

**Research Article**

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**Comparison of deep friction massage and post isometric relaxation technique in cervicogenic headache: A randomised clinical trial**Alisha Noreen<sup>1\*</sup>; Bushra Ijaz<sup>2</sup>; Ao Lijuan<sup>1</sup>; Muhammad Sanaullah<sup>3</sup>; Asha<sup>4</sup>; Abdul Rashad<sup>5</sup>; Ayesha Sonia<sup>6</sup>; Kiran Iqbal<sup>7</sup><sup>1</sup>Rehabilitation College, Kunming Medical University, China.<sup>2</sup>Hussain Memorial Hospital, Lahore, Pakistan.<sup>3</sup>Riphah International University, Pakistan.<sup>4</sup>United College of Physical Therapy, Pakistan.<sup>5</sup>Xi'an Jiaotong University, China.<sup>6</sup>Ziauddin College of Rehabilitation Sciences - Ziauddin University, Pakistan.<sup>7</sup>University of Sialkot, Pakistan.**\*Corresponding Author: Alisha Noreen**Rehabilitation College, Kunming Medical University,  
China.

Tel: +86 15087035072;

Email: dr.elishanoreen@gmail.com

**Abstract**

The study aimed to compare the effectiveness of Deep Neck Friction Massage (DNFM) and Post Isometric Relaxation Technique (PIR) in managing Cervicogenic Headache (CGH). A randomized clinical trial was conducted, with participants from the community with CGH. The participants were divided into two groups: Group A received Deep Neck Friction Massage, which targeted the affected fibres, and Group B received Post Isometric Relaxation Technique, which focused on autogenic inhibition. The treatments were applied daily for three days a week for four weeks. The primary outcome was disability according to a headache disability index scale, while secondary outcomes included changes in upper cervical range of motion. The results showed a statistically significant difference between the two groups, with the latter showing a greater decrease in HDI-score. The effect size was larger in Group A for upper cervical range of motion. The study concluded that both techniques are effective in improving symptoms, but deep neck friction massage demonstrated more clinical benefits than post isometric relaxation technique for treating CGH.

**Keywords:** Cervicogenic headache; Deep neck friction massage; Headache disability index; Post isometric relaxation technique.

**Abbreviations:** Mets: Muscle energy technique; PIR: Post-Isometric Relaxation technique; CGH: Cervicogenic Headache; HDI: Headache Disability Index; IHS: International Headache Society; CFTR: Cervical Flexion Rotation Test.

**Introduction**

Cervicogenic Headache (CGH) is a type of headache of cervical origin, with a prevalence of 17.8% in the general population. It affects approximately 47% of the global population and

is considered a secondary headache [1]. CGHs are caused by neck dysfunction, typically of the upper cervical spine, and are associated with musculoskeletal dysfunction and muscle imbalance. They are unilateral, starting from one side of the posterior head and neck, migrating to the front, and sometimes affecting

ipsilateral arm discomfort [2]. Diagnosis of CGHs should consist of a subjective examination and a detailed physical examination of the cervical spine. The Cervical Flexion-Rotation Test (CFRT) is a reliable and valid tool for diagnosing CGHs, while radiological examination is of limited value. The most important clinical finding to diagnose CGH is impairment of C1-C2 (atlanto-axial) motion [3]. Manual techniques are used to treat CGHs, such as post-isometric relaxation technique and deep neck friction massage. Patients with CGHs often have tightness of the SCM, upper trapezius, levator scapulae, scalene, sub occipital, pectoralis minor, and pectoralis major. The Post-Isometric Relaxation (PIR) technique is useful in helping reduce tightness and trigger point pain [4]. Cervicogenic headaches are thought to be a dysfunction of the sensorimotor system, manifesting itself in the neuromusculoskeletal system in motor control and movement impairments. Specific exercise, such as 'Craniocervical Flexion' (CCF) exercise for activating the deep neck flexors in patients, improves chronic cervical pain [5].

However, there is a lack of evidence demonstrating the efficacy of manual therapy techniques in managing CGH, particularly targeting cervical muscle tightness. Existing studies have methodological limitations, such as unconcealed allocation, lack of blinding, and poor baseline comparability of groups. Future studies should aim to achieve these methodological criteria to contribute to strategies for targeted Cervicogenic headache rehabilitation and improve pain management and overall quality of life.

## Methods

**Study design, period, scope, and participants:** This study was a randomized clinical trial conducted over a four-week period, with participants randomly allocated into two groups: Group A received Deep Neck Friction Massage and Group B received Post Isometric Relaxation Technique. Participants were assessed in a physiotherapy research laboratory and advised not to practice physical exercises during the intervention week. Participants were recruited through outpatient clinics and underwent Cervical Flexion-Rotation Test (CFRT) to assess their headache symptoms. To be included in the study, participants had to be aged between 18 and 60 years, have symptoms lasting more than six months, and not have undergone physiotherapy in the previous three months. Exclusion criteria included physiotherapy in the previous three months, medical restrictions such as cardiorespiratory, neurological, or other rheumatology dysfunctions, or any other chronic condition that leads to pain. The study was reported according to the Consolidated Standards of Reporting Trials (CONSORT) Statement for randomized trials of nonpharmacologic treatments. Participants were provided with verbal and written explanations of the study's objectives and methodology, and their informed consent forms were approved by the local ethics committee.

Sample size of 20 was calculated by using Epitool. Mean 1: -4.33, Mean 2: -1.4, Variance: 5; Confidence: 0.95; Power: 0.8; Tail: 2; Sample size: 20; Sample size per group: 10

## Intervention

**Group A:** Deep friction massage was given to Group A. Friction massage must be given across the affected fibres. The thicker and stronger a normal structure, the more important

friction is given strictly across the grain. The therapist's fingers and patient's skin must move as one, otherwise moving subcutaneous fascia against muscle or ligament could lead to blister formation or subcutaneous bruising. The friction massage must have sufficient sweep and be deep enough.

**Group B:** Post-Isometric Relaxation (PIR) is a technique that involves a decrease in muscle tone after a brief submaximal isometric contraction of the same muscle. It works on the concept of autogenic inhibition and involves taking the hypertonic muscle to a length just short of pain or resistance to movement. A submaximal contraction is performed away from the barrier for 5-10 seconds, with resistance applied in the opposite direction. The patient is asked to relax and exhale during the contraction. A gentle stretch is applied to take up the slack until a new barrier is reached, and the procedure is repeated two or three times.

**Primary and secondary parameters:** The study used an inclinometer, Cervical Flexion-Rotation Test (CFRT), and Headache Disability Index (HDI) to assess the effectiveness of a treatment for Cervicogenic Headache (CGH). The inclinometer showed high validity and reliability, while the CFRT showed promise as a reliable test for upper cervical movement impairment. The HDI demonstrated high internal consistency reliability and good content validity, with robust long-term test-retest stability. Diagnosis was done using the International Headache Society (IHS) criteria, with kappa scores ranging between 0.45 and 0.76, indicating moderate to substantial agreement. The IHS criteria were applied to diagnose different types of headache, with 30% of patients meeting the IHS criteria for migraine, and only 3% for tension-type headache.

**Operational definitions:** Cervicogenic Headache (CGH) refers to a headache of cervical origin. There are 2 basic categories of headaches, primary and secondary. Primary headaches include those of vascular origin (cluster and migraine headaches) as well as those of muscular origin (tension-type headaches). Secondary headaches result from another source including inflammation or head and neck injuries. Cervicogenic Headache (CGH) are considered "secondary headaches [6].

**Data collection and quality assurance:** The patient underwent a comprehensive physiotherapy treatment, including a thorough case history, physical assessment, and examination of the cervical region. The patient's headache severity was assessed using the HDI score. The treatment included a 15-minute heating pad and neck isometrics, followed by Deep Neck Friction Massage (DNFM) and post-isometric relaxation techniques. The treatment was given daily for 4 weeks, with 12 sessions per week. After 12 sessions, the patient's headache status was re-evaluate using the HDI-score. The study used SPSS version 22 for data analysis, with statistical significance set at  $p=0.05$ . Descriptive measures like gender, age, location, and onset were calculated. Tests included pie charts, bar charts, and frequency tables for descriptive statistics, Mann Whitney test and Independent t-test for between-group comparison, and Wilcoxon Rank test and Paired t-test for differences within groups.

## Results

Parametric and non-parametric tests were applied to compare the two population at pre-treatment and post-treatment level.

**Table 1:** Comparison of socio-demographic variables of two groups.

Variables	Group A	Group B	Body-Mass Index %	Group A	Group B	Gender %	Group A	Group B
	Mean±SD	Mean±SD		Group A	Group B		Group A	Group B
Age	40.70±6.68	41.1 ±9.4	18-25 kg/m <sup>2</sup>	70%	60%	Male	50%	30%
Height	2.303±.257	2.25±.206	25-29 kg/m <sup>2</sup>	30%	10%	Female	50%	70%
Weight	48.80±8.60	52.10±5.9	30-40 kg/m <sup>2</sup>	0	30%			
BMI	1.30±.483	1.70±.94						

Independent t test was applied on baseline Group A (Deep friction massage) is compare with Group B (Post-isometric relaxation) to compare Pre-treatment values. Pre-Headache Disability Index (HDI) mean in Group A was 36.70±1.767 and in Group B was 35.30±1.567 with p value was p=0.07. Post-Headache Disability Index (HDI) mean in Group A was 8.60±0.51 and in Group B was 21.50±2.12 and p value was <0.001\*\*. The results showed that there was statistically significant difference between two groups with p<0.05. Headache Disability index decreased to greater extent in Deep friction massage Group with means difference 28.1±1.25 as compared to post-isometric relaxation Group with mean difference of 13.8±0.5.

The Mann Whitney test was used to compare cervical range of motion between two groups: deep friction massage and post-isometric relaxation. The maximum z-value was .000, indicating the data was equal to the mean. The interventional group had a maximum z-value of -0.97, indicating a smaller deviation from the mean. The mean rank of the interventional group was higher than the control group, indicating a larger effect size of the intervention. The Wilcoxon signed ranks test showed a -2 value, indicating a smaller deviation from the mean. The interventional group had a larger effect size than the control group, indicating a larger effect of the Deep Friction Massage (DNF) intervention over Post-Isometric Relaxation (PIR).

### Discussion

This study aims to assess the effect of Deep Friction Massage and Post Isometric Relaxation Technique on Cervicogenic Headache. The results showed a significant difference between groups, with DNFM showing a greater effect than PIR in treating cervicogenic headache. Previous studies have found that MET is more effective than IR alone, and massage therapy provides clinical benefits in cervicogenic headache patients [7]. Exercise can decrease the indications of cervicogenic cerebral pain, and soft tissue treatment has been found to be more beneficial [8]. The previous studies also found that upper cervical spine mobilization showed more clinical advantages than massage treatment in terms of migraine torment boundaries and neck portability for CGH patients. However, the study did not show that massage alone is powerful in cerebral pain [9]. Previous study concluded that MET + IR is more effective in cervicogenic headache than IR alone [1] MET along with Conventional physiotherapy has more significant result than conventional therapy alone [10]. Past study concluded that massage therapy provide clinical benefits in cervicogenic headache patient upper cervical and upper thoracic control were demonstrated to be more viable than assembly and exercise in patients with CH, and the impacts were kept up with at 3 months [11]. Exercise can decrease the indications of cervicogenic cerebral pain, and the impacts are maintained [12]. A solid connection between cervicogenic cerebral pain, forward head stance, and shortcoming and helpless perseverance of the profound neck flexors has been found in the literature. Treatment of neck flexor further improve manifestations of cervicogenic cerebral pain [13]. soft

tissue treatment has given a more beneficial outcome on tolerates results. In any case, the mix of delicate tissue activations with neural control has a bigger impact in lessening cerebral pain recurrence and HDI scores in patients than delicate tissue assembly alone [14]. Past examination show that MET along the edge of regular active recuperation has a ton of significant impact when contrasted and normal active recuperation treatment in treatment of cervicogenic headache [15]. Upper cervical spine mobilization showed more clinical advantages than massage treatment with respect to migraine torment boundaries and neck portability for CGH patient. The consequence of the investigation was not like my examination which shows that massage alone is powerful in cerebral pain [16].

The methodology of this study was designed to minimize potential bias by including concealed treatment allocation and blinding. However, the small sample size and lack of blinding between the therapist and patients may have resulted in bias. Additionally, there was no follow-up period to evaluate the residual effect of each intervention.

### Conclusion

In conclusion, the study recommends the use of deep neck friction massage and post isometric relaxation technique for the treatment of cervicogenic Headache. Other factors such as muscle thickness, improvement stability, and motor control dysfunction should also be considered when evaluating headache symptoms.

### Declarations

**Ethical considerations:** Ethical approval was important for every research study involving human. Therefore, ethical approval was sought from review panel of ethical committee of the Riphah International University, Lahore before the hand to the commencement of study. Written informed consent was taken from each participant of the study and also insured the participant about keeping his/her data confidential. Permission from study setting was also taken.

**Conflict of interest:** All authors have no financial competing interests.

### References

1. Al Khalili Y, Ly N, Murphy PB. Cervicogenic Headache. StatPearls. Treasure Island (FL) ineligible companies. Disclosure: Nam Ly declares no relevant financial relationships with ineligible companies. Disclosure: Patrick Murphy declares no relevant financial relationships with ineligible companies.: StatPearls Publishing Copyright © 2023, StatPearls Publishing LLC. 2023.
2. Anarte-Lazo E, Carvalho GF, Schwarz A, Luedtke K, Falla D. Differentiating migraine, cervicogenic headache and asymptomatic individuals based on physical examination findings: a systematic review and meta-analysis. BMC musculoskeletal disorders. 2021; 22(1): 755.

3. Ashina H, Eigenbrodt AK, Seifert T, Sinclair AJ, Scher AI, Schytz HW, et al. Post-traumatic headache attributed to traumatic brain injury: classification, clinical characteristics, and treatment. *The Lancet Neurology*. 2021; 20(6): 460-9.
4. Bini P, Hohenschurz-Schmidt D, Masullo V, Pitt D, Draper-Rodi J. The effectiveness of manual and exercise therapy on headache intensity and frequency among patients with cervicogenic headache: a systematic review and meta-analysis. *Chiropractic & manual therapies*. 2022; 30(1): 49.
5. Chiou-Tan FY. Musculoskeletal mimics of cervical radiculopathy. *Muscle & nerve*. 2022; 66(1): 6-14.
6. Cumplido-Trasmonte C, Fernández-González P, Alguacil-Diego IM, Molina-Rueda F. Manual therapy in adults with tension-type headache: A systematic review. *Neurologia*. 2021; 36(7): 537-47.
7. Demont A, Lafrance S, Benaissa L, Mawet J. Cervicogenic headache, an easy diagnosis? A systematic review and meta-analysis of diagnostic studies. *Musculoskeletal science & practice*. 2022; 62: 102640.
8. Demont A, Lafrance S, Gaska C, Kechichian A, Bourmaud A, Desmeules F. Efficacy of physiotherapy interventions for the management of adults with cervicogenic headache: A systematic review and meta-analyses. *PM & R: the journal of injury, function, and rehabilitation*. 2023; 15(5): 613-28.
9. Dunning J, Butts R, Zacharko N, Fandry K, Young I, Wheeler K, et al. Spinal manipulation and perineural electrical dry needling in patients with cervicogenic headache: a multicenter randomized clinical trial. *The spine journal: official journal of the North American Spine Society*. 2021; 21(2): 284-95.
10. Fernandez M, Moore C, Tan J, Lian D, Nguyen J, Bacon A, et al. Spinal manipulation for the management of cervicogenic headache: A systematic review and meta-analysis. *European journal of pain (London, England)*. 2020; 24(9): 1687-702.
11. Jull G. Cervicogenic headache. *Musculoskeletal science & practice*. 2023; 66: 102787.
12. Lerner-Lentz A, O'Halloran B, Donaldson M, Cleland JA. Pragmatic application of manipulation versus mobilization to the upper segments of the cervical spine plus exercise for treatment of cervicogenic headache: a randomized clinical trial. *The Journal of manual & manipulative therapy*. 2021; 29(5): 267-75.
13. Mousavi-Khatir SR, Fernández-de-Las-Peñas C, Saadat P, Javanshir K, Zohrevand A. The Effect of Adding Dry Needling to Physical Therapy in the Treatment of Cervicogenic Headache: A Randomized Controlled Trial. *Pain medicine (Malden, Mass)*. 2022; 23(3): 579-89.
14. Núñez-Cabaleiro P, Leirós-Rodríguez R. Effectiveness of manual therapy in the treatment of cervicogenic headache: A systematic review. *Headache*. 2022; 62(3): 271-83.
15. Rani M, Kaur J. Effectiveness of different physiotherapy interventions in the management of cervicogenic headache: a pilot randomized controlled trial. *The Journal of manual & manipulative therapy*. 2022; 30(2): 96-104.
16. Vallejo MC, Zakowski MI. Post-dural puncture headache diagnosis and management. *Best practice & research Clinical anaesthesiology*. 2022; 36(1): 179-89.