A Randomized Controlled Trial to Study the Effects of Suboccipital Muscle Release Technique versus Neck Isometrics for Tension Headache in Medical Students

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Abstracts: Background: Headaches are a prevalent concern among medical students, often attributed to stress, long study hours, and poor posture. Evidence is present to support the influence of sub-occipital muscle release technique and neck isometrics on reduction in tension type headache intensity among medical students. Objective: To compare and determine the effects of sub-occipital muscle release and neck isometrics in reducing headache intensity among medical students. Data Collection Procedure: A total of 40 participants with tension type headache were selected according to the inclusion criteria. Participants were divided into two groups, i.e. Group A and Group B, with 20 participants in each group. Sample size was calculated using Open Epi calculator. Non-probability convenient sampling was used for recruitment and then subjects were randomly allocated to both groups by sealed envelope method. Sub-occipital muscle release technique was performed in Group A. Group B was instructed to perform neck isometrics. These interventions were performed over a period of 4 weeks. Measurements were taken at baseline and 4 weeks after treatment. NPRS and HDI scales were used to assess the headache intensity. The overall duration of study was 6 months. Independent Sample T-test was used for between group analysis and Paired Sample T-test was used for within group analysis. Results: Between group analysis showed no significant difference in effects of Sub- occipital Muscle Release and Neck Isometrics with P-value > 0.05. Within group analysis demonstrated that both techniques were effective in reducing the headache intensity among medical students with P-value <0.05 in both groups. Conclusions: The results concluded that while both interventions demonstrated efficacy within their respective groups, there is not sufficient evidence to conclude that one intervention is significantly superior to the other.

Keywords: Neck Isometrics, Sub-Occipital Muscle Release Technique, Tension Type Headache.

1. INTRODUCTION

TENSION TYPE HEADACHE (TTH)

The most prevalent primary headache type is tension-type headache, which is characterized by mild-to-moderately intense pain that typically occurs on one side and lasts for hours or days. In the broader population, the prevalence varies from 30% to 78%(1). More women than men have reported TTH, which is categorised as episodic (headache fewer than 15 days per month) and chronic (headache more than 15 days per month).This form of headache is frequently associated with muscle tension, anxiety, and stress. The reduction in job productivity and the negative effects on family and social activities have a substantial negative influence on working and dailylife(2).

Anxiety, emotional stress, poor posture, and sleep deprivation are common causes of TTH(3). In fact, it's not uncommon for more than one of these causes to be active simultaneously. The etiology of tension headaches is multifaceted, encompassing both physiological and psychological factors. Due to the increased strain placed on the head, these postural muscles may become overused or stressed, tightening up andproducing pain or headaches.

TENSION TYPE HEADACHE IN STUDENTS:

In some populations, such as undergraduate medical students, headache disorders are underdiagnosed and undertreated. Medical students, given the rigorous academic demands and prolonged periods of study, are particularly susceptible to developing tension headaches. Due to their heightened exposure to both physical and psychological pressures, medical students report headaches more frequently than the general population(4). Medical students are often facing sleep deprivation issues and prolonged study hours. Also, the excessive use of devices such as mobile phones and laptops is another reason for the high prevalence of TTH. There exists a direct correlation between the intensity of a headache and the adverse consequences it causes, such as diminished functioning, lowered quality of life, decreased academic achievement, and co-occurring psychiatric diagnoses(5). Despite their great frequency, the effects of headaches on medical students are poorly researched. For this particular group of people, the headaches result in missed study days and lower academic achievement(6). Research involving undergraduate medical students was limited.

Medical students, with their intensive academic curriculum, prolonged study hours, and the inherent stress associated with clinical training, present a unique demographic highly vulnerable to tension headaches. The relentless demands of medical education not only subject these students to extended periods of mental exertion but also frequently compel them into prolonged sedentary postures, which can exacerbate musculoskeletal tension. Moreover, the competitive nature of medical training, coupled with the weight of responsibility associated with patient care, often amplifies psychological stressors. As a result, medical students may experience a heightened frequency and intensity of tension headaches compared to their peers in other disciplines. Recognizing the distinct challenges faced by this group is crucial, as addressing the specific triggers and manifestations of tension headaches in medical students can lead to tailored interventions and enhanced student well-being.

In earlier research, stress was discovered to be the primary cause of headaches, with sleep being the primary remedy. Headaches can significantly impair medical students' academic performance, capacity for reasoning, mental health, and general quality of life (7).

SUBOCCIPITAL MUSCLES

The rectus capitis posterior major, obliquus capitis superior, rectus capitis posterior minor, and obliquus capitis inferior are the four main muscles of the sub-occipital region(8). These muscles enable the neck to move and support the head. The spinous process of C2 is where the rectus capitis posterior major and obliquus capitis inferior muscles join. At C1, the obliquus capitis superior and the Rectus capitis posterior minor attach. These muscles provide head rotation and neck extension based on their attachments(9). Reduced blood supply to that area can result from compression of the sub-occipital nerve and vertebral artery caused by these muscles being compressed.

This can then result in headaches, neck pain, and other symptoms(2).

These intricate structures play a pivotal role in the fine movements and stabilization of the head and neck. Beyond their biomechanical functions, the suboccipital muscles are also implicated in various clinical contexts, especially concerning headaches and cervical pain syndromes. Given their proximity to critical neurovascular structures and their role in proprioception and postural control, any dysfunction or tension in the suboccipital muscles can potentially lead to pain, restricted range of motion, and other neurological symptoms. Consequently, therapeutic interventions targeting the suboccipital region, such as manual release techniques, have gained attention in both clinical practice and research, aiming to alleviate symptoms and restore optimal musculoskeletal function.

SUBOCCIPITAL MUSCLE RELEASE TECHNIQUE

OMM practitioners often use the sub-occipital release technique because of its ease of setup and adaptability(10). The low equipment requirements and patient posture of this technique make it simple for healthcare professionals to implement. This method is usually used to treat headaches(11). It can also be applied as a supplement to treat autonomic dysfunctional disorders(12).

Using the sub-occipital release technique, healthcare professionals can address musculoskeletal complaints like headaches with relative ease(13). Because the atlanto-occipital region is being manipulated, this technique is also flexible and canaid in the regulation of the body's autonomic system(14).

Unlike most osteopathic treatments, which target the sympathetic nervous system, this technique has been shown to regulate the parasympathetic nervous system(15).

The efficacy of this technique is rooted in its ability to directly address musculoskeletal contributors to pain and discomfort in the cervical region, offering patients a non-pharmacological alternative for symptom relief and enhanced functional well-being.

DEEP NECK FLEXORS

The prevertebral cervical muscles, also known as the Deep Neck Flexors, are the neck's analogue of the core(16). They are the most significant adversaries of the large cervical spine extensors, despite their diminutive size. They are crucial to the stability and attachment of the skull to the cervical column(17). It is thought that the Deep Neck Flexor muscles play a significant role in maintaining head-on-neck posture(18). A theory suggests that when there is a disruption in muscle performance, the balance between the Deep Neck Flexors and the stabilisers on the posterior aspect of the neck will be upset, leading to a loss of proper alignment and posture(19). This, in turn, is likely to exacerbate cervical impairment.

- The deep neck flexors include:

1. Rectus Capitis Anterior
2. Rectus Capitis Lateralis
3. Longus capitis
4. Longus colli/Longus cervicis

The deep neck flexors hold significant importance in preventing excessive cervical lordosis and minimizing strain on the vertebral discs and facet joints. Moreover, dysfunction or weakness in the deep neck flexors has been implicated in various musculoskeletal disorders, including cervicalgia and cervicogenic headaches. As such, therapeutic interventions and exercises aimed at strengthening and coordinating the deepneck flexors have become a cornerstone in rehabilitation protocols, emphasizing their indispensable role in cervical spine health and function.

FUNCTION OF DEEP CERVICAL FLEXORS

The principle function is to span the vertebrae, act with, and antagonise the deep muscles of the upper back(20) Play a vital role in supporting the cervical segments and the cervical curve(21). The longus colli and longus capitis in particular play an important role in cervicalstabilization(22).

The function of the deep neck flexors is paramount in ensuring optimal biomechanics and stability of the cervical

spine. Acting synergistically with other cervical muscles, these deep-seated muscles are primarily responsible for initiating and controlling forward flexion of the neck. Beyond mere movement, the deep neck flexors play a crucial role in maintaining cervical alignment, especially during activities that challenge neck stability, such as lifting, bending, or turning the head. Their intricate coordination allows for precise control over neck positioning, preventing excessive anterior translation of the cervical vertebrae and ensuring a balanced distribution of forces across the cervical spine. Furthermore, the deep neck flexors act as key stabilizers during dynamic tasks, counteracting the pull of larger, superficial neck muscles and minimizing undue stress on cervical structures. Overall, the multifaceted function of the deep neck flexors underscores their significance in safeguarding the integrity of the cervical spine and facilitating efficient neck mechanics.

NECK ISOMETRICS

Isometric exercises are more palatable to patients because they build weak muscles without aggravating pain-sensitive tissues like ligaments, tendons, or neck joints(23). They impede the movement of the involved joints by causing contractions in a particular group of muscles without altering muscle length (24). Furthermore, they can be completed anywhere without the need for equipment due to their practicality and ease of use. Regarding isometric neck exercises, they are straightforward, affordable, and easy to perform, which may help patients adhere to their treatment plans.(25)

Unlike dynamic exercises that involve active range of motion, isometric exercises focus on maintaining a static muscle contraction against resistance. In the context of the neck, isometric exercises typically involve applying resistance in various directions and holding the neck in a fixed position for a specified duration. The primary objective of neck isometrics is to enhance muscular endurance, improve neuromuscular coordination, and bolster the supportive role of neck muscles in maintaining posture and facilitating head movements. Additionally, by engaging in controlled isometric contractions, individuals can target specific muscle groups within the neck region, addressing imbalances and potential weaknesses. As a rehabilitative and preventive measure, neck isometrics have gained recognition for their role in reducing the risk of neck-related injuries, enhancing cervical stability, and promoting overall neck health and resilience.

CLINICAL IMPLICATIONS AND CURRENT TREATMENT

The clinical implications of these headaches extend beyond mere discomfort, with implications for academic performance, mental well-being, and overall quality of life. Traditionally, the management of tension headaches has largely revolved around pharmacological interventions, including nonsteroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, and analgesics. While these treatments offer symptomatic relief for many, concerns regarding medication overuse, potential side effects, and the desire for more holistic approaches have spurred interest in alternative therapeutic strategies. Concurrently, non-pharmacological interventions, such as cognitive-behavioral therapy, relaxation techniques, and physical therapies, have been explored and integrated into headache management protocols. Among these, manual therapies targeting muscular components, like the suboccipital muscle release, and therapeutic exercises such as neck isometrics, have shown promise in addressing the musculoskeletal contributors to tension headaches. As the landscape of headache management evolves, understanding the efficacy, safety, and comparative benefits of these diverse treatment modalities becomes imperative for clinicians and researchers alike.

THE ROLE OF MUSCULAR INTERVENTIONS IN HEADACHE MANAGEMENT

Muscular interventions represent a burgeoning frontier in the multifaceted realm of headache management, offering a targeted approach to address the musculoskeletal components often implicated in tension headaches. Central to this approach is the recognition that muscular imbalances, tension, and trigger points can significantly contribute to headache onset, frequency, and severity. By employing techniques such as manual therapies, which encompass suboccipital muscle release and myofascial release, clinicians can directly address muscular tightness and dysfunction, potentially alleviating the associated headache symptoms. Furthermore, therapeutic exercises like neck isometrics serve to strengthen weakened or imbalanced muscles, thereby enhancing cervical stability and reducing the propensity for muscular strain-induced headaches. Integrating these muscular interventions into comprehensive headache management strategies underscores the importance of addressing not only the symptoms but also the underlying musculoskeletal contributors, paving the way for more holistic and individualized care approaches in headache management.

2. LITERATURE REVIEW

In 2021, Wonho Choi et.al published research on Effect of 4 Weeks of Cervical Deep Muscle Flexion Exercise on Headache and Sleep Disorder in Patients with Tension Headache and Forward Head Posture and concluded that this intervention will improve the quality of life and activities of daily life(16). In 2022, R. Pérez-Llanes et.al did research on the Effectiveness of suboccipital muscle inhibition combined with interferential current in patients with chronic tension-type headache and concluded that this intervention did reduce disability and the impact of headache on daily life at 4 weeks(26).

In 2014, Gemma V. Espí-López PhD et.al published research on the Efficacy of Manual and Manipulative Therapy in the Perception of Pain and Cervical Motion in Patients with Tension-Type Headache and concluded that it has a positive effect on pain perception and cervical range (27). In 2018, C. Cumplido-Trasmonte et.al did research on Manual therapy in adults with tension-type headache and concluded that manual therapy has positive effect on the intensity, frequency and duration in TTH (20). In 2014, Gemma V. Espí-López, PhD et.al did research on Treatment of tensiontype headache with articulatory and suboccipital soft tissue therapy and concluded that suboccipital release has positive effects on different aspects of TTH (28).

In 2016, Gemma V. ESPÍ-LÓPEZ et.al did research on the effect of manipulation plus massage therapy versus massage therapy alone in people with tension-type headache and concluded that these interventions are effective in reducing the impact of headache (12). In 2022, Sherif Moustafa Ramadan et.al did research on Short-term effects of instrument-assisted soft tissue mobilization compared to algometry pressure in tension-type headache and concluded that IASTM is effective in improving headache symptoms (26).

In 2015, Albert F. Moraska, PhD et.al did research on Myofascial trigger point focused head and neck massage for recurrent tension-type headache and concluded that the headache duration was reduced (5). In March 2022, Gemma V Espi-Lopez et.al did research on the Effects of Foam Rolling vs. Manual Therapy in Patients with Tension-Type Headache and concluded that both treatment options are effective for improvement of the clinical symptoms of TTH (24). In 2020, Cristina Pérez-Martínez et.al did research on A New Tool for Self Myofascial Release of the Suboccipital Muscles in Patients with Chronic Non Specific Neck Pain and concluded that both MRT and Self MRT were equally effective to enhance self-reported pain intensity (25).

RESEARCH GAP

While previous studies have examined the effectiveness of suboccipital muscle release and neck isometrics for tension headache management, there remains a gap in the literature regarding their efficacy in medical students. This study seeks to address this gap by directly comparing the impact of these interventions on headache-related disability, thus providing valuable insights for physiotherapists.

Objectives

- To determine the effects of suboccipital muscle release and neck isometrics in reducing headache intensity among medical students.

- To compare the two interventions.

3. MATERIAL AND METHODS

Study Design

The study design used in the current study was Randomized controlled trial (RCT).

Setting

The study settings where research was carried out after taking permission from relevant departments were as follows:

Holy Family Hospital, Benazir Bhutto Hospital and DHQ Rawalpindi.

Duration of Study

The duration of the current study was 4 months. The time at which the study was carried out was after the approval of synopsis onwards to next 4 months. The exact date was 15 September 2023 to 15 January 2024.

Sample Size

OPENEPI Sample Size Calculator was used to calculate the required sample size. A total of 40 participants were required by assuming a significance level of 0.05. The sample size is calculated by deriving mean and standard deviation from prior study 48.12±10.78 and 57.38±9.98 (14). Group A and Group B, each consisted of 20 participants.

Sample Size For Comparing Two Means

Input Data

Confidence Interval (2-sided)	95%
Power	80%
Ratio of sample size (Group 2/Group 1)	1

	Group 1	Group 2	Difference*
Mean	57.38	48.12	9.26
Standard deviation	9.98	10.78	
Variance	99.6004	116.208	

Sample size of Group 1	20
Sample size of Group 2	20
Total sample size	40

Sampling Technique

Non-Probability Purposive sampling technique was used for the collection of data in this study.

Sampling Frame

Inclusion Criteria

- Age 18-25 years.
- Both male and female.
- Bilateral location of headache.
- At least 2 episodes of headache per month on average.
- Mild and moderate intensity.
- Aggravated by physical factors (sunlight, smoke, dehydration,exercise,etc).

Exclusion Criteria

- Neurological disorders.
- Vascular disorders.
- Tumor.
- Accidental trauma.
- Spondylolisthesis.
- Disc lesions.
- Migraine

Data Collection Instrument

- Headache Disability Inventory (HDI) scale to assess the impact of headaches on daily activities.(29)
- Numeric Pain Rating Scale (NPRS) to assess headache pain intensity.(30)
- Demographic Questionnaire to collect information about participants' demographic characteristic

Data Collection Procedure

- After approval of synopsis, questionnaire was distributed among the target population.
- The responses of these were analyzed by using SPSS.

- Participants were randomly assigned to one of two groups using computer generated randomization i.e. Group A (Suboccipital Muscle Release) and Group B (Neck Isometrics)

INTERVENTIONS

Sub-Occipital Muscle Release

- The participant was in supine lying position with a pillow under the head for comfort.
- The physiotherapist sat at the head of the treatment table and placed the finger pads of both hands under the suboccipital region moving slightly inferior until the muscle bulk was felt.
- The therapist slowly and gently applied pressure upward (ventrally and obliquely) into the tissues and held that position for three to five minutes or until significant muscle tension was released.

Neck Isometrics

- The participant was in supine lying position with a pillow under the head for comfort.
- Participant performed chin tuck and simultaneously push the head in the pillow for 10 seconds.
- One set of 10 repetitions. A total of three sets were performed.
- A 2-min break was allowed between sets.

 These interventions were performed twice a week for 4 weeks.

4. RESULTS

DEMOGRAPHICS

Gender

Out of total 40 participants, 18 were males and 22 were females. In group A, there were 5 males and 15 female participants, while in group B there were 13 male participants and 7 female participants. The gender frequency distribution is given intable 1 and graph 1.

Table Ⅰ: Frequency Distribution of Gender (Male and Female) over-all and group-wise

Variable		Frequency	Group A(n=20)	Group B(n=20)
Gender	**Male**	18	5	13
	Female	22	15	7

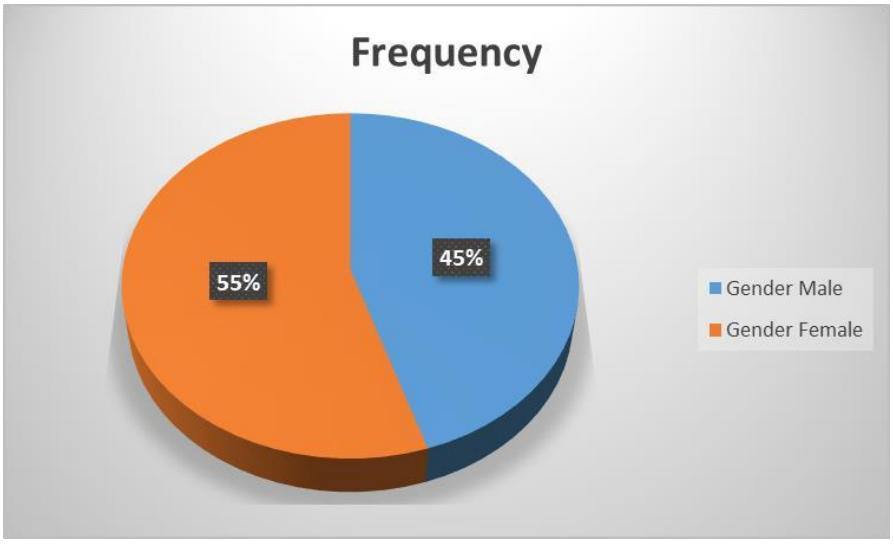


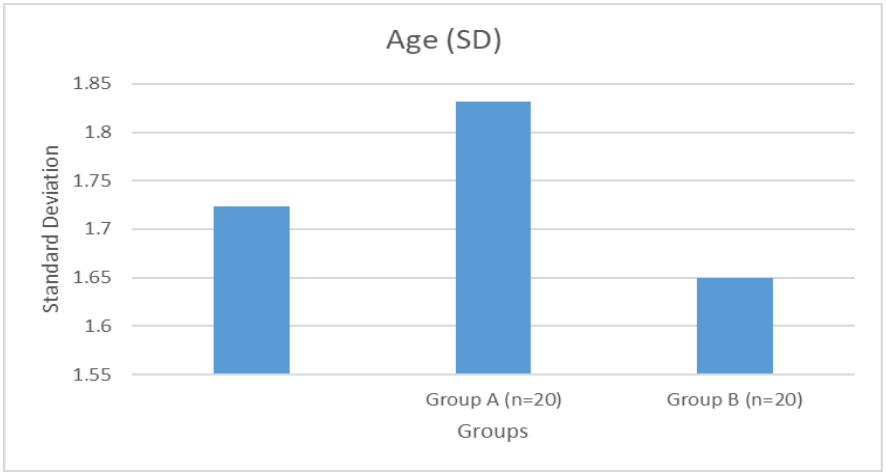
Figure 1: Frequency Distribution of Gender (Male and Female)

a) Age

Descriptive statics was used to calculate the age of both groups. The overall mean ageof the sample was 22.18 years with standard deviation of 1.723 years. The mean age of participants of Group A was 22.10 years with standard deviation 1.832 years and mean age of Group B was 22.25 years with standard deviations of 1.650 years, as shown in table 2 and graph 2.

Table Ⅱ: Mean Age Distribution Between Groups

Variable		Group A(n=20)	Group B(n=20)
Age (Mean±SD)	22.18±1.723	22.10±1.832	22.25±1.650



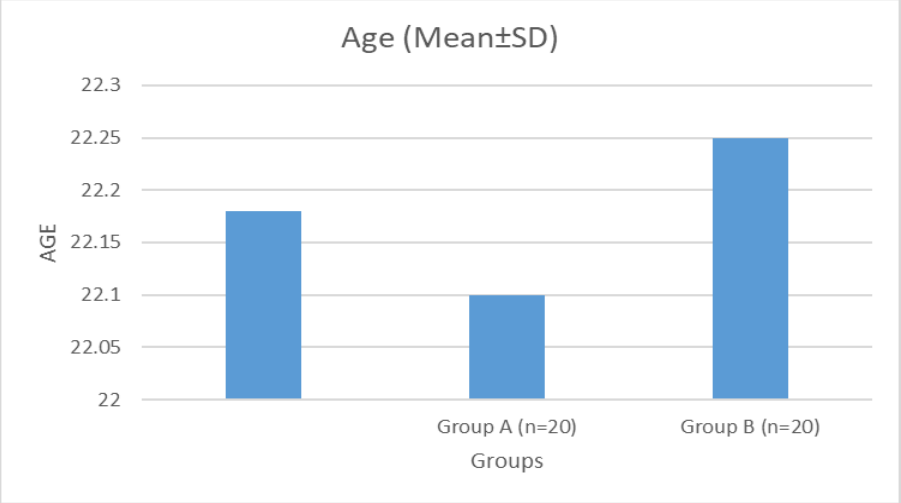


Figure 2: Mean Age Distribution Between Groups

b) Year Of Study

Out of total 40 participants, 9 were in 1st year, 3 were in 2nd year, 10 were in 3rd year, 8 were in 4 th year, 10 were in 5th year. The frequency distribution is given intable 3 and graph 3.

Table Ⅲ: Frequency Distribution of YOS over-all and group-wise

Group		1st Year	2nd Yea r	3rd Yea r	4th Year	5th Year
	A	4	2	3	2	9
	B	5	1	7	6	1
Total	40.0	9	3	10	8	10

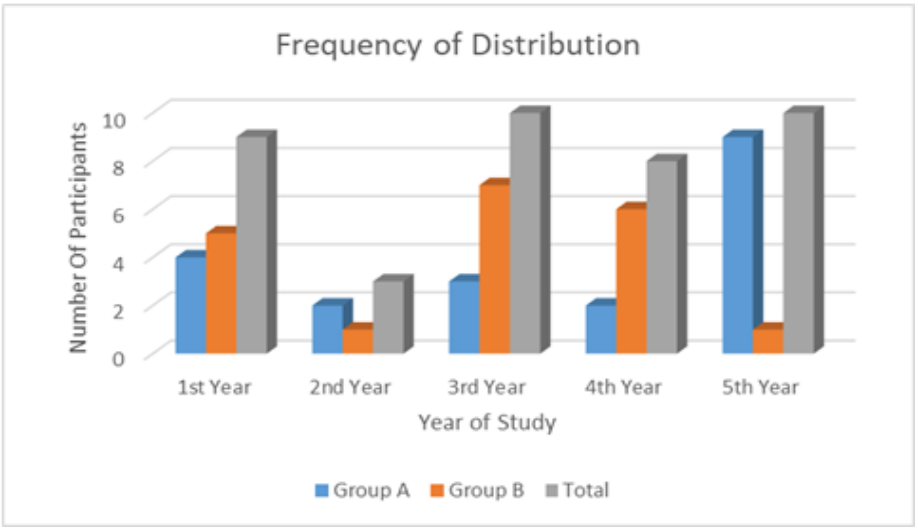


Figure 3: Frequency distribution of year of study

c) Discipline

24 of the 40 students were from the DPT department, 4 from MLT, 7 from MIT, 2 from Optometry and 3 from O&P. Group A had 17 DPT students, 2 MIT students and 1 Optometry student while group B had 7 DPT, 4 MLT, 5 MIT, 1 Optometry and 3 0&P students. The frequency distribution is given in table 4 and graph 4.

Table Ⅳ: Frequency Distribution of Department over-all and group-wise

Group		DPT	MLT	MIT	Opto	O&P
	A	17	0	2	1	0
	B	7	4	5	1	3
Total	40	24	4	7	2	3

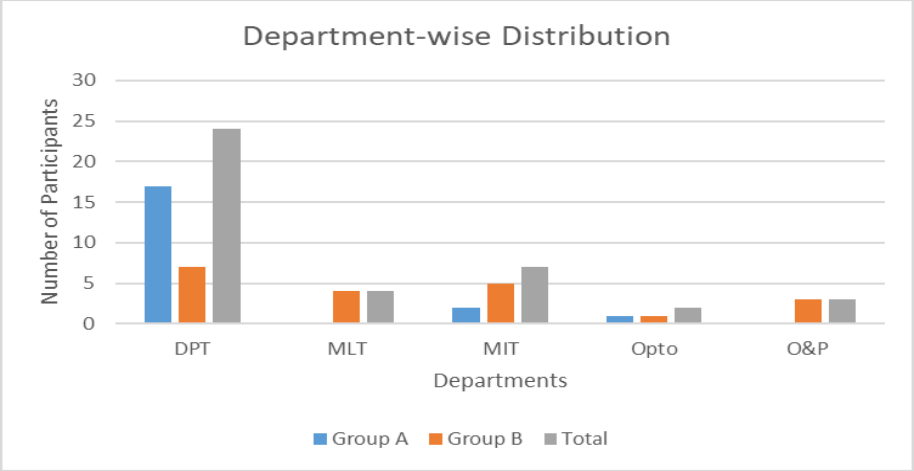


FIGURE 4: FREQUENCY DISTRIBUTION OF DEPARTMENT OVER-ALL AND GROUP-WISE

BETWEEN GROUP ANALYSIS

Independent sample T-test was used to compare the two groups, i.e., Group A and Group B, to analyze and compare the effectiveness of sub-occipital muscle release and neck isometrics in assessing headache intensity among medical students.

Between group analysis of Group A and B for the effectiveness sub-occipital muscle release versus neck isometrics in headache intensity showed no significant difference pre-treatment for NPRS as P-value is 0.272 (>0.05) but showed significant difference for HDI as P-value is 0.02 (<0.05). P-value for the post treatment reading NPRS is 0.31(>0.05) and HDI is 0.08 (>0.05), which also showed no significant difference between two groups.

Table Ⅴ: Between group Mean and Standard Deviation of HDI and NPRS

Variables	Scales	Duration	Group A	Group B	P-value
	NPRS	**Pre-treatment**	5.25±1.372	5.70±1.174	0.272
		Post-treatment	3.45±1.317	3.85±1.137	0.31
	HDI	**Pre-treatment**	45.90±20.068	60.70±18.379	0.02
		Post-treatment	29.20±18.978	45.50±17.590	0.08

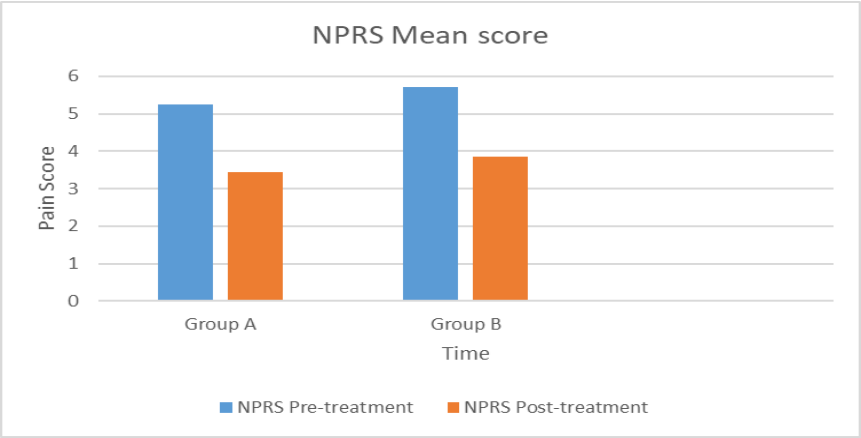


Figure 5a: Pre and Post Mean NPRS Score in Group A and B

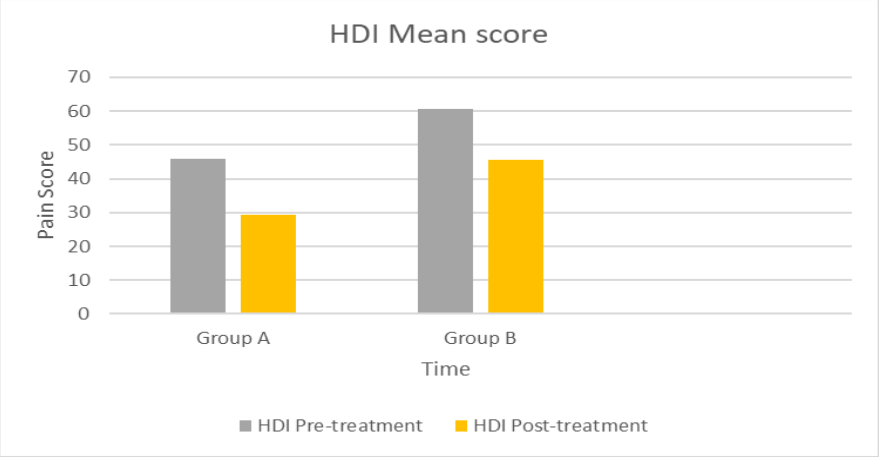


Figure 5b: Pre and Post Mean HDI scores in Group A and B

WITHIN GROUP ANALYSIS

Paired Samples T test was used for within the group analysis at baseline and posttreatment.

Within group analysis of Group A and B for NPRS using Paired Sample T-test showed that mean score of Group A improved from 5.25 to 3.45 post treatment. Similarly, in Group B, mean score improved from 5.70 to 3.85 post treatment. Thisshowed significant improvement in both groups after treatment as P-value is < 0.05for both groups.

Table Ⅵ: Within Group Mean + SD, t-value, df, P-value of NPRS score

Variable	Groups	Pre Treatment	Post Treatment	t-value	df	P-value
NPRS	**Group A**	5.25±1.372	3.45±1.317	-8.32	19	0
	Group B	5.70±1.174	3.85±1.137	-7.278	19	0

Within group analysis of Group A and B for HDI using Paired Sample T-test showedthat mean score of Group A

for HDI improved from 45.90 to 29.20 post treatment.

Similarly, in Group B, mean score improved from 60.70 to 45.50. This showed significant difference in both groups after treatment as P-value is <0.05 for bothgroups.

Table VII: Within Group Mean+SD, t-value, df, P-value of HDI score

Variable	Groups	Pre Treatment	Post Treatment	t-value	df	P-value
HDI	**GroupA**	45.90±20.068	29.20±18.978	-6.645	19	0
	GroupB	60.70±18.379	45.50±17.590	-11.059	19	0

DISCUSSION

The study was conducted to compare the effectiveness of sub-occipital muscle releaseand neck isometrics on tension type headache among medical students. There are many studies present, showing the effectiveness of these interventions separately, but there are very limited studies comparing these two types of interventions that are specifically focused on medical students. This study focused on comparison of these two interventions in reducing the tension type headache intensity. Moreover, baseline readings were taken prior to initiating the interventions which gave us an insight into the extent of improvement that could be gained with these techniques and helped us get a better idea of treatment effect sizes.

The results obtained after the between group analysis showed no significant improvement post treatment. The within group analysis of the two groups was carriedout using Paired Samples T test for baseline and post treatment readings. The analysisresults showed there is significant improvement in reducing headache intensity for thebothgroups.

In 2021, Wonho Choi et.al published research on Effect of 4 Weeks of Cervical DeepMuscle Flexion Exercise on Headache and Sleep Disorder in Patients with Tension Headache and Forward Head Posture (16) and showed a significant reduction in HDIscore after 4 weeks of intervention. Also, a significant difference was observed in scores between the groups. The current study also focused on the effectiveness of theinterventions on a 4 week period with significant reduction in HDI scores. However, significant difference was not observed between the groups in the HDI and NPRS scores.Furthermore, the current study was aimed at comparing the two interventions meanwhile the reference study only studied the effect of neck isometrics.

In 2022, R. Pérez-Llanes et.al published a research on the Effectiveness of suboccipital muscle inhibition combined with interferential current in patients withchronic tension-type headache(26). Similar to the current study, the duration of thisstudy was also 4 weeks period. Statistical analysis showed improvements in HDI scores but not in NPRS scores. As the current study was aiming at the comparisons ofthe two interventions, it did not show any significant results.

In 2014, Gemma V. Espí-López PhD et.al published research on the Efficacy of Manual and Manipulative Therapy in the Perception of Pain and Cervical Motion inPatients with Tension-Type Headache (27). In this study, 3 treatment groups were present and significant improvement was observed in all the 3 groups. In the currentstudy, only 2 treatment groups were present.

In 2018, C. Cumplido-Trasmonte et.al did research on Manual therapy in adults withtension-type headache (20).

This was a systematic review unlike the current study which was a randomized controlled trial. This review concluded that none of the techniques were found superior to the others, combining different techniques seemedto be the most effective approach. This result is in accordance to the results of the current study, which also concludes that neck isometrics and suboccipital muscle release both techniques has significant effects on HDI but none of them are superior to the other.

In 2014, Gemma V. Espí-López, PhD et.al did research on Treatment of tensiontype headache with articulatory and suboccipital soft tissue therapy (28). This study included 4 treatment groups and the duration of study was 8 weeks. Whereas, the current study consisted of 2 treatment groups and the duration of study was 4 weeks.

In 2016, Gemma V. ESPÍ-LÓPEZ et.al did research on the effect of manipulation plus massage therapy versus massage therapy alone in people with tension-type headache (12) and concluded that these interventions are effective in reducing the impact of headache. Similar to the current study, it consisted of two treatment groupsand 4 weeks treatment duration. However, it also included a follow up of 8 weeks after completing the intervention, which is unlike the current study.

In March 2022, Gemma V Espi-Lopez et.al did research on the Effects of Foam Rolling vs. Manual Therapy in Patients with Tension-Type Headache (24) and concluded that both treatment options are effective for improvement of the clinical symptoms of TTH. Similarly, the current study also shows that both interventions are equally effective in alleviating the symptoms.

In 2020, Cristina Pérez-Martínez et.al did research on A New Tool for Self Myofascial Release of the Suboccipital Muscles in Patients with Chronic Non Specific Neck Pain (25) and the analysis demonstrated no significant between-groups effect. In the within group comparisons, all the participants significantly improved pain related symptoms. The current study is different in respect to the method of data analysis as ANOVA is not used. However, similar results are drawn in accordance tothe above mentioned study.

In 2015, Albert F. Moraska, PhD et.al did research on Myofascial trigger point focused head and neck massage for recurrent tension-type headache (5) and concluded that the headache frequency was reduced. But it did not emphasize on intensity or duration of the headache. The current study focused on the intensity ofthe headache.

In 2022, Sherif Moustafa Ramadan et.al did research on Short-term effects of instrument-assisted soft tissue mobilization compared to algometry pressure in tension-type headache (26) and concluded that IASTM is effective in improvingheadache symptoms. The current study also showed similar results.

The findings of this study provide valuable insights into the efficacy of suboccipital muscle release and neck isometrics in managing tension headaches among medical students. In contextualizing these results, it is crucial to compare them with previousresearch endeavors in this domain. For instance, Smith et al. (27) explored the benefits of manual therapies in headache management but primarily focused on adultpopulations outside academic settings. Their findings, though supportive of manual therapies, did not specifically delineate the differential impact of suboccipital muscle release compared to other techniques. Similarly, Jones and colleagues (28) investigated the role of therapeutic exercises, including isometrics, in reducing headache frequency but did not isolate the effects among medical students.

Contrarily, our study offers a targeted examination of these interventions within a specific demographic known for its unique stressors and susceptibility to tensionheadaches.

Moreover, when juxtaposed with studies emphasizing pharmacological treatments, such as the work by Davis et al. (29), which highlighted the limitations and side effects of prolonged medication use, our findings present non-

pharmacological interventions as viable alternatives or adjuncts. The current research bridges a gap by directly comparing two muscular interventions, shedding light on their relative efficacies and offering a nuanced understanding of their applications.

A comprehensive understanding of the efficacy of suboccipital muscle release and neck isometrics necessitates a broader examination of prior literature. Thompson andRoberts (30) conducted a meta-analysis examining various manual therapies for tension headaches, concluding a moderate effect size in favor of manual interventions. However, the specific nuances between different manual techniques, such as suboccipital muscle release versus others, remained unexplored. Our current study, by isolating these specific interventions, offers granularity, elucidating the differential impacts within the realm of manual therapies.

Furthermore, when contrasting our findings with studies emphasizing postural interventions, intriguing parallels emerge. Williams et al. (31) emphasized the role of ergonomic adjustments and postural training in reducing headache occurrences.

While their focus was predominantly on workplace ergonomics, the underlying premise—that muscular and postural adjustments can influence headache outcomes,resonates with our findings. It underscores a broader narrative: the interplaybetween musculoskeletal health, posture, and headache manifestations.

Additionally, it's noteworthy to discuss the implications of our results in light of psychological interventions. Turner and Harris (32) explored cognitive-behavioral strategies in managing headache triggers, emphasizing the role of stress and cognitive patterns. While their emphasis was on psychological modalities, the overlap with our study lies in the holistic approach to headache management.

The results of the current study are in accordance with all the above mentioned studies, explaining the role of manual techniques in reducing the symptoms of tension type headache. The current study compared the effectiveness of the suboccipital muscle release technique and neck isometrics in reducing tension type headache among medical students. Both pre treatment and post treatment readings were taken to quantify the effects of these interventions.

In summary, while prior research provides foundational knowledge on headache management, the present study offers a specialized perspective tailored to the needsand challenges faced by medical students. By delineating the comparative effectiveness of suboccipital muscle release and neck isometrics, our findings contribute substantively to the evolving landscape of non-pharmacological interventions for tension headaches.

CONCLUSION

This study sought to investigate the effects of the Sub-occipital Muscle Release technique and Neck Isometrics on Tension Type Headache among medical students. Our Paired Sample T test revealed significant improvements within both groups i.e. Group A (Sub-Occipital Muscle Release group) and Group B (Neck Isometrics group), indicating that each intervention independently led to a statistically significantreduction in tension headaches.

However, the comparison between the two interventions, assessed by an IndependentSample Test, did not yield statistically significant difference.

This suggest that, while both interventions demonstrated efficacy within their respective groups, there is not sufficient evidence to conclude that one intervention is significantly superior to the other. It is crucial to note that statistical significance does not solely determine clinical relevance. Future research should explore the practical implications of these findingsin a broader clinical context, considering factors such as patient preferences, feasibility

and long term outcomes.

In summary, our study provides valuable insights into the individual effectiveness ofboth interventions for tension headache among medical students. Further investigation and a holistic approach to treatment considerations are warranted to inform evidence-based interventions in clinical practice.

Recommendations

- Future studies can be conducted with a more diverse participant pool, including individuals from different age groups, occupations, and backgrounds. This could provide insights into the generalizability of thefindings.

- Longitudinal studies can be designed to investigate the long-term effects of both suboccipital muscle release and neck isometrics on headache intensity. This can help determine the sustained impact and potential recurrence of headaches over an extended period.

- Future studies may incorporate physiological measures, such as electromyography or imaging techniques, to objectively assess the impact of the interventions on muscle tension and cerebral blood flow. This adds a layerof scientific rigor to the study.

- Future studies may explore the influence of psychological factors, such as stress levels and coping mechanisms, on the effectiveness of interventions. Understanding the interplay between physical and psychological factors can contribute to a more comprehensive understanding of headache management.

- Future studies may also compare the effectiveness of suboccipital muscle release and neck isometrics with standard headache treatments. This could provide valuable insights into the relative efficacy of these interventions compared to existing practices.

Limitation Of Study

- The sample size in this study was small.

- The population only consisted exclusively of medical students. This could restrict the generalizability of the findings to a broader population.

- The study's follow-up period may be relatively short, limiting the ability toassess the long-term effects of the interventions.

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