

RESEARCH PAPER

“Comparative Study on the Effectiveness of Manual Therapy Techniques Combined with Laser Therapy in the Management of Trapezitis among College Students”

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Abstract

Objective: Trapezitis is an inflammatory condition affecting the trapezius muscle, leading to pain that worsens with movement and may persist at rest. It is a common musculoskeletal disorder associated with poor posture and repetitive neck movements. This study compared the effects of manual therapy techniques—Positional Release Technique (PRT) and Muscle Energy Technique (MET)—in combination with low-level laser therapy (LLLT) for the management of trapezitis in college students.

Materials and Methods: A single-blinded randomized experimental study was conducted on forty participants aged 18–25 diagnosed with trapezitis. Participants were randomly divided into two groups: Group A (PRT + LLLT) and Group B (MET + LLLT), both treated for four weeks. Outcome measures included the Visual Analogue Scale (VAS) and Neck Disability Index (NDI).

Results: Both groups demonstrated significant improvement post-treatment ($p \leq 0.05$). However, Group B (MET + LLLT) showed superior results with greater reductions in pain and disability compared to Group A.

Conclusion: The combination of MET and low-level laser therapy was more effective than PRT with laser therapy in reducing pain and improving cervical range of motion in trapezitis among college students.

Keywords: Trapezitis, Muscle Energy Technique, Positional Release Technique, Low-Level Laser Therapy, Neck Disability Index, Visual Analogue Scale

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INTRODUCTION:

Present even at rest, trapezitis is explained as inflammatory processes of the Trapezius muscle creating stress pain, also classified as neck stiffness or tightness encircling the neck or shoulder; it is worse by movement.[1] One should start with Usually, patients express discomfort that hinders their everyday living's activities. Three to five days is pain's duration.[2]Trapezitis generally results from forward head position, repeated motions, poor back support while sitting, working devoid of arm support, extended forward bending activity.[3] Pain and shielding spasm in the opponent groups of muscle may cause a limited and unpleasant passive range of motion. Those who drive for more extended periods of time or those who work at computers are more likely to have this disorder. Women in middle

age have the greatest frequency; they are more impacted than men.[4]The scapula is raised, depressed, rotated, and retracted using trapezius muscle.[5]Large superficial back muscles with trapezoidal form are the trapezius muscles. From the outside protuberance of the anterior bone to the shorter thoracic spine vertebra and subsequently laterally to the spinal column of the scapula. The Trapezius consists of the the higher the middle; and lower sets of fibers.[6]It causes extreme neck spasm by inflammatory pain. It starts at the rear of the the head and runs from C7 to T2 vertebral bodies on the spine. Its attachments are to the spine of the shoulder border, the acromion process, and the outside portion of the collarbone. Along with from the accessory nerve, it obtains nerve signals from the C1 via C4 cervical nerve roots. The prevalent issue

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in the general population is neck discomfort, which has frequency between 10% and 15%. [7] Studies with average point prevalence of 13% (range 5.9%-38.7%) and average lifetime incidence of 50% (range 14.2% - 71.0%) show very diverse rates of neck discomfort. [8] Bad ergonomic practices such extended limited work posture with constant head and neck along with spine flexion might point to a risk factor. [9] The lifetime frequency of mechanical neck discomfort in the general global population is between 30 and 50%. [10]. Once the trapezitis is identified, there are many treatment choices available including pharmacological ones include non-steroidal anti-inflammatory in character and pain-modulating ones. Treatments include stretching, myofascial release techniques, posture and MET approaches in electrotherapy. [11,12] Aiming for maladaptive changes in trapezitis patients, present studies concentrate on reducing pain, improving The range, and decreasing functional impairment a treatment choice offers. [13] One hand method applied to a positional release represents a technique which restored a certain muscle to its original resting tone. While muscle in the skeletal system is kept in a shortened state for an extended length of time. It brings adaptive shortening and finally results in spasm.

This technique inserts extremely concentrated muscle and lengthens fibres approaching the place of initiation. This position lessens the quantity of offensive impulses that reach the brain, therefore preventing the muscle spasms' activation. By use of this path, the patient's muscle releases and adopts a normal resting tone. The technique slowly and passively brings the person affected to a readily position of neutrality with no firing of the skeletal muscle spindle, thereby producing the expected result. [14] The Positional Release technique (PRT) is a soft Tissue technique also known as Stress Counter Strain (SCS), which includes recovering Muscle tone and enhancing circulation in a light manual treatment for Muscle soreness and spasm. This method first identifies the active TPs then applies pressure till a Nociceptive reaction arises. The region is then positioned so that the stress in the afflicted muscle is lowered, therefore lowering the TP's discomfort. The stressed tissues are perceived as most relaxed and a local drop of tone occurs when the point of ease/pain decrease is reached. [15] Muscle energy methods (MET) include the insertion of an isometric stretch to the target muscle. Using the Golgi tendon organs, post isometric relaxation is produced under autogenic inhibition. [16] MET may help to lower pain, extending tight muscle groups and fascia, lower muscular tonus, increase local circulatory system, strengthen weak muscles and mobilise joint limitations. [17] This method aims to cure Hypomobile joint (stiffness) and provide the joints appropriate biomechanical and physiological function. In a muscle, MET lets one attain a tonus

release sooner than stretching. The stressed tissues become most relaxed after they attain either comfortable or painlessness, which reduces the local tone. Besides in mobility of restricted joints, and relief of highly concentrated and spastic muscles, MET is used in neuromuscular reconfiguration. Patients whose problems are exacerbated by certain posture or body position will find this appropriate approach. [18] The area is then set up so that the Trapezius suffers less damage by lowering the amount of pressure in the affected muscle. Originally labelled as muscle energy methods, precisely targeted and regulated tender tissue osteopathic (first) manipulation procedures combine. Laser therapy reduces pain and inflammation as well as stimulates tissue healing. Often known as cold-frequency laser therapy, low intensity laser treatment reduces oedema and inflammation, generates analgesia, and advances recovery. Laser irradiation removes waste products, stimulates collagen production, alters DNA synthesis, heals injured neurological tissues, and enhances circulation of blood and oxygen supply in trigger point sites. Ten items comprise NDI: pain intensity, personal cleanliness, lifting, sleeping, driving, leisure, headaches, focus, learning, and employment. The overall score is 0 (no activity restrictions) to 5 (severe activity limits) with six different answers in each of the 10 questions. [19]

MATERIALS AND METHODS

Study Design and Setting

The present study was conducted in the Outpatient Department (OPD) of Physiotherapy at Subharti Medical College and Hospital. The research design was experimental in nature, employing a simple random sampling method for the selection and allocation of participants.

Study Population

A total of 40 participants were included in the study. All participants were within the age group of 18 to 25 years. Selection of subjects was carried out based on predefined inclusion and exclusion criteria.

Inclusion Criteria

Participants were included in the study if they met the following criteria:

- Age between 18 and 25 years
- Diagnosed with trapezitis, confirmed by a physician
- Willing to participate and provided informed consent

Exclusion Criteria

Participants were excluded from the study if they had any of the following conditions:

- Cervical spine lesions associated with trapezitis
- Fibromyalgia disorder with trapezitis

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- Systemic illnesses with trapezitis
- Cervical disc herniation with trapezitis
- Recent upper limb surgery
- Skin infections or dermatological conditions
- Shoulder inflammation associated with trapezitis
- Tuberculosis of the shoulder with trapezitis
- Cervical spondylosis with trapezitis

Procedure

All participants were provided with a detailed explanation of the study protocol prior to the commencement of the study. Written informed consent was obtained from each participant using an ethics committee-approved consent form.

A total of 40 participants were randomly allocated into two groups, with 20 participants in each group:

- **Group A:** Participants received laser therapy along with the positional release technique.
- **Group B:** Participants received laser therapy in combination with the muscle energy technique.

The intervention was carried out over a period of four weeks.

Outcome measures were assessed for all participants before (pre-intervention) and after (post-intervention) the treatment period to evaluate the effectiveness of the interventions.

Intervention

Group A: Laser Therapy Combined with Positional Release Technique (PRT)

The participant was positioned in a relaxed supine lying position. The therapist stood on the affected side. Tender points were identified along the upper fibers of the trapezius muscle.

The therapist applied gentle pressure over the tender point using the index and middle fingers. The participant's head was then passively moved into lateral flexion towards the side of the tender point. Simultaneously, the shoulder on the affected side was abducted to approximately 90°. Fine adjustments, including slight flexion or extension, were made to achieve a position of maximal comfort (position of ease).

This position was maintained for **90 seconds**. Following this, the body part was slowly and passively returned to the neutral anatomical position. The entire procedure was performed carefully to avoid discomfort.

Laser Therapy

After the positional release technique, the participant was seated comfortably while the therapist stood on the affected side.

Laser therapy was applied over the identified tender area with the following parameters:

- **Frequency:** 10 Hz
- **Dosage:** 7 J/cm²
- **Area covered:** 1 cm²

- **Duration:** 4 minutes per session

The treatment was administered **4 days per week for 4 consecutive weeks**.

Appropriate safety precautions were taken throughout the procedure to prevent exposure of the eyes to laser radiation.

Group B: Muscle Energy Technique (MET) Combined with Laser Therapy

Muscle Energy Technique (MET)

The participant was positioned in a supine lying position. The head was flexed, rotated *ϋ*ϋϋϋ the contralateral side, and side-bent away from the affected trapezius to place the muscle in a stretched position.

The therapist stabilized the participant's head with one hand while placing the other hand over the affected shoulder. The participant was instructed to gently elevate the shoulder toward the ear against the therapist's resistance. An equal counterforce was applied by the therapist to create an isometric contraction.

- **Contraction duration:** 10 seconds
- **Relaxation phase:** Participant was instructed to relax completely
- After relaxation, the therapist moved the muscle to a new barrier (increased stretch)
- This procedure was repeated **5 times per session**

Laser Therapy

Following the muscle energy technique, the participant was seated comfortably, and the therapist stood on the affected side.

Laser therapy was applied over the tender area with the following parameters:

- **Frequency:** 10 Hz
- **Dosage:** 7 J/cm²
- **Area covered:** 1 cm²
- **Duration:** 4 minutes per session

The treatment was administered **4 days per week for 4 consecutive weeks**.

All necessary safety precautions were taken to prevent exposure of the eyes to laser radiation.

Outcome Measures

The effectiveness of the interventions was evaluated using the following outcome measures:

- **Visual Analogue Scale (VAS)** for pain assessment
- **Neck Disability Index (NDI)** for functional disability assessment

Assessments were conducted before (pre-intervention) and after (post-intervention) the treatment period.

Ethical Considerations

Ethical approval for the study was obtained from the Institutional Ethical Board in March 2023 (Approval No.: B-24/PHYSIO/IRB/2022-2023).

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All participants provided written informed consent prior to participation. Confidentiality of participant data was strictly maintained, and the collected data were used solely for research purposes.

C. Results and Discussion

Both descriptive and inferential statistical methods were used for the analysis and tabulation of the collected data. All statistical analyses were performed using standard statistical software. A **95% confidence interval** was applied for all analyses, and the level of statistical significance was set at **p < 0.05**.

The normality of the data was assessed using the **Shapiro–Wilk test**. The results indicated that the

data were normally distributed for the dependent variables:

- **Visual Analogue Scale (VAS):** p = 0.381
- **Neck Disability Index (NDI):** p = 0.414

Since the p-values were greater than 0.05, the data followed a normal distribution, and therefore, **parametric tests** were applied for further analysis.

- The **paired t-test** was used to determine the statistical significance of differences **within each group** (pre- and post-intervention).
- The **unpaired t-test (Student’s t-test)** was used to compare the statistical differences **between Group A and Group B**.

Table:1 Visual Analogues Scale Score Comparison between Groups prior to and After Test

TEST	A GROUP		B GROUP		t - TEST	df	SIG
	Average mean	S.D	Average mean	S.D			
BEFORE TEST	5.65	1.08	5.60	.882	.159	38	.874*
AFTER TEST	2.95	.887	1.75	.716	4.70	38	.001**

Although the B group – Muscle Energy Method with Laser Therapy indicates 1.75 ±.716, which has the lower mean value, Table 1 explains the comparison of Pre test and Post test within Group A and the B group in Visual Analogue Scale & Neck Disability Index (NDI) Score indicates significant difference in the mean values at P ≤ 0.05. The null assumption is therefore disproved

Table:2 Comparison of Neck Disability Index Score between Groups In before and after Test

TEST	A GROUP		B GROUP		t - TEST	df	SIG
	Average mean	S.D	Average mean	S.D			
BEFORE TEST	56.10	4.82	56.35	3.31	-.191	38	.849*
AFTER TEST	42.25	3.89	27.95	3.79	11.81	38	.003**

Table 2 explains the comparison of the Mean Values of Group A & Group B on Neck Disability Index (NDI) Score, When comparing the mean after test results for both Group A and the second group on the cervical spine Disability Index (NDI) Score indicates a significant decrease in the two groups yet (referred to as Group B, on the other – Muscle Energy Method with Laser Therapy) indicates 27.95 ± 3.79 which has the lesser average value and is more efficient than (Group A, which used Positional Release A method with Laser Therapy) at P ≤ 0.05, 42.25 ± 3.89. The null assumption is thereby disproved

Table:3 Comparison of Visual Analogue Scale Score within Groups before Pre and after Test

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GROUPS	BEFORE TEST		AFER TEST		t - TEST	SIG
	Average mean	S.D	Average mean	S.D		
A GROUP	5.65	1.08	2.95	.887	21.13	.000**
B GROUP	5.60	.882	1.75	.716	29.32	.000**

Table 3 explains the Comparison of Visual Analogue Scale Score within Group-A and GROUP-B In Pre and Post Test, The mean values at $P < 0.05$ demonstrate significant variation between Before test and after test within the first group and the second group upon Visual Analogue Scale as well as The cervical region Disability Index (NDI).

Table:4 Comparison of Neck Disability Index Score Within Group-A and GROUP-B In Pre and Post Test

GROUPS	BEFORE TEST		AFTER TEST		t - TEST	SIG
	Average mean	S.D	Average mean	S.D		
A GROUP	56.10	4.82	42.25	3.89	21.85	.000**
B GROUP	56.35	3.31	27.95	3.79	24.12	.000**

Table 4 reveals the comparison of Neck Disability Index Score Within Group-A and GROUP-B In Pre and Post Test .There is a statistically significant difference between the pre test and post test values within Group A and Group B at $P \leq 0.05$

DISCUSSION:

Trapezius is functionally significant for daily tasks. As the Trapezius muscle works in various directions, the amount of stress or looseness dictates the neck flexibility. Faulty ergonomics which are maintained for extended periods of time leading to muscular imbalance causes Trapezitis. [20]
 Physiological process in METS include variations in visco-elasticity, modifications to muscle extensibility, and stretch tolerance variation. First changing the skeletal muscle spindle and then hindering muscular contractions by activating the Golgi tendon organ helps METS mostly reduce the muscle spasms or tightness of the muscles. Post isometric relaxation is this phenomena. (21)
 Eliminating limiting restrictions of mobility in the body is the advantage of PRT (position release treatment) method of MET (muscle energy technique). Reducing preventive muscle tightness,

fascial trigger place, joint, low mobility, discomfort, swelling, and strengthening of circulation and strength help to achieve this. (22)
 Thomas E,et.al(2019) in the study named The efficacy of muscle energyTechniques in symptomatic and Asymptomatic subjects: proves the effect of muscle energt technique as Useful as pain relievers and to hasten the repair of damaged tissues is laser treatment. Faster wound healing, less muscular tension, greater flexibility of the neck region, pain and inflammation relief all depend on laser treatment's circulation of blood to the afflicted region. Therapeutic worth of Laser's ability to cause subsequent tissue regeneration, soft tissue repair, and stimulation of protein synthesis. The group that had laser treatment had significantly lower NDI results. Laser treatment's beneficial effects also help to relieve pain by means of neural blockage of the sympathetic nervous system along with triggering

neuromuscular contractions therefore reducing muscle spasms. Within hours to days, local oedema decreases and inflammation is reduced. [23].

Published by V.N. Ravish et al. in 2014, to assess the efficacy of myofascial release method vs positional release technique with laser in Patients with unilateral trapezitis. At the end he found that the two groups had greatly enhanced range of motion, functional mobility, and pain reduction. When the two groups' subjects are compared, nevertheless, MRT with LASER shows greater improvements than PRT with LASER. [24] Effectiveness on Chronic Trapezitis of Myofascial Technique and Muscle Energy Technique. Aneri Jhaveri et al. released it in 2018. She has determined that for participants with chronic trapezitis, Muscle Energy Technique proved to have much more additional impact than Myofascial Release Method in alleviating pain, cervical impairment and cervical motions. [25] Effect of Combining Therapies on Muscle Tenderness and Neck Pain in Male Patients with Activated Myofascial Trigger Points of Upper Trapezius. Published in 2020 by Ahmad H. Alghadir et al., it suggests that MET with ICT reduces neck discomfort and muscular soreness in males with the higher trapezius active MTrP more effectively than MET alone. [26] In patients with persistent upper trapezitis, a research comparing the benefits of Muscle Energy method and positional release method on pain and neck ROM. Published in 2019 by Saloni Thaker et al., it finds that Muscle Energy Technique (MET) is a good choice for treating persistent upper trapezitis. [27] Management of shoulder rotator cuff muscles injury: comparison of laser and ultrasound therapy. Published by Shahiduz Zafaret al., Concluded in 2017 that both ultrasonic therapy and laser treatment is helpful modalities for improving the degrees of shoulder movements and decreasing the SPADI disability ratings among the patients with grade 1 and 2 rotator cuff injuries. In these criteria, LASER improves them more than ultrasonic treatment. [28] Effect on pain and quality of life in individuals with mechanically discomfort in the neck with static stretching and muscle energy approach. Published in 2016, Apoorva Phadke et al. found that Muscle energy method improved pain and functional impairment in individuals with mechanical neck pain more than stretching technique. [29] The Statistical research revealed that both groups A and B had improved Visual analogue scale (VAS) and The cervical region disability index (NDI). When both the Groups are evaluated at the end of 4 weeks, participants in Group B who had Laser treatment with Muscle energy method exhibited greater Improvement in VAS & NDI than those in Group A who underwent Laser therapy with Positional release technique. Pre-intervention mean of Visual analogue scale (VAS) in Group A was 5.65 after treatment of the participants with Positional release

technique (PRT) combined with Laser therapy; the mean value of Visual analogue scale (VAS) improved to 2.95 at the end of four weeks.

Pre-intervention mean of Neck disability index (NDI) towards afflicted Side was 56.10 and improved to 42.25 at the end of four weeks. Which, inside the group, had statistical relevance? Pre-intervention mean of Visual analogue scale (VAS) in Group B was 5.60; after treating the participants with Muscle energy method (MET) together with Laser treatment, the mean value of Visual analogue scale (VAS) changed to 1.75 at the end of four weeks. Neck disability index (NDI) towards afflicted Side had a pre-intervention mean of 56.35 and changed to 27.95 at the end of four weeks. This displayed statistical relevance inside the group. Although Muscle Energy method (Group B) indicates 1.75, a lower mean value than Positional release method 2.95, the post-test mean values of Group A and Group B on VAS in terms of pain intensity demonstrate a substantial reduction. Although Muscle Energy Technique (Group B) shows 27.95 degrees, a mean value more successful than Positional release technique (Group A), the post test mean values of Group A and Group B on the Neck Disability Scale (NDI) afflicted side indicate a notable rise. displays 42.25.

Conclusion

The results of the present study demonstrate that both intervention groups showed statistically significant improvements in post-test outcomes. However, **Group B**, which received **Muscle Energy Technique (MET) combined with laser therapy**, exhibited greater improvement in cervical range of motion and pain reduction in individuals with trapezitis.

Therefore, it can be concluded that **Muscle Energy Technique in combination with laser therapy is more effective** in reducing pain and enhancing cervical mobility compared to **Positional Release Technique combined with laser therapy**.

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