

[ORIGINAL ARTICLE]**Effect of Mulligan Traction Along With Progressive Neck Muscles Strengthening In Patients With Cervicogenic Headache Among Collage Going Students: Pre And Post Experimental Study**Shinde Mukesh¹, Shripad Nikitesh², Chaudhari Shruti³, Mahajan Pradnya⁴, Nagulkar Jaywant⁵¹Assistant Professor, ²Intern, ³Assistant Professor, ⁴Assistant Professor, ⁵Professor.¹⁻⁵Dr.Ulhas Patil College of Physiotherapy, Jalgaon, India**ABSTRACT :**

Background: Cervicogenic headache is one of a most common types of headache characterized by chronic hemi cranial pain referred to the head from either bony structures or soft tissues of the neck.

Methodology: A pre-post experimental study was conducted on 32 college going students. Subjects were selected according to the inclusion and exclusion criteria of the convenient sampling technique. A pre-treatment evaluation of the HDI score, headache duration, headache intensity, headache frequency, and passive flexion rotation test was done before intervention. Mulligan traction and progressive neck muscle strengthening using pressure biofeedback were given for alternate days 3 sessions/ week, for 3 Weeks & And intervention evaluation was done. Statistical analysis was carried out using paired t-tests.

Results: On intra-group comparison using paired t-test, there was significant difference between the pre-post comparison of headache intensity (<0.0001), duration (<0.0001), frequency (<0.0001) & headache disability inventory (<0.0001) in college-going students.

Conclusion: The upper cervical mulligan traction and strengthening of the deep neck cervical muscles for 3 weeks effectively reduce the symptoms of cervicogenic headache.

Keywords: Cervicogenic headache, Headache disability inventory, Mulligan traction, Progressive neck muscle strengthening.

Introduction

Cervicogenic headache is one of the most common type of headache which may arise from the malalignment of cervical vertebrae. The International Headache Society (IHS 2013) has validated cervicogenic headache as a secondary headache, which means headache caused by a disorder of the cervical spine and its component bony, disc and or soft tissue elements, usually but not invariably accompanied by neck pain. Cervicogenic headache is characterized by chronic hemi cranial pain that is referred to the head from either bony structures or soft tissues of the neck^[1]. It is a 'side-locked' or unilateral fixed headache characterized by a non-throbbing pain that starts in the neck and

spreads to the ipsilateral occulo-frontal-temporal area. According to the study conducted by Mitul Thakur, et.al concluded that cervicogenic headache is a common form of headache in prevalence in individuals of age group 18-30 years with females are more prone than male (Female to Male ratio=2:1). The prevalence of CEH in individuals with frequent headache is 15.6%.^[3] The flexion-rotation test has been described as a method to differentiate rotational motions taking place at the upper versus lower cervical spine in patients with headache. The FRT-P has been found to have a high degree of sensitivity (90-91%) and specificity (88-90%) when used to examine patients with CEH.

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□ **Signs and symptoms for cervicogenic headache-**

- a. Precipitation of head pain, similar to the usually occurring one:
 1. On neck movement and / or sustained awkward head positioning.
 2. On external pressure over the upper cervical or occipital region.
- b. Restriction of the range of motion in the neck.
- c. Ipsilateral neck, shoulder, or arm pain of a rather vague non-radicular nature or, occasionally, arm pain of a radicular nature.
- d. Moderate-severe pain, non-throbbing and non-lancinating pain, starting in the neck region.

□ **The clinical criteria for cervicogenic headache proposed by the international headache society:**

- a. Unilateral head or face pain without side shift; the pain may occasionally be bilateral (unilateral on both sides).
- b. Pain localized to the occipital, frontal, temporal, or orbital regions.
- c. Intermittent attacks of pain that lasts for hours to days.
- d. Triggers:-sustained or awkward neck postures, digital pressure over C3, C4, C5 Vertebrae; it can also be triggered with the actions which involve vigorous neck Movements i.e cough, sneeze.

The recent studies on non-pharmacological i.e exercise treatment in cervicogenic headache concluded that all of the training i.e. (strength, endurance, stretching) methods decreased headache. However, stretching, which is often recommended for patients, was less effective alone, when combined with muscle endurance and strength training.

A study investigated the effect of manual cervical traction in patients with CGH and mentioned a significant improvement in both pain and disability.^[9] One research concluded that intermittent cervical traction was significantly effective on cervical pain and brachialgia in terms of pain and Rom.^[10] Again a trial showed that MUCMT added to TT was more effective than TT alone in increasing the upper cervical rotation ROM to the affected side and headache as well Moreover, both treatment protocols revealed a significant improvement in all outcome measures.^[11]

A study conducted by Dr. Rabia Ashfaq, et.al showed that Pressure biofeedback training was quite effective in improving the endurance capacity of deep cervical. They have concluded that Deep Cervical Flexor Training with Visual Pressure Biofeedback was significantly effective ($p < 0.005$) for reduction in neck pain than the conventional training (isometric, stretching, and scapulothoracic exercises). Studies comparing the effectiveness of manual therapy with flexion exercise i.e. (chin tuck) to improve the forward head posture have also been conducted. In addition, studies have reported the effectiveness of strengthening exercises of the deep flexor muscles of the cervical area for correct posture and relief of CGH headache and for improving forward head posture.

Headache Disability Inventory was used to evaluate headache disability. This tool is a useful measure for evaluating the effects of headaches and treatment and the effect of headaches on daily life. It consists of 25 questions, and one can choose from three scales.

Considering the causes and pathomechanics it is very important to work on cervical muscle strength and alignment of cervical vertebrae. There are plenty of medical and physiotherapy approaches present for managing cervicogenic headache. But no study is conducted on the following intervention of mulligan traction and deep cervical neck muscles strengthening. So our aim was to Study the effect of mulligan traction along with progressive neck muscles strengthening in patients with cervicogenic headache among collage going students.

Materials & Methodology

Study Design: Pre & Post Experimental Study.

Study Population: Collage going students with cervicogenic headache.

Sampling Technique: Convenient Sampling Technique.

Sample Size: 32

Sample size was calculated by formula,

$$\begin{aligned} \text{Minimum sample size (n), } n &= \frac{Z^2 S^2}{d^2} \\ &= \frac{(1.96)^2 (4.45)^2}{(+1.5)^2} \\ &= 32 \end{aligned}$$

M=52.33

S=Standard deviation=4.45

d=Absolute precision=+1.5

Z4=1.9 at alpha=5% Level of Significance

Study Duration: 6 Months

Ethical Approval :- Study was approved by institutional ethical committee of Dr.Ulhas Patil College of Physiotherapy, Jalgaon.

Clinical Trial Registration No. :- CTRI/2023/07/055104

Place of Study: Dr. Ulhas Patil College of Physiotherapy, Jalgaon.

Materials: Patient Evaluation Sheet, Pen, Pressure biofeedback, stopwatch, Plinth, HDI Questionnaire

Inclusion criteria

1. Age group 18-25
2. 2-3 episodes of headache per month
3. Unilateral headache without side shift
4. Patients with positive passive flexion rotation test

Exclusion criteria

1. Trauma to cervical and head region
2. Migraine or tension type headache
3. Any malignancy
4. Patient with fibromyalgia
5. Cervical radiculopathy
6. Pt with psychological problems
7. Vascular problems, dizziness, vertigo
8. Patient on medications for headache

Outcome Measures

1. Headache intensity, headache duration & headache frequency
2. Headache disability inventory (HDI)

Procedure

To conduct the study Permission from Institutional ethical committee was taken. The trial was registered under the Clinical Trials Registry-India (ICMR-NIMS) with CTRI No. CTRI/2023/07/055104. 32 Subjects were selected according to the inclusion and exclusion criteria by Convenient sampling Technique. A written consent was taken from selected subjects for study. Procedure was thoroughly explained to the subjects. Earlier the demographic data of each and every individual were taken in consideration. Pre-treatment evaluation of

HDI score, headache duration, headache intensity, headache frequency, passive flexion rotation test was done before intervention. Mulligan traction & Progressive neck muscle strengthening using pressure biofeedback were given for alternate day 3 sessions/ week, for 3 Weeks & Post intervention evaluation was done.

Passive Flexion rotation test - The test is commonly performed passively. The passive flexion-rotation test (FRT-P) is performed with the patient supine. An examiner passively positioned the patient's neck into full flexion to pre-tension the structures of the middle and lower cervical spine, then the patient's head is passively rotated each direction while the flexed position is maintained. Since the C1/C2 motion segment accounts for 40-60% of the total cervical ROM, this test is intended to isolate motion at that segment. Criteria for a positive test consists of ROM restriction with firm resistance, a 10-degree difference in motion between painful and non-painful sides, and pain provocation.

Intervention:-

1. Mulligan Traction

The cervical traction was delivered with the participant in a supine position. The therapist placed forearm under patients head in mid prone position, just beneath the subject's occiputs, in transverse plane. The therapist pronates his forearm against the subject's occiput while fixing the subject's chin with other hand. The resultant traction force was sustained for 10 sec. A maximum of 5-repetitions was delivered in a single session followed by 2 min rest between each session. If pain aggravates during procedure or any discomfort or unusual signs experienced by subjects the procedure was stopped.

2. Progressive Strength Training

It includes strengthening of deep cervical muscles using pressure bio feedback. The subject was in hook-lying position; with pressure biofeedback was placed between the plinth and the posterior aspect of the cervical spine just below the craniocervical junction. The subject's head and neck was positioned to ensure a neutral cervical spine and craniocervical position. The pressure sensor will inflate to 20 mm of Hg so that the space can be filled between the back of the neck and the plinth, then asked the subject to posterior retraction of chin to push neck directly back on the sensor. The dial was kept in front of the subject

so that he can monitor any deflection of the pointer during holding phase which will 10 second. During the 3-week exercise program, the pressure was 20 mmHg at week 1, if the patient was able to hold it for 10 second. Patient was asked to hold on 22 mmHg in week 2 and 24 mmHg in week 3. The patient hold the contraction at the respective level for 10 seconds and preformed minimum 10 contractions and had 5 sec rest time in between each repetitions. A total no. of three sets was performed, and the rest time between sets was 1 min. After the end of the 3rd week, post-intervention outcomes, i.e. HDI scores, headache duration, intensity, frequency were assessed & results were carried out.

Results :

The study included 32 subjects who met the inclusion criteria out of 40 who were assessed individually. The remaining 8 were excluded, as they didn't match the inclusion criteria. Statistical analysis was done using statistical package of social science (SPSS) version 28.0.0.1. Paired t test was done for pre & post comparison of outcomes measures.

Table 1:-Age Distribution

Age	20	21	22	23	24	25
No. Of subjects	8	7	7	7	2	1
Percentage	25%	22%	22%	22%	6%	3%

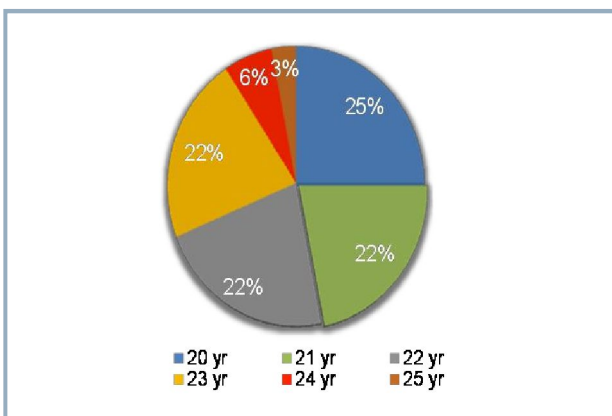


Table 2: Gender Distribution

Gender	Male	Female
No Of Subjects	6	26
Percent	19%	81%

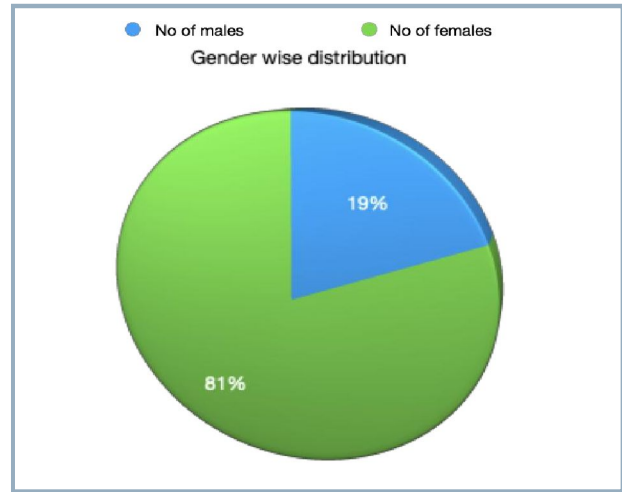


Table 3: Pre-Post HDI Comparison

Comparison of mean between pre and post treatment for HDI				
Parameter	Follow up	HDI(mean)	t value	p value
HDI	Pre	55.56 \pm 9.4	7.680	<0.0001
	Post	45.18 \pm 6.51		

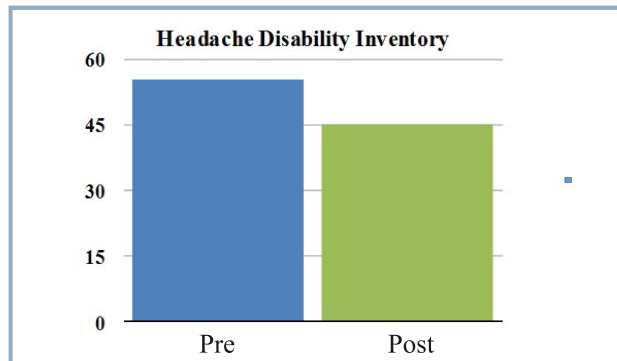


Table 4 : Pre-Post Headache Frequency Comparison

Comparison of mean between pre and post treatment for frequency				
Parameter	Follow up	Frequency (mean)	t value	p value
Frequency	Pre	3.56 \pm 9.4	5.853	<0.0001
	Post	2.18 \pm 0.93		

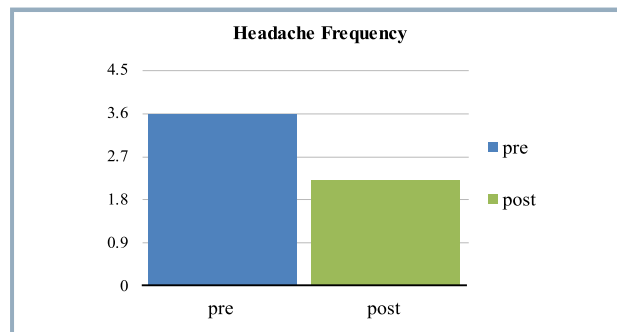


Table 5 : Pre-Post Headache Duration Comparison

Headache Duration Comparison of mean between pre and post treatment				
Parameter	Follow up	Duration (mean)	t value	p value
Duration	Pre	5.71 ±2.32	6.661	<0.0001
	Post	2.65 ±1.00		

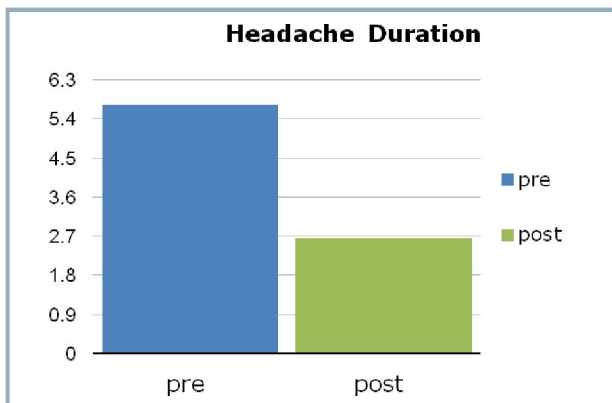
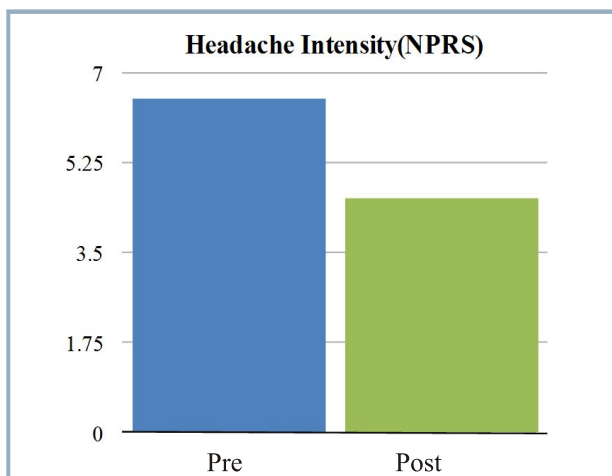


Table 6 : Pre-Post Headache Intensity Comparison

Headache Duration Comparison of mean between pre and post treatment				
Parameter	Follow up	NPRS (mean)	t value	p value
NPRS	Pre	6.52 ±1.15	7.114	<0.0001
	Post	4.56 ±1.04		



Discussion

The purpose of this study was to evaluate the effect of mulligan traction and deep cervical neck muscles strengthening and change in headache intensity, duration of headache, frequency of headache and compare the scores of HDI in patients with cervicogenic headache patients. This is a pre and post experimental study which was performed on college going students 32 samples were recruited between

the age of 20 -25 yrs. out of which 26 were female and 6 were male.

Cervicogenic headache is thought to be referred pain arising from irritation caused by cervical structures innervated by spinal nerves C1, C2, and C3; therefore, any structure innervated by the C1–C3 spinal nerves could be the source of a cervicogenic headache. This may include ligaments, joints, disc and musculature. Sustained awkward posture which is common in young adults now a days may cause deep cervical flexors muscles shortening and again the mal-alignment of the cervical vertebra which cause CGH.

In our study we found that upper cervical mulligan traction along with deep neck cervical muscles strengthening for 3 weeks is effective in reducing the symptoms of cervicogenic headache (p value <0.0001). This could be due to the effect of upper cervical traction, which was documented to separate the cervical segments C1, C2 ,C3, it’s also mobilize the facet joints, in an anteroposterior direction stimulating the joint proprioceptors this again causes cervical muscles to relax and widens the intervertebral foramina & realign the cervical vertebrae to their positions respectively.

Taking deep cervical flexors muscles strengthening exercise into consideration it helps musculo tendinous proprioceptors to reduce their stretch reflex responses, improves blood supply and reduces metabolite increase respectively. This also causes decrease in the cervical lordosis, causing increase in spinal stability, decrease in superficial muscle tension, and increase in muscle strength as well. This increases the input of noxious receptor information and decreases the pain threshold.

Our study is in accordance with a randomized controlled trial conducted by Mohamed A. Khalil1, Hamed Alkhozamy et.al on Effect of Mulligan upper cervical manual traction in the treatment of cervicogenic headache, stated that a significant difference was observed in the comparison of pre- vs. post-treatment outcomes when assessed and mean values of outcomes were as follows 3.2 and 1.93 for duration, 2.93 and 1.98 for frequency respectively. This result suggests that MUCMT is effective in reducing the headache intensity, duration and frequency supporting the results of the present study.

Borisut et al. studied the effect of strengthening and endurance exercise for cervical muscles in patients

with cervical pain and found a significant improvement in all outcome measures. They explained that the results might be due to a rise in neuromuscular effectiveness and enhancement in deep neck flexor control. The above studies have proved that with the help MUCMT and deep cervical muscle strengthening there was a significant reduction in the (HDI), Intensity, frequency and duration of the cervicogenic headache.

All the proceeding research and literature suggest that, the use of mulligan upper cervical traction along with deep cervical neck muscles strengthening was effective in relieving the symptoms of cervicogenic headache.

Conclusion

The upper cervical mulligan traction along with deep neck cervical muscles strengthening for 3 weeks is effective in reducing the symptoms of cervicogenic headache.

Conflict of Interest: All authors declare that they have no conflicts of interest.

Source of Funding: Not required.

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