.00$; $\text{Chi}^2 = 0.01$, $\text{df} = 1$ ($P = 0.93$); $I^2 = 0\%$

Test for overall effect: $Z = 1.04$ ($P = 0.30$)

Test for subgroup differences: $\text{Chi}^2 = 0.31$, $\text{df} = 1$ ($P = 0.58$), $I^2 = 0\%$





- **Efficacy of Dry Needling Therapy**

- A high-quality RCT compared trigger points dry needling therapy to trigger points manual therapy or to no treatment in adults with CGH.
- The authors reported significant between group differences in favor of dry needling therapy compared to no treatment for headache frequency, headache intensity, and headache duration.
- There were no significant differences between dry needling and trigger points manual therapy for all outcomes.

Cryotherapy

- Cryotherapy refers to treatment by the lowering of local tissue temperature.
- The major physiologic effects of cryotherapy include **changing local sensation, muscle relaxation,** and **vasoconstriction,** which are possibly **followed by vasodilation.**
- Cold decreases the excitability of free nerve endings of peripheral nerve fibers, thus decreasing the nerve conduction velocity of pain fibers and causing local analgesic effect.

Cryotherapy

- Cryotherapy is sometimes used in chronic pain, mostly because of its effect on reducing muscle spasm.
- It has been demonstrated that cryotherapy is effective in the treatment of myofascial pain syndrome (MPS), especially combined with stretching exercise.
- MPS is often characterized by **active trigger points** with **referred pain** and is associated with sensitized local nerve endings.
- A trigger point may be palpated as a small nodule or a strip of tense muscle tissue.
- Cold can block the sensitized nerve endings, reduce local pain, and decrease muscle spasm.

**TABLE
17.1**

Indications and Contraindications for Cryotherapy

Indications	Contraindications
Acute injury including acute swelling (controlling hemorrhage and edema)	Impaired circulation (i.e., Raynaud phenomenon)
Acute contusion	Peripheral vascular disease
Acute muscle strain	Hypersensitivity to cold
Acute ligament sprain	Skin anesthesia
Bursitis	Open wounds or skin conditions (cold whirlpools and contrast baths)
Tenosynovitis	Local infection
Tendinitis	
Muscle spasm	
Muscle guarding	
Chronic pain	
Myofascial trigger points	

Types of Devices and Techniques



Cervicogenic headache in the general population: The Akershus study of chronic headache

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Abstract

Objective: The objective was to study the prevalence of cervicogenic headache (CEH) in the general population.
Methods: An age- and gender-stratified random sample of 30,000 persons aged 30–44 years received a mailed questionnaire. Those with self-reported chronic headache were interviewed by neurological residents. The criteria of the Cervicogenic Headache International Study Group and the International Classification of Headache Disorders, second edition, were applied.
Results: The questionnaire response rate was 71% and the participation rate of the interview was 74%. The prevalence of CEH was 0.17% in the general population, with a female preponderance. Fifty per cent had co-occurrence of medication overuse and 42% had co-occurrence of migraine. The pericranial muscle tenderness score was significantly higher on the pain than non-pain side ($p < .005$). The cervical range of motion was significantly reduced compared to healthy controls ($p < .005$). The mean duration of CEH was eight years. Based on patients' self-reports, greater occipital nerve (GON) blockage and cryotherapy was reported effective in 90% of those who had this procedure, while other treatment alternatives were reported less effective.



Cryotherapy

- Based on patients' self-reports, greater occipital nerve (GON) blockage and cryotherapy was reported effective in 90% of those who had this procedure, while other treatment alternatives were reported less effective.
- Gebauer's Spray and Stretch® can also be used to address muscle tightness and trigger points located both in the cervical and facial musculature

Thermotherapy

- Thermotherapy is used to increase tissue temperature.
- Thermotherapy can be divided into **superficial** and **deep** heat (diathermy).
- Superficial heat is named as such because penetration of heat is superficial and usually less than 1 cm deep,
- whereas diathermy can reach as deep as 3 to 5 cm without heating superficial tissues.

**TABLE
17.2**

Indications and Contraindications for Thermotherapy

Indications	Contraindications
Subacute and chronic inflammatory conditions	Acute musculoskeletal conditions
Subacute or chronic pain	Impaired circulation
Subacute muscle strain	Peripheral vascular disease
Subacute contusion	Skin anesthesia
Subacute ligament sprain	Open wounds
Muscle guarding	Infection
Muscle spasm	
Decreased range of motion of joint	
Myofascial trigger points	

Superficial Heat

- As a result of poor penetration, superficial heat generally affects only cutaneous blood flow and cutaneous nerve receptors.
- The primary effect of superficial heat is that it increases local blood flow and local circulation, produces analgesia, increases muscle relaxation, and reduces inflammation through removal of metabolites and other products.
- They are often used in **muscle spasm, chronic tenosynovitis, osteoarthritis, and chronic inflammation and pain.**

Types of Devices and Techniques

- The superficial heating devices include
 - heating pad
 - hydrocollator packs
 - paraffin bath
 - hot whirlpool
 - Infrared (IR)
- The temperature from these devices is unreliable and decreases rapidly.

Hydrocollator Pack

- The most commonly used superficial heat in institutions is the commercial hydrocollator pack.
- A thermostat maintains the high temperature of 170°F (76°C) and helps to prevent burns. The hydrocollator packs are immersed in the thermostat completely.
- When hydrocollator packs are applied, the patient should be in a comfortable position. Treatment duration is recommended to be 15 to 20 minutes.
- The patient must not be allowed to lie on the packs because this will increase the risk of burn. In addition, it may force the silicate gel out through the seams of the fabric sleeves.
- Checking the skin condition frequently to prevent a local burn is important, especially in the older patient.



• **Fig. 17.4** Commercial hot pack. (A) Hydrocollator packs stored in a tank. (B) Technique of wrapping hydrocollator packs; six layers of toweling should be provided to prevent the patient from burns.

Infrared

- Infrared is classified as superficial heat, although it is an **electromagnetic energy** modality rather than a conduction energy modality.
- It is generally agreed that no form of infrared energy can have a depth of penetration greater than 1 cm.
- Infrared is a **dry heat modality** compared with other types of superficial heat.
- Dry heat from an infrared lamp tends to elevate superficial temperatures more than moist heat; however, moist heat probably has a greater depth of penetration

Hydrotherapy



• Fig. 17.7 Whirlpool with jet flow.

Paraffin Bath



• Fig. 17.5 Paraffin bath. (A) Hand being dipped in paraffin bath. (B) After being dipped in paraffin, the hand should be wrapped in plastic bags and toweling.

Deep Heat

- The forms of heat having deeper penetration into tissue, including ultrasound, shortwave, and microwave, are classified as deep heat or diathermy.
- Deep heat is the form of heat which can maximally deposit its energy on deep tissue such as ligament, tendon, muscle, and joint capsule, avoiding excessive heat in skin and subcutaneous fat.
- The mechanism of heat transfer for deep heat modalities is **conversion**, referring to the transformation of energy (e.g., acoustic or electromagnetic) to heat.
- Deep heat modalities include
 - Ultrasound
 - Shortwave
 - microwave.

Ultrasound

- Ultrasound is an oscillating sound pressure wave with a frequency greater than the upper limit of the human hearing range, usually 20 kHz.
- The physiologic effects of ultrasound can be divided into
 - Thermal
 - Nonthermal (or mechanical)
- Nonthermal effects include **cavitation**, **media motion** (acoustic streaming and microstreaming), and **standing waves**.
- Cavitation is the oscillation of bubbles in a sound field.

Ultrasound

- Ultrasound delivery can be continuous or pulsed, depending on whether thermal or nonthermal effect is preferable.
- Pulsed delivery involves the emission of brief bursts or pulses of ultrasound, interspersed with pause periods, which can be achieved by adjusting duty factor or cycle, commonly ranging from 10% to 50%.
- The smaller the duty factor, the less heat will be produced.
- Most of the therapeutic ultrasound used in diathermy has frequencies ranging between 0.8 and 3 MHz.
- Low-frequency ultrasound has better penetration, and high frequency ultrasound generates more heat in the superficial area.

• **BOX 17.1** **Contraindications and Precautions of Ultrasound Diathermy**

General heat precautions

Acute injury/inflammation

Near nerve, brain, eyes, and reproductive organs

On pregnant uterus

Near spine or laminectomy sites

Malignancy

Near pacemaker

On epiphysis

Implants containing plastic materials

Sonophoresis

- It has long been known that application of ultrasound to the skin increases its permeability (sonophoresis or phonophoresis) and enables the delivery of various substances into and through the skin.
- Transdermal drug delivery offers several important advantages over traditional oral delivery or injections, including minimizing gastric irritation, first pass effect, and pain.
- Ultrasound of low to medium frequencies (20 to 200 kHz and 0.2 to 1 MHz, respectively) is predominantly used.
- For musculoskeletal disorders, phonophoresis with topical steroidal or nonsteroidal antiinflammatory cream has been shown to be effective in pain reduction for patients suffering from, for example, MPS, knee osteoarthritis (KOA), carpal tunnel syndrome (CTS), and epicondylitis.

Ultrasound

- Subjects were randomly divided into 4 groups: PR, PhH, UT, and control (15 in each group).
- All 3 treatment groups showed decreases in pain and PPT and an increase in cervical lateral flexion range of motion compared with the control group.
- Both PhH and PR techniques showed more significant therapeutic effects than UT.



Original article

The Effects of Pressure Release, Phonophoresis of Hydrocortisone, and Ultrasound on Upper Trapezius Latent Myofascial Trigger Point

Javad Sarrafzadeh PhD, PT, Amir Ahmadi PhD, PT  , Marziyeh Yassin MSc, PT

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Comparison of pressure release, phonophoresis and dry needling in treatment of latent myofascial trigger point of upper trapezius muscle

- comparing pressure release, phonophoresis of betamethasone and dry needling on the upper trapezius latent myofascial trigger point.
- Considering the significant, positive effects of all three methods, dry needling and phonophoresis seem to be more effective than pressure release.

to determine immediate effects of ischemic compression (IC) and ultrasound (US) for the treatment of myofascial trigger points (MTrPs) in the trapezius muscle.

- comparing pressure release, phonophoresis of betamethasone and dry needling on the upper trapezius latent myofascial trigger point.
- The results showed an immediate decrease in basal electrical activity (BEA) of the trapezius muscle and a reduction of MTrP sensitivity after treatment with both therapeutic modalities. In the case of IC, an improvement of AROM of cervical rachis was also been obtained.

Electrotherapy

- Electrotherapy has been used for treating people since the days of ancient Egyptians and Hippocrates.
 - Electric eel and fish capable of producing electricity were used to treat headache and joint pains.
- It was initially speculated that ES dilated blood vessels and separated the clogging particles of stagnant fluid, thereby stimulating blood flow.

Electrotherapy

- The mechanism of action of electrotherapy devices on pain can
- be broadly summarized as:
 - (1) segmental inhibition of pain signals to the brain and the dorsal horn of the spinal cord (Melzack and Wall's gate control theory)
 - (2) activation of descending inhibitory pathways and stimulation of the release of endogenous opioids and other neurotransmitters such as serotonin, gammaaminobutyric acid, noradrenaline, and acetylcholine.
- Currently, electrotherapy is used in a variety of clinical indications including preventing or treating pain, neuromuscular disease, restriction of motion, wound and tissue healing, and edema management.

Electrotherapy

- Electrotherapy is thought to help in the disorders discussed earlier based on its effect on reducing muscle spasms, slowing or preventing disuse atrophy, stimulating muscle and blood circulation, improving joint range of motion, and promoting wound and tissue healing.
- Electrotherapy is also used to enhance drug delivery in **iontophoresis** and related applications

Types of Electrotherapy

- Transcutaneous Electrical Nerve Stimulation
- Interferential Current
- Iontophoresis
- Microcurrent

TABLE 17.5 Electrotherapy Modalities and Indications

Modality	Indications
Transcutaneous electrical nerve stimulation (TENS)	Nociceptive pain: acute, subacute, or chronic pain Neuropathic pain
Percutaneous electrical nerve stimulation (PENS)	Mild to moderate pain
Electrical twitch-obtaining intramuscular stimulation (ETOIMS)	Myofascial pain syndrome (MPS)
Interferential current (IFC)	Musculoskeletal conditions Neurologic conditions Incontinence
Electrical myostimulation (EMS)	Sarcopenia MPS
High-voltage galvanic stimulation (HVGS)	Wounds Weakness Fatigue
Microcurrent	Depression Posttraumatic stress disorder Anxiety Neuropathic pain Fibromyalgia
Iontophoresis	Pain treatment: acute, subacute, or chronic Soft tissue inflammation Pain prophylaxis Swelling

TENS

- The headache NRS score, frequency, lasting time in the manipulation group decreased significantly, while in the TENS group just the headache NRS score decreased significantly.
- The ROM scores in both groups showed no significant changes.
- The response rate of manipulation treatment is 94.5%, significantly higher than 64.5% of TENS treatment.

[Comparative study on effects of manipulation treatment and transcutaneous electrical nerve stimulation on patients with cervicogenic headache].

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Zhong xi yi jie he xue bao = Journal of Chinese Integrative Medicine, 01 Jul 2007, 5(4):403-406 Language:chi

DOI: 10.3736/jcim20070408 PMID: 17631795

- Very low quality evidence determined that pulsed electromagnetic field therapy (PEMF) and repetitive magnetic stimulation (rMS) were more effective than placebo, while transcutaneous electrical nerve stimulation (TENS) showed inconsistent results.
- We cannot make any definite statements on the efficacy and clinical usefulness of electrotherapy modalities for neck pain.
- Since the evidence is of low or very low quality, we are uncertain about the estimate of the effect.

Electrotherapy for neck pain

✉ Peter Kroeling, Anita Gross, Nadine Graham, Stephen J Burnie, Grace Szeto, Mario Forget [Authors' declarations of interest](#)

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<https://doi.org/10.1002/14651858.CD004251.pub5> 

TENS

- patients received a sequence of radiofrequency treatments (cervical facet joint denervation, followed by cervical dorsal root ganglion lesions when necessary),
- other patients underwent local injections with steroid and anaesthetic at the greater occipital nerve, followed by transcutaneous electrical nerve stimulation (TENS) when necessary.
- There were no statistically significant differences between the two treatment groups at any time point in the trial.

Randomised controlled trial of cervical radiofrequency lesions as a treatment for cervicogenic headache [ISRCTN07444684]

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- Therapist relieves the patient symptoms by using different modalities, gentle motion and therapeutics exercises.
- A period of 2 weeks-4 weeks is usually adequate for resolution of symptoms.
- Successful long-term outcomes can be achieved with a comprehensive exercise program.

Cervicogenic Headache: Diagnostic Evaluation and Outcomes of Various Physiotherapy Modes

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Table 4: Distribution of cases by application of therapeutic exercises.

Sr.No.	Modalities	No. of cases n (%)	Pain relief n (%)	Spasm relief n (%)
1	Hot pack	80 (40%)	24 (30%)	72 (90%)
2	TENS	80 (40%)	64 (80%)	-
3	Ultrasound	40 (20%)	8 (20%)	24 (60%)

Pulsed ElectroMagnetic Therapy

- Magnetic therapy is a type of therapy where the body is exposed to a particular form of energy i.e. low frequency magnetic field. When body tissues are exposed to magnetic fields, a weak electrical current is produced which may:
 - Enhance cellular permeability and ability to reduce swelling
 - Regulate painful stimuli and reduce pain
 - Improve blood circulation through a vasolidating effect
 - Promote muscle relaxation and bone healing
 - Strengthen the immune system

Pulsed ElectroMagnetic Therapy

PULSATING ELECTROMAGNETIC FIELD IN THE THERAPY OF HEADACHE

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Results of drug therapy for headache are unsatisfactory, and we therefore searched for a nonmedicinal treatment using a pulsing electromagnetic field (PEMF).

Ninety patients suffering from headache were treated with a PEMF during a 5-year period. All patients had been previously treated without satisfactory results using either acupuncture or drugs. Among the patients were 68 females and 22 males, age 25-65.

The PEMF (Vitanova-Automatik) was applied via large coils to the whole body, 20 min/day for 15 days. Results of treatment were evaluated one month after treatment (Table 1). Good to excellent results were obtained in migraine, tension, and cervical headaches. Poor results were observed in cluster and post-traumatic headache. During the PEMF therapy we observed no exacerbation of pain or other side effects.

Pulsed ElectroMagnetic Therapy

- Experimental group was treated with both Pulsed ElectroMagnetic therapy (PEMT) and acupuncture, control group was treated with acupuncture only.
- Experimental group was effective than control group in pain intensity using VAS, because PEMT plus acupuncture was more effective than acupuncture only.
- The results indicate that the pulsed electromagnetic therapy is effective on treating cervicogenic headaches.

Effects of Pulsed ElectroMagnetic Therapy for Cervicogenic Headaches: Randomised Clinical Trial

· Journal of Korean Medicine Rehabilitation
· Abbr : JKMR
· 2007, 17(3), pp.147-159
· Publisher : The Korean Academy Of Oriental Rehabilitation Medicine · Research Area : Korean Medicine

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KCI 후보

number of Cited : 8

ABSTRACT

Objectives : The study was performed to evaluate the effects of ElectroMagnetic Therapy treatment for patients suffering from cervicogenic headaches. Methods : After receiving medical examination at the Department of Oriental Rehabilitation Medicine, College of Oriental Medicine, Dong-Guk University from November 1, 2006 to June 5, 2007, 34 patients with cervicogenic headache were divided into two groups(experimental vs control). Experimental group(n=18) was treated with PEMT plus acupuncture, control group(n=16) was treated with acupuncture only.



Biofeedback

- “Biofeedback is a process that enables an individual to learn how to change physiological activity for the purposes of improving health and performance.
- Precise instruments measure physiological activity such as brain waves, heart function, breathing, muscle activity, and skin temperature.
- These instruments rapidly and accurately’ feedback’ information to the user.
- The presentation of this information often in conjunction with changes in thinking, emotions and behavior supports desired physiological changes.
- Over time, these changes can endure without continued use of an instrument.”

Biofeedback

- Motor control training of deep neck flexors with **pressure biofeedback** is an effective intervention for improving pain intensity and disability in patients with neck pain and preferable to strength-endurance training of cervical muscles.



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Systematic Review

Motor control training of deep neck flexors with pressure biofeedback improves pain and disability in patients with neck pain: A systematic review and meta-analysis

Georgios Tsiringakis ^a  , Zacharias Dimitriadis ^b, Evrpidis Triantafylloy ^a, Siunnadh McLean ^a

Biofeedback

- The deep cervical flexor's training using pressure biofeedback along with conventional exercise was more effective to reduce pain intensity and Headache Disability and thus improving the endurance capacity of deep cervical flexor muscle over a period of 3 weeks for the management of CGH.



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EFFICACY OF DEEP CERVICAL FLEXOR STRENGTH TRAINING VERSUS CONVENTIONAL TREATMENT IN CERVICOGENIC HEADACHE

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Biofeedback

- There was no significant difference in the mean values of the headache pain, neck pain, NDI and ROM between DNF group and traditional group post-treatment
- there was a **significant decrease** in the mean values of headache **frequency** of the DNF group post-treatment compared with that of traditional treatment group.

Efficacy of Biofeedback Exercise of Deep Neck Flexors on Cervicogenic Headache

Document Type : Original Article

Authors

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10.21608/MJCU.2019.52825

Abstract

Abstract

Background: Cervicogenic Headache (CGH) is a common condition causing significant disability. Patients with CGH had less strength and endurance of Deep Neck Flexors (DNF).

Aim of Study: The purpose of this study was to investigate the efficacy of (DNF) strength exercise using Pressure Bio-feedback Unit (PBU) for CGH patients.

Material and Methods: Thirty patients (15 females and 15 males) with CGH, their age ranged from twenty to forty years, were randomly allocated into DNF group received DNF strength exercise using PBU in addition to traditional program and

Low-level laser therapy

- The term laser is an acronym for Light Amplification of Stimulated Emissions of Radiation.
- LLLT is relatively low in energy, usually from a few milliwatts (mW) to 100 to 200 mW and is applied for short periods of time (seconds to minutes), which produces insignificant changes in tissue temperature (measured to be approximately 1.0°C).
- LLLT is thought to have a stimulating effect on target tissues and is used to decrease pain and inflammation, stimulate collagen metabolism and wound healing, and promote fracture healing.
- The exact mechanism is still under investigation, but the effect on **inflammation modulation** and **cell proliferation** has been proposed

Laser therapy & neck pain

- We identified 16 randomized controlled trials including a total of 820 patients.
- In **acute** neck pain, results of two trials showed a relative risk (RR) of **1.69** for pain improvement of LLLT versus placebo.
- Five trials of **chronic** neck pain reporting categorical data showed an RR for pain improvement of **4.05** of LLLT.
- LLLT reduces pain immediately after treatment in acute neck pain and up to 22 weeks after completion of treatment in patients with chronic neck pain.

THE LANCET



Volume 374, Issue 9705, 5–11 December 2009, Pages 1897–1908

Articles

Efficacy of low-level laser therapy in the management of neck pain: a systematic review and meta-analysis of randomised placebo or active-treatment controlled trials

Dr Roberta T Chow MBBS^a, Prof Mark I Johnson PhD^b, Prof Rodrigo AB Lopes-Martins PhD^c, Prof Jan M Bjordal PT^{d, e}

Low-level laser therapy

- Compared with PT alone, adding KT gave better results in all three parameters.
- Adding low-level laser gave better scores in both pain pressure threshold and neck disability index.
- Adding KT to PT gave better results in all parameters than adding low-level laser.

Potential of physiotherapy by low-level laser or kinesiio taping for treatment of cervicogenic headache: a randomized controlled study

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2016, 32:248–254

Background

Cervicogenic headache (CGH) is a referred pain originating from the neck and perceived in the head and/or face. Its morbidity and cost of treatment hugely affect the society. Classical management is by physiotherapy (PT) and analgesics.

Patients and methods

A total of 45 patients with CGH were treated either by PT alone or by PT and low-level laser or by PT and kinesiio taping (KT).

Results

Three outcome measures were obtained: the pain pressure threshold, the neck disability index, and the forward head posture improved significantly in all groups. Compared with PT alone, adding KT gave better results in all three parameters. Adding low-level laser gave better scores in both pain pressure threshold and neck disability index. Adding KT to PT gave better results in all parameters than adding low-level laser.

Conclusion

In the short term, KT improved compared with the low-level

Keywords:

cervicogenic headache, forward head posture, pain pressure threshold, physiotherapy

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Laser therapy

- patients on standard drug therapy receive course treatment using laser irradiation of cervical paravertebral zones from the HILT (made in Italy), a wavelength of 1064 nm.
- Decrease of pain syndrome in 100% of cases, but it was totally blocked at 82% of the patients. As a result of treatment by the end of the course found unreliable the average ad in 46.5% of people

Laser therapy in cervicogenic headaches

Year: 2014, volume 10 **Issue:** №4 **Pages:** 868-872

Heading: rehabilitative medicine **Article type:** Original article

Authors: Bulakh O.A., Filatova E.V.

Organization: Private Health Care Facility "LEYTONS, LLC", Zelenograd, Outpatient medical center "Polyclinic № 201 of the Moscow City Health Department"

Summary:

Tftea/m of the present study was to determine the effectiveness of laser irradiation of cervical spine in the treatment of cervicogenic headaches. Material and methods. Survey and treatment of 28 patients of 40-60 years with diagnosed cervicogenic cranialgia (15 men and 13 women). Age of the disease ranged from 3 months to 3 years. All patients had cervical spine x-ray examination. To determine the pain activity the Visual analogue scale (VAS) was used, Credo's vegetation index was calculated, Index of functional changes (IFC), test CAH [san] (WAM —wellbeing, activity, mood). All patients on

- **Contraindications**

- Laser has been well recognized as being potentially dangerous.
- Even the low-power lasers with only a few milliwatts of output power can be hazardous to human eyes if the beam hits the eye directly or after reflection from a shiny surface.
- In addition, LLLT should not be used in areas with cancerous tissue.

Dry needling

- Dry needling of **myofascial trigger points** is becoming an increasingly common approach.
- Three relevant studies were identified and all three showed statistically significant improvements following dry needling, **but no significant differences between groups**.
- Only one study reported on headache frequency or intensity, reporting a 45mm improvement in VAS score following the addition of dry needling to conventional physiotherapy.

Review Article

Evidence for the use of dry needling and physiotherapy in the management of cervicogenic or tension-type headache: A systematic review

Stacey France¹, Jenna Bown², Matthew Nowosiłskyj³, Megan Mott⁴, Stephanie Rand⁵ and Julie Walters⁶

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DOI: 10.1177/0333102414523847
cep.sagepub.com


Dry needling

- Patients were randomized to receive upper cervical and upper thoracic spinal manipulation plus **electrical dry needling** or upper cervical and upper thoracic spinal mobilization and exercise.
- Upper cervical and upper thoracic **high-velocity low-amplitude thrust** spinal manipulation and **electrical dry needling** were shown to be more effective than nonthrust mobilization and exercise in patients with CH, and the effects were maintained at 3 months.



ELSEVIER



The Spine Journal

Volume 21, Issue 2, February 2021, Pages 284-295



Clinical Study

Spinal manipulation and perineural electrical dry needling in patients with cervicogenic headache: a multicenter randomized clinical trial

James Dunning PhD, DPT, MSc^{a, b}  , Raymond Butts PhD, DPT, MSc^{b, c}, Noah Zacharko DPT, MPT^d, Keith Fandry DPT^e, Ian Young DSc, PT^{b, f}, Kenneth Wheeler DPT^g, Jennell Day DPT^h, César Fernández-de-las-Peñas PhD, DMSc, PT^{a, i}

Dry needling

- Compare the effect of dry needling (DN) and ischemic compression (IC) on the headache symptoms as well as MTrP-related features in subjects with CeH originating from MTrPs of the SCM muscle using a sonographic method.
- Both interventions could reduce headache symptoms, PPT, and MTrP area.
- Neither intervention was found to be superior to the other in short-term follow-up.

A sonographic comparison of the effect of dry needling and ischemic compression on the active trigger point of the sternocleidomastoid muscle associated with cervicogenic headache: A randomized trial

Article type: Research Article

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Abstract: BACKGROUND: Cervicogenic headache (CeH) is among the common types of headache which has an undesirable influence on the quality of life. The myofascial trigger point (MTrP) within the sternocleidomastoid (SCM) muscle is one of the most important causes of CeH. OBJECTIVE: The purpose of this study was to compare the effect of dry needling (DN) and ischemic compression (IC) on the headache symptoms as well as MTrP-related features in subjects with CeH originating from MTrPs

Massage

- The first group was treated with spinal mobilization techniques of the upper cervical spine, while the second group was treated with massage therapy of the neck region.
- Upper cervical spine mobilization demonstrated more clinical benefits than massage therapy with regard to headache pain parameters and neck mobility for CGH subjects.

Mobilization versus massage therapy in the treatment of cervicogenic headache: A clinical study

Cite

Article type: Research Article

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Abstract: Background and Objective: Cervicogenic headache (CGH) is a common problem associated with neck pain. In this study the effect of cervical mobilizations was compared with that of massage therapy in the management of CGH. Design: Thirty-six subjects with CGH, randomly assigned into two groups, participated in the study. The first group was treated with spinal mobilization techniques of the

- The neck-stabilizing exercise and transcranial direct current stimulation were shown to be effective in decreasing the tone of the cervical muscles by stabilizing the cervical bone and improving muscle durability, and in improving the movement and limitation of joint range of motion by decreasing muscle tone and stiffness.

경두개 직류자극을 결합한 목 안정화 운동이 경추성두통환자의 근육특성과 기능에 미치는 영향

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Effects of Neck Stabilizing Exercise Combined with **Transcranial Direct Current Stimulation** on Muscle Characteristics and Function in Patients with Cervicogenic Headache

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Summary

- Manual therapy
- TENS
- Cryotherapy
- Ultrasound
- Pulsed ElectroMagnetic Therapy
- Biofeedback
- Laser therapy
- Massage
- Dry needling
- tDCS



تشکر
از توجه شما