

# Effectiveness of Dry Needling Therapy Versus Upper Cervical Spine Mobilization Technique on Pain, Neck Disability in Subject with Cervicogenic Headache among Young Population

(Comparing Dry Needle Therapy & Upper Cervical Spine Mobilization Technique for Cervicogenic Headache)

Meenakshi B.<sup>1</sup>; Ramana K.<sup>2</sup>; Dr. Ramana. K.<sup>3\*</sup>

<sup>1</sup>Under Graduate Student, <sup>2,3</sup>Assistant Professor,

<sup>3</sup>MPT (Ortho), COMT, CDNT, (Ph.D).

<sup>1,2,3</sup>Saveetha College of Physiotherapy, SIMATS, Chennai, Tamil Nadu, India.

Corresponding Author: Dr. Ramana. K.<sup>3\*</sup>

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## Abstract:

### ➤ *Background:*

Cervicogenic headache is a chronic, unilateral neck pain originating from bony structures or neck soft tissues, often accompanied by restricted neck range of motion. Anesthetic blockades help alleviate discomfort and limit neck motion. Dry needling therapy is a therapeutic method using sterile filiform needles to trigger points in the skin, reducing pain and enhancing musculoskeletal performance. It encourages the body's innate repair ability and blood flow, reducing discomfort. Upper cervical spine mobilization technique is a manual therapy used to upper cervical spine, treating ailments like vertigo, headaches, whiplash injuries, and neck pain. The aim of the study is to know the Effectiveness of dry needling therapy versus upper cervical spine mobilization technique on pain, disability and neck function in individual with cervicogenic headache among young population.

### ➤ *Methods:*

30 cervicogenic headache subjects were selected based on the inclusion and exclusion criteria. Neck disability index (NDI) is used identify pain, head and neck function and Range of motion is used measure the cervical spine range of motion. The subjects were divided into dry needling group (15 Subjects) and mobilization Group (15 Subjects). Dry needling group were treated with Dry needling therapy and mobilization Group treated with upper cervical spine mobilization.

### ➤ *Outcome Measures:*

Neck disability index, Neck ROM.

### ➤ *Result:*

Pre and post-test values were analysed and result suggested that Dry needling group have significant improvement than upper cervical spine mobilization group with p value <0.0001.

### ➤ *Conclusion:*

It is suggested that Dry needling therapy can be more effective for reducing the pain and improve cervical spine mobility.

**Keywords:** Cervicogenic Headache, Dry Needling, Upper Cervical Spine Mobilization, NDI and ROM.

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## I. INTRODUCTION

Cervicogenic headache (CGH) is characterized by unilateral neck pain that originates in the bony structures or neck's soft tissues. A type of headache known as cervicogenic headache is one that develops in the cervical spine or neck. The pain and suffering that radiates to the head are caused by problems with the neck's joints, discs, or muscles (1). There may be neck discomfort, stiffness, or restriction in movement along with the pain, which can be felt in the front, back, or side of the head. Poor posture, repetitive neck motions, and neck traumas are common causes of cervicogenic headaches. (2)

One of the more prevalent types of headache, CEH may represent between 0.4 and 15% of all headache cases as well as between 15 and 20% of all chronic and recurrent headaches. Women have reportedly been diagnosed four times more often than men, yet evidence on the disparity in prevalence between the sexes is mixed. Patients who have experienced whiplash or a concussion with accompanying neck discomfort and movement restrictions may also develop CEH(3) intervertebral discs and their associated tissues and bones of the body elements, typically but not always, as well as the bony components of the cervical vertebrae. According to several reports, the prevalence of CEH associated with neck discomfort ranges from 0.1% to 4.1%. On the other hand, there is no evidence of the prior occurrence of this kind of headache. prevalence in China of CEH. The authors' clinical hospital data is the basis for the higher incidence ages indicated by falling incidence. The most popular forms of treatment for pain are typically non invasive therapeutic approaches (pharmacological physical activity, manual manipulation, radiofrequency, acupuncture, anesthesia, etc.) and treatment strategies. To treat CEH, the cervical facet joint was occluded. But it's still unclear how the C2 nerve's coagulation works.(14)

Biopsychosocial elements (i.e., biological, social, and psychological components) may be among the major contributing variables to CGH, despite its idiopathic origin. Biological variables include things like one's physical condition, hard work habits with bad biomechanics (such forward head posture), heavy lifting, degenerative disc problems, and traffic accidents. Psychological aspects include things like anxiety, sleep problems, and life satisfaction. Social elements include things like family dynamics and social contacts. (2)

A variety of CGH therapy approaches, including spine manipulation, massage, stretching, dry needling, spinal mobilization, and more, have been documented in prior

literature. Many side effects can occur from drugs used to treat headaches, and invasive therapies are challenging to perform since they need for a high level of expertise. When it comes to mild to moderate severity, non-pharmacological methods are highly effective in managing CGH. From our selection of physiotherapy treatments, these three interventions spinal mobilization, postural correction exercises for muscular deficits, and neural mobilization for neural tissue mechanosensitivity are the sources of discomfort experienced by CGH patients to address articular impairment. Therefore, in the current study, physiotherapy therapies for controlling symptoms of CGH include spinal mobilization and dry needling(20)

Dry needling is a therapeutic method that penetrates the skin with filiform needles to activate trigger points or muscles beneath. It is mostly employed to reduce pain and enhance musculoskeletal performance. To relieve pain and muscular tension, healthcare providers employ dry needling as a therapeutic treatment. Thin needles are used to target "trigger points" in the body's afflicted regions. These needles encourage the body's innate ability to repair itself while also enhancing blood flow to the area, which can help reduce discomfort and tension.(21)

For the treatment of myofascial pain disorders, dry needling is a skillful technique that is commonly used by physical therapists, doctors, chiropractors, and acupuncturists. This method involves penetrating the skin, subcutaneous tissues, muscle, and fascia with a small, sterile needle in order to deactivate TrPs without the need for anesthesia. The fine needle is taken out after a TrP is deactivated [ . It is a low-risk, effective method that is simple to learn and execute. For dry needling to be effective, Hong recommended that local twitch responses be generated; the timing of application would depend on how irritable the TrP .Dry needling may not alter every component of central sensitization, but it is likely to enhance range of motion, decrease referred and local pain, alter TrPs' metabolic milieu, and improve muscle blood flow, oxygenation, and activation patterns. (26)

Upper cervical spine mobilization technique is a type of manual therapy performed by chiropractors and physical therapists to loosen stiff and painful joints in the upper cervical spine. This method involves reducing muscle tension and enhancing joint mobility by gently oscillating or maintaining pressure on the upper cervical vertebrae. It is frequently used to treat ailments like vertigo, headaches, whiplash injuries, and neck pain.

A numerical pain rating scale was used to determine the average headache intensity (NPRS). The frequency of headaches was calculated by counting the days with headaches throughout the previous week. In Iran, related-disability was measured using the Neck Disability Index (NDI), which has been translated and validated into Persian. The NDI showed strong construct validity and reliability in CGH patients (27). Ten items make up the NDI, a self-report assessment with scores ranging from 0 (no disability) to 5 (complete disability). The sum of the numerical responses for each item results in a total score that might vary from 0 to 50 points. The scores are to be interpreted as follows: 0–4 denotes no, 5–14 mild, 15–24 moderate, 25–34 severe, and 34 more very severe. (28)

Active cervical range of motion (CROM) was measured in the flexion, extension, left, and right rotation directions using a universal goniometer. This tool for CROM assessment has excellent intra- and interrater reliability. In this study, we will find the effectiveness of Dry needling therapy and Upper cervical spine mobilization technique young population with cervicogenic headache (29)

## II. MATERIALS AND METHODS

This study recruited 100 participants diagnosed with shoulder impingement syndrome. In that 40 participants were not met inclusion and exclusion criteria. During intervention period 30 participants were withdrawn due to their personal reasons. The remaining participants diagnosed with cervicogenic headache, meeting the specified inclusion and exclusion criteria were recruited. After description of the study goals, assessment and intervention, the patients signed the informed consent form and entered into the study. The participants diagnosed with similar conditions were split evenly into two groups: Finally, 30 subjects were recruited. Those individuals were divided into two groups (dry needling group  $n=15$  and mobilization group  $n=15$ ) by convenient sampling method and each group consist of 15 participants. The selected samples were underwent measurement of Neck disability index (NDI), Range of motion. Both groups participated in a structured treatment program lasting for six weeks. Ethical clearance was obtained from institutional scientific review board with the number of 01/016/2023/ISRB/SR/SCPT.

30 participants diagnosed with Cervicogenic headache, meeting the specified inclusion and exclusion criteria were recruited. The inclusion criteria consisted of participants diagnosed with cervicogenic headache, gender – both male and female, Age - 18 to 30 years, Flexion rotation test positive, Neck disability index score between 14-25. The exclusion criteria Bilateral headache, Migraine features such as nausea, vomiting, and photophobia, Sudden onset headache, Headache associated with autonomic symptoms such as tearing, redness of the Eye, or drooping of the eyelid. Neurological symptoms such as weakness, numbness, or tingling in the face Or limbs, Severe headache that significantly impairs daily activities or requires bed rest, trauma.

## III. INTERVENTION

### ➤ Dry Needling Therapy: Sternocleidomastoid Muscle

- **Materials Required:** sterile filiform needles (0.25 × 25 mm), glove, couch, sanitizer. Patient
- **Position:** The patient was supine position or prone position.
- **Procedure:** patient's neck was slightly bent to the ipsilateral side, and the therapist found the active TrPs in the affected muscle. The protocol was followed and standard single-use sterile filiform needles (0.25 × 25 mm) were utilized with the help of insertion tubes. As soon as the carotid artery was identified, the pincer palpation technique was used to needle both the clavicular and sternal heads. To divide the neurovascular systems from the muscle bellies, the needle was inserted anteriorly and posteriorly. To lessen the severity and length of pain, eight to ten fast needle insertions were made deeply into the skin over the trigger points. Immediately following the needle removal, a cotton swab was used to apply compression to the needling site for ninety seconds. It was used three times, separated by 48 hours.

### ➤ Trapezius Muscle: Upper Portion

- **Materials Required:** sterile filiform needles (0.25 × 25 mm), glove, couch, sanitizer. Patient
- **Position:** Needling Technique The patient is in prone or side-laying.
- **Procedure:** The pincer palpation is used to pierce the muscle. The needle is inserted so that it is pointed toward the practitioner's finger and perpendicular to the skin. The needle is held in place in the shoulder between the fingers. It is possible to put the needle anteriorly to posteriorly or posteriorly to anteriorly. Preferred Pain From the posterior-lateral area of the neck, it extends ipsilaterally behind the ear and into the temporal region. Innervation Pneumothoraxes caused by foreign objects entering the lung are the most frequent severe side effects. Needling that is focused on the practitioner's finger and that is done only between the fingers of the pincer grip reduces this.

### ➤ Upper Cervical Spine Mobilization Technique

- **Patient Evaluation:** Assess the patient's condition thoroughly to determine the appropriateness of mobilization techniques.
- **Informed Consent:** Explain the procedure and obtain the patient's consent.
- **Procedure Steps:**
  - **Patient Positioning:** The patient typically lies on their back on a treatment table or sits comfortably in a chair.

- **Stabilization:** The practitioner stabilizes the patient's head with one hand, usually under the patient's occiput (the base of the skull).
- **Contact Point:** The practitioner uses their other hand to make contact with the specific vertebra or joint that needs mobilization. This may involve precise finger placement or the use of certain tools or techniques based on the practitioner's training.
- **Mobilization Technique:** The practitioner applies gentle, controlled forces or rhythmic movements to the targeted joint or vertebra.
- **Feedback:** Throughout the process, the practitioner communicates with the patient, asking for feedback about any discomfort or changes in symptoms.

#### ➤ *Outcome Measures*

##### • *Neck Disability Index (NDI) :*

The Neck Disability Index (NDI) can be used to assess functional limitations and disability associated with cervicogenic headaches. Cervicogenic headaches are headaches that arise from disorders of the neck, such as arthritis, disc degeneration, or muscle tension. The NDI contains ten items that assess the severity of neck pain, headache, and associated symptoms such as dizziness, numbness, or tingling in the arms or hands. The questions focus on activities of daily living, such as taking care of personal hygiene, performing household chores, and engaging in leisure activities. Using the NDI with cervicogenic headaches involves assessing the degree of disability and functional impairment related to neck pain that may be contributing to or causing the headaches. The scale can be used to monitor the progress of interventions aimed at improving neck and headache symptoms

- ✓ 0-4points no disability,
- ✓ 5-14points mild disability,
- ✓ 15-24points moderate disability,
- ✓ 25-34points severe disability,
- ✓ 35-50points (70-100%) complete disability.

#### ➤ *Range of Motion (ROM)*

Range of motion (ROM) is a method of measuring the degree of movement that a joint is capable of. It is a common outcome measure for conditions such as cervicogenic headache, which is a headache that originates from the neck. The ROM can be measured for the cervical spine, which refers to the seven vertebrae that make up the neck. To measure the range of motion in the cervical spine for individuals with cervicogenic headaches, a goniometer may be used to assess specific movements such as flexion, extension

#### ➤ *Statistical Analysis*

The collected data underwent analysis and examination. Mean and standard deviation were employed for each parameter. The statistical significance of differences between

pre-test and post-test measures was assessed using both the Paired t-test and Unpaired t-test.

## IV. RESULTS

When compared to the pre-assessment, the post assessment shows that there is a significant decrease in head pain and increase in quality of life using NDI and ROM scales. The statistical mean value for NDI of Dry needling group pre intervention was  $25.07 \pm$  and standard deviation was  $4.27 \pm$  post intervention value was  $12.33 \pm$  and  $2.72 \pm$ . Hence the post intervention mean value shows higher significant value than the pre intervention. The statistical mean value for NDI of Mobilization group pre intervention was  $25.20 \pm$  and standard deviation was  $4.31 \pm$  and post intervention value was  $18.33 \pm$  and  $3.87 \pm$ . Hence the post intervention mean value shows higher significant value than the pre intervention. The statistical mean value for ROM of Dry needling group pre intervention was  $22.27 \pm$  and standard deviation was  $4.86 \pm$  post intervention value was  $40.00 \pm$  and  $2.55 \pm$ . Hence the post intervention mean value shows higher significant value than the pre intervention. The statistical mean value for ROM of Mobilization group pre intervention was  $23.67$  and standard deviation was  $4.05 \pm$  and post intervention value was  $30.00 \pm$  and  $4.38 \pm$ . Hence the post intervention mean value shows higher significant value than the pre intervention. The paired t-test and unpaired t-test was used to statistically analyze the values. In Dry needling group the post mean value of NDI and ROM is  $12.33 \pm$  and  $40.00 \pm$  whereas in Mobilization group it is  $18.33 \pm$  and  $30.00 \pm$ .

## V. DISCUSSION

The goal of the present study is to compare the Effectiveness of dry needling therapy and upper cervical spine mobilization technique to reduce pain and neck disability and also to assess the effectiveness in terms of reducing pain and disability. The results were measure using the ROM and the Neck disability index questionnaire before and after the treatment. Beneficial effect were significantly greater in Dry needling Group (Dry needling therapy) than Mobilization Group (Upper cervical spine mobilization technique). when the response were compared between both groups, the result showed a significant difference in Dry needling therapy than the Upper cervical spine mobilization technique.

An early study by Seyedeh Roghayeh Mousavi-Khatir et al (2022) concluded that A mixture of peripheral and central effects, such as a decrease in nociceptive peripheral drive (the TrP), a modification of the spinal effect in the dorsal horn, and an activation of central inhibitory pain pathways, are proposes as the neurophysiological processes of DN. These processes would account for the decrease in headache severity seen in CGH patients who added DN to a physical therapy regimen.

An early study by Zahra Mohammadi et al. (2021) concluded that the efficacy of one session of MTrP DN into SCM in patients with CGH, whereas earlier research examined



the efficacy of applying DN into same patients' suboccipital and upper trapezius muscles. Our study's findings are consistent with other research, demonstrating that treating individuals with CGH who have active MTrPs in their SCM muscle is beneficial since this muscle is involved.

An early study by James Dunning et al. (2021) concluded that dry needling and spine manipulation are effective treatments for CH patients. The results show that a mean of seven sessions of thrust spinal manipulation and electrical dry needling, using a semi standardized intramuscular and perineural electrical dry needling protocol targeting the suboccipital muscles, greater and lesser occipital nerves of the upper cervical spine, the posterior occiput myofascial, the supraorbital muscles, and the ophthalmic branch of the trigeminal nerve within the oculofrontotemporal region, resulted in greater improvements in headache intensity, disability, frequency, duration, and medication intake. For four weeks, the classes were held once or twice a week.

An early study by Asefeh Sedighi et al. (2017) concluded that As a measure of headache frequency and intensity, as well as active CROM, functional rating index, and trigger point discomfort, DN had favourable effects on the headache index. Compared to the SDN group, the DDN group experienced larger improvements.

An early study by Addison Lerner-Lentz et al. (2021) concluded that the outcomes of mobilization versus manipulation for patients with cervicogenic headaches using a practically applied strategy. The current study's findings show that during the study period and during the follow-up, both groups saw improvements in their levels of pain and function. But there were no variations in disability, pain, headache effect, or cervical range of motion between the groups. As a result, dry needling therapy has found more significant than upper cervical spine mobilization technique in cervicogenic headache to reduce pain and to Increase range of motion

## VI. CONCLUSION

In conclusion, this study suggests that Dry needling therapy showed a more significant effect on individuals with Cervicogenic headache than the upper cervical spine mobilization technique . Dry needling therapy exhibited a notable impact on pain, cervical mobility compared to the Upper cervical spine mobilization.

## ETHICAL APPROVAL

All the procedures performed in the study were in accordance with the ethical standards of the institutions. The study was approved by the Institutional Scientific review board Number: 01/ 016/ 2023/ ISRB/ SR/ SCPT

## CONSENT TO PARTICIPATE AND PUBLISH

Written informed consent was taken from all participants. The authors affirm that human research participants provided informed consent for publications.

- **Fundings:** This study is a self-funded study

## AUTHOR'S CONTRIBUTIONS

MB and RK conceived of the presented idea. MB developed the theory and performed the computations. RK verified the analytical methods. RK encouraged MB to investigate [about shoulder impingement syndrome] and supervised the findings of this work. Authors discussed the results and contributed to the final manuscript.

MB and RK carried out the experiment. MB wrote the manuscript with support from RK.

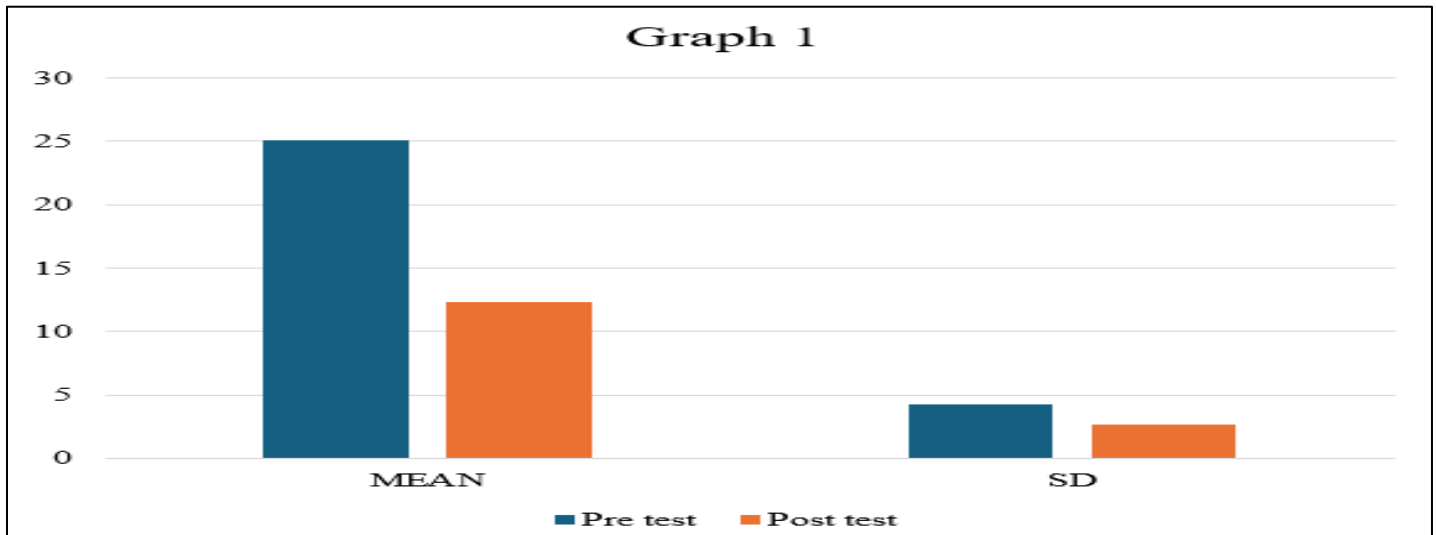
## CONFLICT OF INTREST

The authors declare that they have no competing interests.

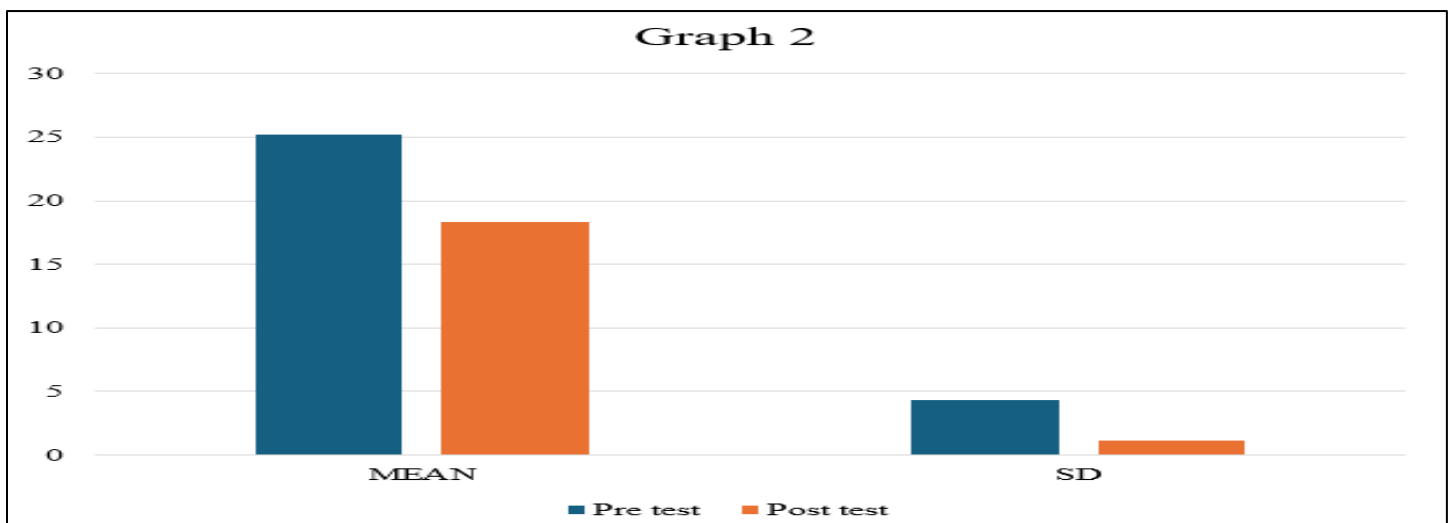
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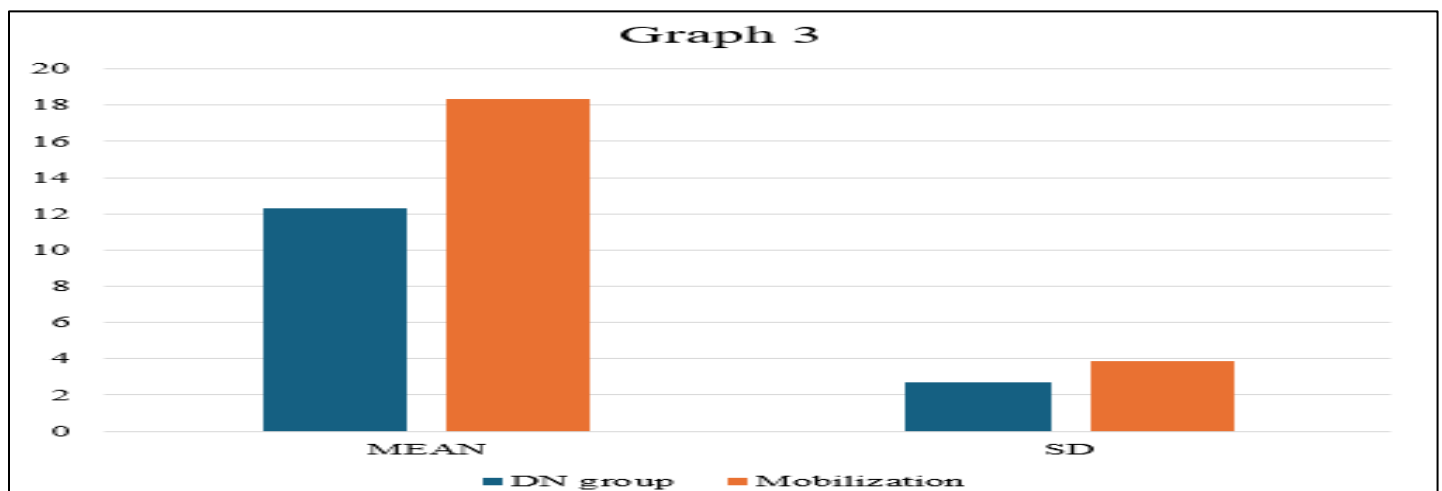
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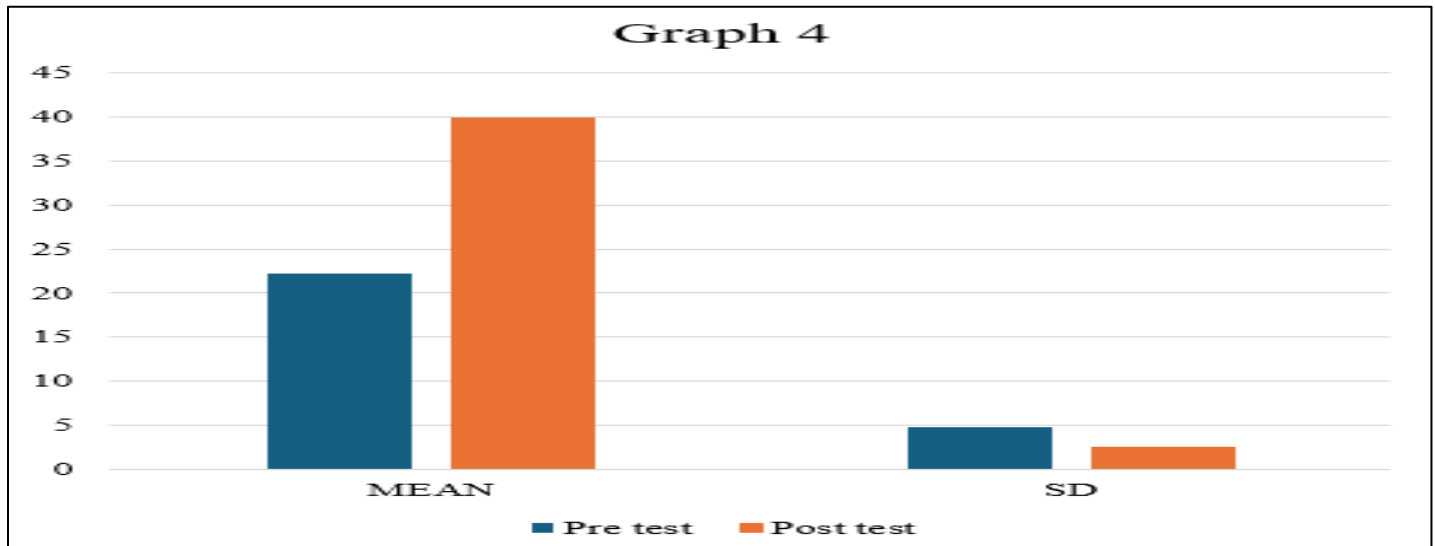
Graph 1: Comparison of Pre and Post Value of Dry Needling Group Using Neck Disability Index by Paired T- Test



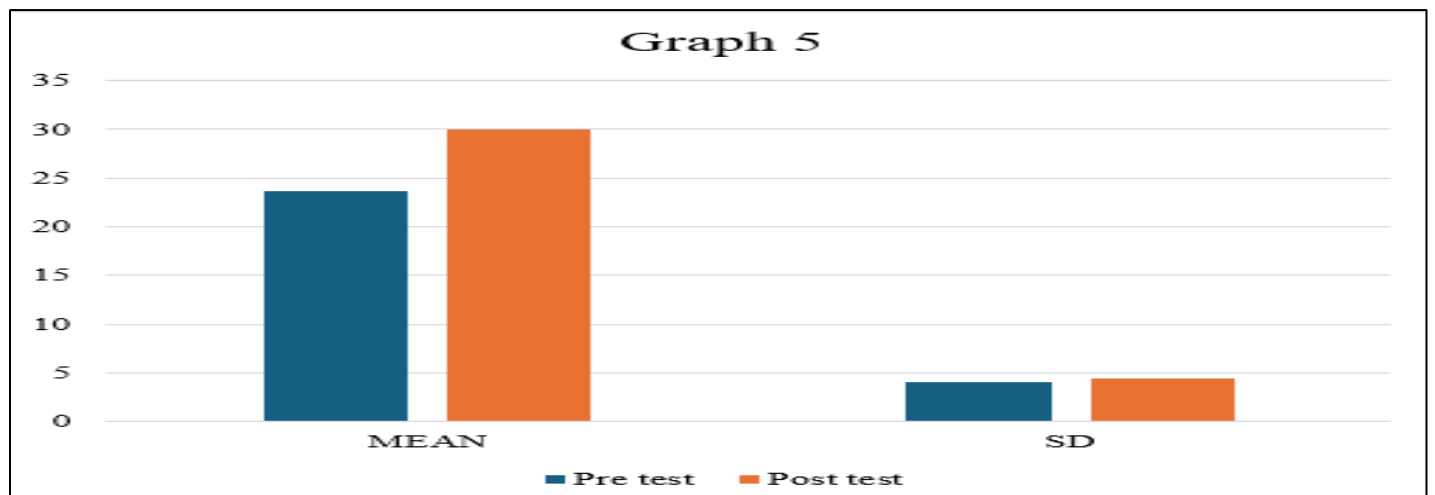
Graph 2: Comparison of Pre and Post Value of Mobilization Group Using Neck Disability Index by Paired T-Test



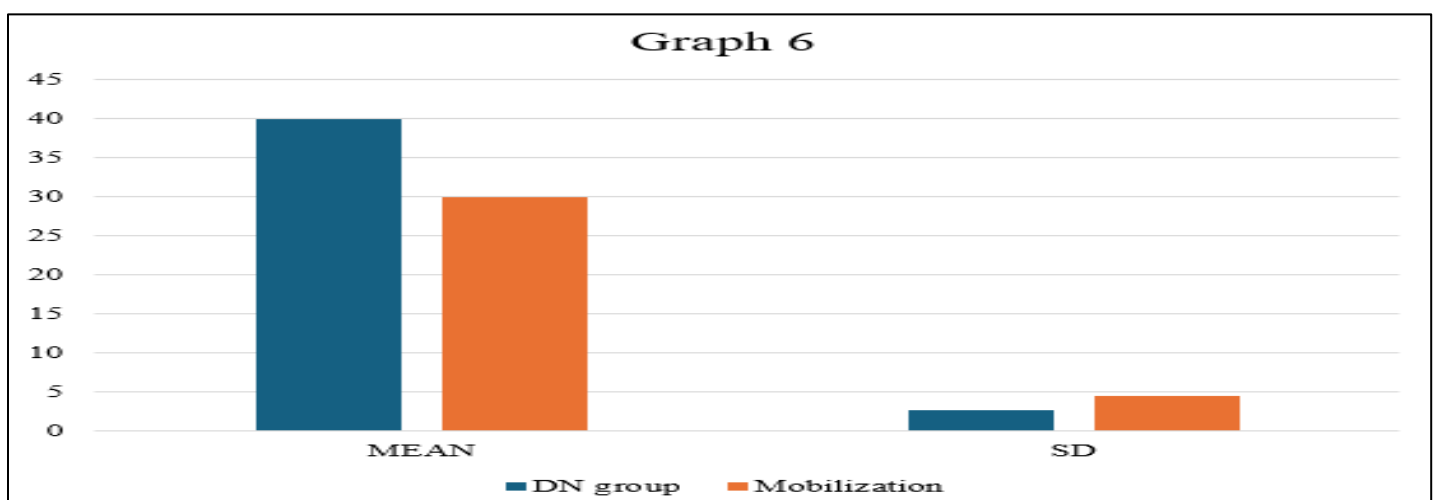
Graph 3: Comparison of Post Value of Dry Needling (Dn) Group and Mobilization Group Using Neck Disability Index By Unpaired T Test



Graph 4: Comparison of Pre and Post Value of Dry Needling Group Using Rom by Paired T-Test



Graph 5: Comparison of Pre and Post Value of Mobilization Group Using Rom by Paired T-Test



Graph 6: Comparison of Post Value Dry Needling Group and Mobilization Group Using Rom by Unpaired T Test