

Effectiveness of Postural Correction Versus Soft Tissue Techniques Along with Neural Mobilization in Management of Pain and Disability Associated with Cervicogenic Headache: A Comparative Study

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Abstract

Background: This study was developed to compare the effect of soft tissue technique with neural mobilization and postural correction with neural mobilization on pain and disability among patients with cervicogenic headache.

Purpose: The purpose of the study was to control the pain and impairment related to cervicogenic headache (CGH), this study compares the effectiveness of two interventions: postural correction and soft tissue techniques combined with neural mobilization.

Materials and Methods: A sum of 30 participants were recruited, based on the selection criteria from the above-mentioned study setting. The procedure was explained, and a written grant was collected from all patients before the initiation of the procedure. The subjects were allocated randomly into 2 groups. The intervention group was given the postural correction exercise along with the neural mobilization and another group was given soft tissue technique along with neural mobilization.

Results: The study found that there is a positive impact of postural correction along with neural mobilization on pain reduction and absence of ability that has been connected with cervicogenic headache with a significant value of < 0.0001 .

Conclusion: The study concluded that Postural correction exercises along with neural mobilization were effective in reducing the individual's discomfort, enhancing the cervical range of motion, and reducing the level of impairment. However, the Headache Impact Test-6 (HIT-6) and Northwick Park Neck Pain Questionnaire (NPAQ) outcome measures for both groups indicated a substantial change in the post-treatment analyses; GROUP A, which received postural correction along with neural mobilization, had more significant changes than the soft tissue technique along with neural mobilization (GROUP B).

Keywords: Cervicogenic headache (CGH), Neural mobilization technique, Postural modification, soft tissue technique

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Introduction

Headache is the most common type of pain, affecting 66% of the world's population¹. As a result, it is a severe health issue that affects both quality of life and work productivity^{2,3}. A disease occurring in the cervical spine, including bone, disc, soft tissue, can result in a secondary headache known as a cervicogenic headache (CGH). According to World Cervicogenic Headache Society, Cervicogenic headache (CGH) is a pain with a characteristic of referred pain, occurring in part of the head brought on by an initial nociceptive signal in muscle which is supplied by the cervical nerves⁴. Cervicogenic headache is estimated to frequent 0.4% to 2.5% of the general population, however it can affect up to 20% of people with chronic headaches⁵. Cervicogenic headache is a type of headache that affects the cervical and cranial regions and is caused by abnormalities in the cervical spine soft tissues⁶. The upper cervical ligaments, C1-C3 intervertebral discs, suboccipital muscles, C1-C2 nerve roots, ligaments of upper cervical segment, and synovial type of joints are all components that are attributing the pain in cervical areas. The sub occipital nerves may also be the cause of headaches in the occiput region since they send nerve branches to the atlanto-occipital joint, as opposed to the muscles of the cervical region, which can produce referred pain to the face and head⁷. Fifteen to twenty percent of all long term and recurring headaches are caused by it. With a restricted cervical range of motion, the pain is common in the temporal lobe area and may relate to the frontal, occipital and the region of orbital lobe⁸. Cervicogenic headaches can occasionally cause considerable radiation to the shoulders, neck, or skull. The pain is usually neuropathic or mechanical in origin, and it is correlated with certain body motions and postures as well as a limited ROM in the neck⁹.

CGH can be caused by a number of different anatomic features in the cervical spine. The upper 3 spinal nerves of the cervical segment and the trigeminal nerve meeting onto second order neurons in the upper cervical spinal cords trigemino-cervical nucleus is what causes the headache. The craniovertebral connection is maintained by capsules of joint, transverse ligaments, alar ligaments and tectorial membrane¹⁰. The deep flexor muscles play

an important function in stabilizing the cervical segments. The increased cervical lordosis is due to the weakening of the muscle. When a headache originates in the neck, prolonged posture may be an aggravating factor. The purpose of the cervical slump test is to detect aberrant neural dynamics in headache sufferers who can benefit from neural mobilization, as described for cervicogenic headache (Jull, 2002). For these patients, postural adjustment is deemed vital in their daily activities¹¹.

The symptoms such as headache, stiffness around neck is made worse by the neck's uncomfortable positioning, any excess pressure placed on the problematic side's upper cervical spine or occiput, and neck movement. Thus, Postural correction is chosen as an effective intervention tool in reducing the pain and disability that is caused by Cervicogenic headache. One component that has been proposed to aggravate or cause CGH is cervical dysfunction caused by improper posture. In migraine and tension-type headaches, the suggested connection between abnormal cervical position and headache has been demonstrated, although there are mixed results in CGH¹². Cervical joint dysfunction is one of the causes of CGH and persistent headache is a common symptom after structural changes in the cervical spine¹³. Correcting head and neck posture involves strengthening, the upper trapezius, stretching the pectoralis major deep layer of flexors of the cervical spine and pectoralis minor, and the scalene. This treatment's objective was to lessen the intensity and frequency of headaches.

A form of manual physical therapy that involves hands-on techniques is called soft tissue mobilization. Stretching and deep pressure are used in soft tissue mobilization (STM) to loosen up tight muscles, reduce muscle tension and move fluids that are entrapped in the tissues, causing discomfort and inflammation. Soft tissue injuries, such as muscle strains and sprains, are treated using STM¹⁴.

The interconnections between the mechanics and physiology of the neuronal system are included in neural mobilization. The nervous system must adjust while performing movements and integrating other actions. Neural mobilization includes mechanical events such as sliding, elongation, and compression, angulation and cross-sectional changes as well as

functional events such as axoplasm flow and intraneural blood flow. When these processes fail or become more active, it might lead to negative neurodynamics. Restoring the functional balance between the neural tissue's relative movement and adjacent mechanical interfaces is the primary theoretical goal of neural mobilization as the intervention of adverse neural dynamics, which brings down the pressure created on the neural tissue and helping in optimal physiology¹⁵. The nervous system is susceptible to neural edema, ischemia, fibrosis, and hypoxia if these dynamic protective systems have been compromised, which may result in altered neurodynamics¹⁶.

AIM

To compare the effect of soft tissue technique with neural mobilization and postural correction with neural mobilization on pain and disability among patients with cervicogenic headache.

Materials and Methods

A pre-test and post-test experimental study was conducted in order to compare the efficacy of soft tissue technique with neural mobilization and postural correction with neural mobilization on pain and disability among patients with cervicogenic headache. Participants were selected from Private medical college and hospital, Thandalam according to the selection criteria in convenient sampling method. Study procedure was explained to all the subjects and informed consent was obtained from all individuals included in this study. The collection of data began in January 2023, and treatment sessions began in February 2023 for four weeks.

Inclusion criteria:

- Total of 30 participants of both genders, aged between 18years to 45years with cervicogenic headache,
- Unilateral or side-dominant headache without side shift,
- Headache causing neck stiffness or pain, Restricted cervical range of motion, Cervical slump test positive,
- Subject who scores less than 49 in Headache impact test (HIT- 6),
- Subjects who score less than 40% in NPQ are taken in for the study.

Exclusion criteria:

- Participants with Migraine,
- Hemi-cranial continua,
- Chronic tension type headache,
- Cluster headache, Headache following trauma/injury in the neck/head, Headache following vascular disorder in cranial/cervical region are excluded.

Outcome Measure: The Headache Impact Test-6 (HIT-6) was created to analyze a variety of components that affect headache burden, and it has been useful in providing quantitative and useful data on the impact of headache. Pain, social function, role function vitality, cognitive function, and psychological distress are the six components of the HIT-6.

The Northwick Park Neck Pain Questionnaire (NPQ) analyses patient impairments as a result of neck pain. It helps to analyze the outcome and track symptoms over time in populations with short-term or long-term neck pain and is simple to complete and score. The questionnaire is separated into nine sections, 1) neck pain intensity, 2) neck pain and sleeping, 3) pins and needles or numbness in the arms at night, 4) duration of symptoms, and 5) carrying, 6) reading and watching television 7) working and /or housework 8) social activities and 9) driving.

Procedure

Based on the selection criteria, a total of 30 individuals were chosen. Before beginning the procedure, all volunteers gave written informed consent after being explained about the study. The subjects involved in the study were allocated randomly into two groups as A and B. Both the groups underwent a treatment session of about 30 minutes, 3 days a week for four weeks. Group A received postural correction exercises along with the neural mobilization. In which postural correction is applied for about 15 minutes and neural mobilization is applied for about 15 minutes. The neural mobilization techniques involve Neural sliders, neural tensioners and the exercise regimen includes, Training the holding capacity of deep neck flexors, retraining cervical spine extension, Extensors of cervical spine, Co- ordination of neck flexors and neck

extensors, Retraining Scapular orientation in posture, Training scapular stabilizers, Postural re-education. Group B received soft tissue techniques including kneading, pulling, transverse strumming and skin rolling for 15 minutes, starting with skin rolling for 2 minutes followed by pulling for 2 minutes and then the transverse strumming and kneading is applied as each for 2 minutes in grade 1 initially. Then the grade was increased with patient tolerance and the technique was repeated again along with neural mobilization. Soft tissue techniques were applied to temporal muscle, sternocleidomastoid muscle, masseter muscle, suboccipital muscle and upper trapezius muscle. The pretest measures of cervical

slump test, Northwick Park neck pain questionnaire, Headache Impact Test [HIT-6] were assessed and the same was assessed and recorded after 4 weeks of training as post-test values.

Data Analysis

Statistical analysis was done with an intention to treat the cervicogenic headache by correcting the posture and applying soft tissue technique for the reduction of pain and disability. Pre and post-test values for HIT-6 and NPAQ were noted. Paired t-test was used for within group analysis, and Unpaired t-test was used for across group analysis.

Table 1: Pre and Posttest Mean and SD of Group A (Postural correction and neural mobilization) and Group B (Soft tissue technique and neural mobilization) obtained using HIT-6.

Group	Parametric	Mean	SD	t value	p value
Group A	Pre-test	68.67	5.07	24.422	0.0001
	Post-test	42.67	3.18		
Group B	Pre-test	67.6	5.70	14.471	< 0.0001
	Post-test	48.6	4.45		

Table 2: Pre and Posttest Mean of Group A (Postural correction and neural mobilization) and Group B (Soft tissue technique and neural mobilization) obtained using (NPAQ)

Outcome	Group	Parametric	Mean
NPAQ	Group A	Pre-test	81.4
		Post-test	41.2
	Group B	Pre-test	80.466
		Post-test	48.26

Table 3: Post-test mean and SD of group a vs b (postural correction and neural mobilization vs soft tissue technique and neural mobilization) obtained using HIT-6 and post-test mean and sd of group A vs B (postural correction and neural mobilization vs soft tissue technique and neural mobilization) obtained using NPAQ.

Group	Parametric	Mean	SD	t value	p value
Group A	Pre-test	42.67	3.18	4.2008	= 0.0002
	Post-test	48.60	4.45		
Group B	Pre-test	41.20	10.02	2.124	= 0.0426
	Post-test	48.27	8.09		

Results

The study revealed that postural correction along with mobilization of neural structures showed a significant change in reducing pain and disability, associated with cervicogenic headache with the

significant p value of < 0.0001 by analysis through paired t test (Table 1 and 2). Group B, received soft tissue technique and neural mobilization also showed a considerable change in reduction of pain and disability in patients with cervicogenic headache,

analyzed using HIT-6 and NPAQ, which was analyzed using paired t-tests (TABLE 1 and 2). On comparing both group A and B, the group (GROUP A) which received postural correction and neural mobilization, showed a greater improvement than the group received soft tissue technique and neural mobilization (GROUP B), which was statistically revealed by analysis of un-paired t-test with the level of significance (Table 3).

Discussion

The study aimed to show the effectiveness of soft tissue technique, posture correction, and neural mobilization in treating cervicogenic headaches. Postural correction plays an important role in reducing the impact of cervicogenic headaches by strengthening the neck muscles and rectifying the forward-head posture. The characteristics and effect of postural correction on headaches have been studied by Mary Kate McDonnell (2005), who took the effort to analyze the effect of posture correction combined with an exercise regimen. The author found that the modification of cervical, scapulothoracic, and lumbar region alignment had a significant positive impact on CGH¹⁷. In view of this finding, we decided to train the deep neck extensors and flexors, coordinate the extensors and flexors, retrain the scapular orientation, and train the scapular stabilizer in order to give postural correction for the neck.

In addition to postural correction, soft tissue techniques were also said to have a beneficial effect on CGH. Diana Hopper et al. (2013) conducted a pilot study to find the acute effects of soft tissue techniques on the involvement of upper cervical segments in CGH. Eight subjects were provided with soft tissue technique to bilateral cervical muscles and ended with a conclusion stating that soft tissue technique enhances the ROM of the upper cervical segment in the short term as measured by the flexion-rotation test¹⁸. With the consideration of the result obtained from this study, we made an attempt to include soft tissue technique as an intervention tool to the participants recruited in our study. By combining the scientific evidence that has been provided in the study in the aforementioned studies. We emerged with the idea of comparing the effects obtained from postural correction and soft tissue technique

in reducing the pain and disability associated with CGH. In 2020, Jayabalan Prakash et al. did an experiment with 30 subjects on the effectiveness of neural mobilization along with postural correction in CGH. The authors stated that the combination of these two interventions had a positive effect on CGH by reducing pain and increasing the cranio-vertebral angle. Studies have linked the diminished neck muscular endurance with the forward neck position, which may put inappropriate physiological stresses on the cervical spine¹⁹. Similarly, Alejandro Ferragut Garcas et al. (2016) combined soft tissue technique with neural mobilization in the treatment of tension-type headaches. This study concluded that the frequency of tension-type headaches was controlled in patients involved in the group that received a combination of both interventions, compared with the group receiving only one intervention¹⁴. Also in 2016, Jaspreet et al. studied the effect of neural mobilization and awareness of the correction of posture in CGH. The study revealed that in the treatment of CGH, neural mobilization was effective²⁰.

So, we made the neural mobilization technique a common intervention for both groups to reduce the risk of bias. With the conclusion of all the above-mentioned studies, we designed a protocol involving soft tissue technique along with neural mobilization and postural correction along with neural mobilization for the patients with CGH to reduce pain and disability. The results of this study concluded that postural correction in combination with neural mobilization is effective in reducing pain and disability in patients with CGH. The patients who had headaches from head or neck injuries were not included in the recruitment of participants, which was the best way to enhance the sample size as these people account for around 50% of CGH. Blinding of the therapist, provided therapy was not done. Future research might try to concentrate on the long-term impact of these therapies, as this study only did a four-week follow-up.

Conclusion

The present study concluded that postural correction exercise along with neural mobilization were effective in reducing the individual's discomfort, enhancing the cervical range of motion,

and reducing the level of impairment. However, the Headache Impact Test-6 (HIT-6) and Northwick Park Neck Pain Questionnaire (NPAQ) outcome measures for both groups indicated a substantial change in the post-treatment analyses; GROUP A, which received postural correction along with neural mobilization, had more significant changes than the soft tissue technique along with neural mobilization (GROUP B).

Ethical clearance: The ISRB committee of a private hospital and institution in Chennai has provided its clearance for the conduct of human research that complies with all applicable national laws, institutional regulations. (Application Number 01/016/2022/ISRB/PGSR/SCPT).

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Conflict of Interest: Nil

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