P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (RJIF): 5.93
IJPESH 2025; 12(5): 25-28

https://www.kheljournal.com
Received: 13-06-2025
Accepted: 19-07-2025

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Effectiveness of muscle energy technique versus ischemic compression on the upper trapezius muscle with mechanical neck pain

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Abstract
Mechanical neck pain, commonly caused by poor posture during prolonged sitting and forward head positioning, significantly impacts daily activities and quality of life, especially among undergraduate students. This study investigates the effectiveness of two manual therapy techniques—Muscle Energy Technique and Ischemic Compression—targeting the upper trapezius muscle, a frequent site of tension and discomfort. Thirty individuals with mechanical neck pain were randomly assigned to two treatment groups and assessed using standardized tools to measure pain and functional disability before and after the intervention. Both treatments led to improvements; however, Ischemic Compression showed greater effectiveness in reducing pain intensity and enhancing functional outcomes. The study concludes that Ischemic Compression is a more effective intervention than Muscle Energy Technique for managing upper trapezius-related mechanical neck pain.

Keywords: Energy Technique (MET), Ischemic Compression (IC), Numerical Pain Rating Scale (NPRS), Neck Disability Index (NDI). Mechanical neck pain

1. Introduction
Neck pain is a widespread and discomforting musculoskeletal condition affecting individuals globally, often without a clear pathological cause and is thus termed non-specific or mechanical in nature [1]. It represents a significant public health issue and a leading source of disability across populations [2], limiting active participation in daily activities [3]. Although neck pain can result from inflammation, degeneration, trauma, tumors, or systemic diseases, the majority of cases arise from mechanical causes such as poor posture [4], especially with prolonged forward head posture during reading or computer use [6]. Mechanical neck pain (MNP), stemming from musculoskeletal components like muscles, ligaments, discs, and joints, typically worsens with movement or sustained posture and is often associated with upper trapezius muscle strain [5].
Prevalence rates suggest that 45–54% of the general population experience mechanical neck pain at some point in life, with a higher occurrence in undergraduate students due to sedentary habits and improper ergonomics [6]. The upper trapezius muscle is a frequent site for myofascial trigger points (MTrPs), which cause local and referred pain, impairing function and quality of life [7]. Two common interventions for MTrPs are the Muscle Energy Technique (MET) and Ischemic Compression (IC). MET is a form of soft tissue manipulation where the patient contracts the muscle against resistance to reduce tension and pain [8]. In contrast, IC involves applying sustained manual pressure to trigger points, enhancing blood flow and reducing muscle tightness [8].
To evaluate treatment outcomes, the Numerical Pain Rating Scale (NPRS) and Neck Disability Index (NDI) were used for both pre- and post-intervention assessments.

2. Materials and Methodology
2.1 Materials
- Consent form
- Pen
- Assessment chart

- Couch and plinth
- Chair
- Numerical Pain Rating Scale (NPRS)
- Neck Disability Index (NDI)

2.2 Methodology

2.3 Study Design

- Comparative study design

2.4 Study Setting

- Conducted at the Department of Physiotherapy, Sri Ramakrishna Hospital, Coimbatore, under staff supervision.

2.5 Sample Size

- 30 participants (15 in each group), aged between 18–25 years.

2.6 Sampling Method

Participants with mechanical neck pain were selected and randomly assigned to:

- **Group A:** Muscle Energy Technique (MET)
- **Group B:** Ischemic Compression (IC)

2.7 Study Duration

- Total study duration: 6 months

2.8 Treatment Duration

- 2 weeks, with treatment on alternate days (7 sessions total), each lasting 20 minutes.

2.9 Selection Criteria

Inclusion Criteria

- Age between 18–25 years
- Both genders
- Idiopathic neck pain
- NPRS value ≥ 4

Exclusion Criteria

- History of cervical spine trauma/fracture
- Post-operative cervical pain
- Malignancy
- Cervical rib, spondylosis, or disc syndrome
- Vertebrobasilar insufficiency
- Brachial neuralgia
- Infections (e.g., tuberculosis)
- Inflammatory conditions (e.g., rheumatoid arthritis)

2.10 Variables

Independent Variables

- Muscle Energy Technique (Group A)
- Ischemic Compression (Group B)

Dependent Variables

- Numerical Pain Rating Scale (NPRS)
- Neck Disability Index (NDI)

2.11 Treatment Techniques

Group A – Muscle Energy Technique (MET)

a. MET involves patient-initiated isometric or isotonic contractions against therapist resistance to stretch and relax muscles.

b. Stretching methods include:

- Post-isometric relaxation
- Proprioceptive Neuromuscular Facilitation
- Active isolated stretching
- Yoga-based and ballistic stretching

General Protocol

- Warm-up before stretching
- Hold stretches for 30–60 seconds
- Avoid pain, numbness, or tingling
- Maintain focus throughout the stretch

Specific Techniques

1. **Neck Flexors**
- Supine position
- Patient lifts head, therapist provides resistance on forehead

2. **Neck Extensors**
- Prone position with head off the table
- Therapist resists head extension from the occipital area

3. **Combined Cervical Flexion**
- Supine position
- Patient brings chin to chest, therapist applies resistance

4. **Combined Cervical Extension**
- Prone position
- Patient lifts head and looks up, therapist offers resistance

5. **Cervical Rotation**
- Supine/sitting with neutral neck position
- Patient rotates head side-to-side, therapist resists motion

Group B – Ischemic Compression (IC)

Patient Position

- Supine on the couch, head supported, arms in slight abduction.

Therapist Position

- Standing at the head of the couch.

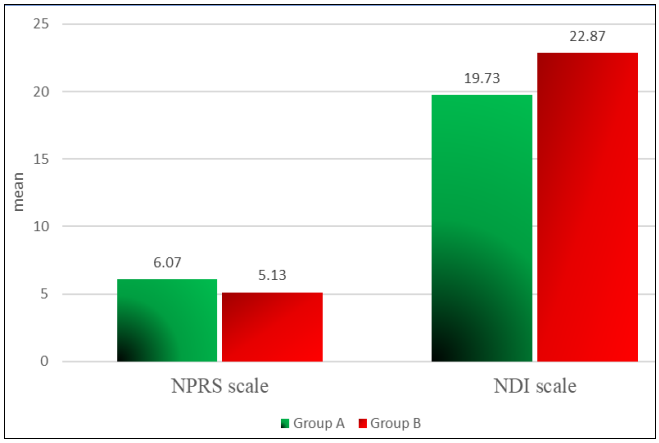
Technique

- Therapist uses a pincer grasp to palpate the upper trapezius for active trigger points (commonly 1–2 inches medial to the acromion).
- Applies gradually increasing pressure on the trigger point using the thumb.
- Patient may feel referred pain in a "question mark" pattern (neck, side of head, behind the eye).
- Pressure is held for 20 seconds to 1 minute or until the muscle relaxes.
- Followed by effleurage and passive stretch to flush and relax the muscle.

3.Result

Pre-test and post-test values of the study were collected and assessed for variations in improvement and their results were analyzed using independent t test and parried t test. The statically analysis of the study showed that there is a significant difference between the groups in NPRS scale and NDI scale with a t value of NPRS scale and NDI scale was 2.048.

Comparison of results



4. Discussion

This study compared the effectiveness of Muscle Energy Technique (MET) and Ischemic Compression (IC) in managing mechanical neck pain (MNP) among individuals aged 18–25 years. Both interventions significantly reduced pain and improved functional disability, as measured by the Numerical Pain Rating Scale (NPRS) and Neck Disability Index (NDI). While both groups showed notable within-group improvements, the IC group demonstrated superior outcomes. Group B (IC) had a greater reduction in NPRS scores (mean difference 1.40) compared to Group A (MET) (mean difference 1.26), and also showed lower post-treatment pain levels. Similarly, in terms of functional improvement, Group B showed a slightly higher reduction in NDI scores than Group A, with statistically significant differences in post-treatment scores between the groups. These findings suggest that Ischemic Compression is more effective than Muscle Energy Technique in reducing pain and disability associated with mechanical neck pain.

5. Conclusion

The conclusion of this study is based on the post mean measure of Numerical Pain Rating Scale and neck disability Index of both group A and group B and concluded that there is a significant improving the functional mobility and reducing the neck pain in group B, in comparison with the patients in group A.

As per data analysis and interpretation, null hypothesis (H0) is rejected and the alternate hypothesis (H1) is accepted which states that There is significant improvement on Ischemic Compression (Group B) than muscle energy technique (Group A) on upper trapezius muscle with mechanical neck pain.

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