



ORIGINAL ARTICLE

COMPARISON OF THE EFFECTIVENESS OF MANUAL THERAPY V/S TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION IN PATIENTS WITH TRAPEZIUS MYALGIA

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ABSTRACT

Background Trapezius myalgia, marked by neck-shoulder pain and trigger points in the upper trapezius, is common among individuals engaged in repetitive or static work and those under psychological stress. This study compares the effects of manual therapy and transcutaneous electrical nerve stimulation (TENS) in patients with trapezius myalgia. **Methods:** A randomized clinical trial was used with 30 patients who were diagnosed with trapezius pain and stiffness and met the inclusion criteria. Patients were equally divided in 2 groups. First group underwent manual therapy comprising techniques like myofascial release (MFR) and ischemic compression (IC) and the second group underwent transcutaneous electrical nerve stimulation (TENS) and it was followed with both groups being administered with passive stretching of the upper trapezius and moist heat pack. The treatment consisted of 20 sessions over a period 4 weeks. Numerical Pain Rating Scale (NPRS) and range of motion (ROM) scores were evaluated on the first and tenth days of therapy. **Results:** Statistically significant reduction in pain levels and an increase in neck ROM in both groups. The manual therapy group showed a t-value of 10, which was higher than the critical t-value of 1.761, confirming a meaningful reduction in pain. The TENS group showed a t-value of 5.57, also exceeding the critical t-value of 1.761. The independent t-test showed a computed t-value of 5.89, which exceeded the critical t-value of 1.701. **Conclusion** The study found improvements in pain and mobility in both groups with trapezius myalgia following treatment. However, the group receiving manual therapy, including MFR and IC showed more significant results compared to the TENS group. Therefore, manual therapy is recommended for better pain reduction and mobility improvement in patients with trapezius myalgia.

Keywords: Trapezius myalgia, Myofascial release, Ischemic compression, Numerical pain rating scale

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INTRODUCTION

Musculoskeletal disorders (MSDs) are among the leading causes of chronic pain and functional impairment globally, with neck and shoulder pain being especially prevalent in sedentary and physically demanding occupations¹. One of the most common and under diagnosed causes of neck-shoulder pain is trapezius myalgia, a regional pain syndrome involving the upper trapezius muscle, which plays a critical role in cervical spine posture, scapular elevation, and upper limb mechanics².

Trapezius myalgia typically presents with pain, stiffness, and localized tenderness, often accompanied by myofascial trigger points (MTrPs)—hyperirritable spots within taut bands of muscle that elicit referred pain, motor dysfunction, and autonomic phenomena upon stimulation³. The upper trapezius is especially susceptible due to its postural role and continuous activation during static tasks such as prolonged desk work or mobile device usage⁴.

The etiopathogenesis of trapezius myalgia is multifactorial and includes:

- Sustained low-level muscle contraction leading to reduced local circulation and ischemia;
- Accumulation of sensitizing substances (e.g., bradykinin, substance P, CGRP);
- Dysfunction at the neuromuscular junction;
- Central and peripheral sensitization mechanisms that maintain a chronic pain state.^{5,6}

Electromyographic studies have revealed that affected muscles demonstrate increased resting activity and altered motor unit

recruitment patterns, which further perpetuate pain and dysfunction⁷.

Trapezius myalgia is highly prevalent among office workers, students, factory workers, healthcare professionals, and individuals with high psychosocial stress⁸. Its chronic nature not only reduces work productivity but also impairs quality of life, often leading to secondary headaches, insomnia, and mood disturbances⁹. Despite its common occurrence, management strategies remain varied and inconsistent due to differences in clinical presentation, diagnostic criteria, and therapist expertise¹⁰.

Physiotherapy remains the cornerstone of treatment, offering a wide range of interventions—both manual and electrotherapeutic. However, there is limited consensus on which approach offers superior outcomes for pain relief, trigger point deactivation, and functional restoration.

Manual therapy techniques such as myofascial release (MFR) and ischemic compression (IC) have gained prominence for treating myofascial pain syndromes, including trapezius myalgia.

The myofascial release (MFR) approach is a soft tissue mobilization treatment that aims to stimulate mechanical, neurological, and psychophysiological adaptation as interfaced through the myofascial system. It improves lymphatic drainage and blood circulation while relaxing stiff muscles. Additionally, it restores muscle alignment and modifies the viscoelasticity of connective tissue¹¹.

Ischemia compression—also referred to as trigger point release massage or manual pressure release—is a form of manual therapy. Continuous compression or persistent pressure

applied repeatedly to the trigger site or nearby regions, usually for a duration of 30 to 90 seconds (more precisely 30, 60, or 90 seconds), is what is known as ischemic compression. Local ischemia and further blood reperfusion brought on by this pressure may raise muscle metabolism.¹²

The non-invasive technique known as transcutaneous electrical nerve stimulation (TENS) produces a low-frequency alternating electrical current that blocks spinal cord gates and causes the sensory release of endorphins. Numerous pains and symptoms have been studied and treated with it. Previous research has demonstrated that TENS effectively reduces pain in a range of musculoskeletal conditions, such as neuropathic, low back, arthritic, and postoperative pain. Because TENS may directly block the C-fibers that transmit pain, it is more effective at lowering pain. While high-frequency TENS (80-100Hz) is commonly used to treat acute pain because it stimulates the A-beta fibers, low-frequency TENS (<10Hz) is primarily focused on treating chronic pain¹¹.

While both manual therapy and TENS are supported by literature as effective treatments for myofascial pain, limited research exists directly comparing the combined effect of MFR and IC with TENS for specifically managing trapezius myalgia. Understanding the comparative effectiveness of these two approaches is essential to guide evidence-based clinical decisions, optimize treatment protocols, and personalize therapy based on patient profiles.¹¹

Some studies suggest manual therapy may offer longer-lasting results through mechanical and neuromuscular modulation¹³, while others favor TENS for its ease of application and pain-

relieving capabilities in acute and subacute phases.¹⁴ However, the variability in outcome measures, intervention protocols, and patient populations in prior studies necessitates further investigation through well-designed

This study aims to assess and compare the effects of manual therapy and TENS in patients with trapezius myalgia.

Statement of Question: What is the comparative effectiveness of manual therapy v/s transcutaneous electrical nerve stimulation (TENS) in reducing pain and improving mobility in patients with trapezius myalgia?

Aim of the study was to assess and compare the effects of manual therapy and transcutaneous electrical nerve stimulation (TENS) in patients with trapezius myalgia.

Objectives of the study:

1. To evaluate the reduction in pain intensity following manual therapy in patients with trapezius myalgia.
2. To evaluate the reduction in pain intensity following transcutaneous electrical nerve stimulation (TENS) in patients with trapezius myalgia.
3. To assess and compare improvements in range of motion between both groups.
4. To determine which modality is more effective for short-term and/or long-term management of trapezius myalgia.

METHODOLOGY

Study Design: Study design was a randomized clinical trial, comparative study. The Study Area was Department of Physiotherapy, Northern Railway Central Hospital, Delhi, India.

The study was conducted for a period 6 months.

Inclusion Criteria: Patients of age between 18 to 60 years, Upper trapezius pain persisting for more than one month, Pain rated at least 3 on the numeric pain rating scale (NPRS), Trigger points present on upper trapezius, restricted mobility of the neck.

Exclusion Criteria: Presence of cervical radiculopathy, Neck pain associated with cervical spine injury, History of neck surgery.

Method of selecting subjects: Patients diagnosed with trapezius myalgia by the Orthopedic department of the hospital.

Thirty patients were randomly selected from the population for the study and they were assessed and divided into two groups (group I and II). Group I undergoing myofascial release (MFR) and ischemic compression (IC) and group II undergoing transcutaneous electrical nerve stimulation (TENS).

Sample Size: 30 patients were randomly selected based on the inclusion and exclusion criteria for the study and were divided into two groups (group I and II) each of 15 patients³⁶.

Sample Design: This was a convenient sampling method; simple random sampling.

Instrumentation: TENS unit, Moist heat pack, NPRS scale, Goniometer, Statistical tools-computer

Procedure:

1. Patient preparation and assessment:

All individuals experiencing trapezius pain and clinically diagnosed with trapezius myalgia were screened to determine their eligibility

based on predefined inclusion and exclusion criteria. Those who met the criteria and expressed a willingness to participate were thoroughly informed about the purpose, nature, and procedures of the study, including the intervention they would undergo. The study details were explained in a clear and comprehensible manner to ensure that participants fully understood their involvement.

After providing this information, their written informed consent was obtained to confirm their voluntary participation. Following consent, demographic data such as age, sex, occupation, and residential address were collected.

An initial evaluation was then conducted to assess their pain levels and physical condition. Pain intensity was measured using the Numerical Pain Rating Scale (NPRS), a standardized tool for assessing pain severity. Additionally, the active range of motion (ROM) of the neck joint was evaluated using a goniometer, a device specifically designed to measure joint movement and flexibility. These baseline measurements were recorded to establish a reference point for future comparisons throughout the study.

2. Treatment interventions:

a) Manual therapy (Group I)

Myofascial release therapy (MFR) with deep transverse friction was given. It included the use of techniques such as thumb after thumb pattern, palm's ulnar border, and forearm to glide medially towards the upper scapular region, all of this for 5 minutes. It was followed by ischemic compression (IC) which was given with 90 second pressure on trigger points. This was followed by application of moist heat pack

over upper trapezius for 15 minutes and passive stretching of the upper trapezius. The treatment consisted of 20 sessions over a period of 4 weeks, with sessions conducted five times per week. Each session lasted for 30 minutes.

b) Transcutaneous electrical nerve stimulation (TENS) (Group II)

High frequency transcutaneous electrical nerve stimulation (TENS) of 100Hz was administered with electrodes applied over the trapezius muscle. The participants in this group underwent 10 minutes of application of TENS at intensity tolerated by the patient and capable of inducing upper trapezius muscle contraction. This was followed by application of moist heat pack over upper trapezius for 15 minutes and passive stretching of the upper trapezius. The treatment consisted of 20 sessions over a period of 4 weeks, with sessions conducted five times per week. Each session lasted for 30 minutes.

Data Analysis: The study aims to find and compare the effectiveness of manual therapy and transcutaneous electrical nerve stimulation (TENS) in patients with trapezius myalgia.

The data was analyzed using IBM SPSS version 30, with descriptive statistics used to assess the demographics of the participants. To compare pre- and post-treatment values of pain and ROM within the same group, a paired t-test was used. Additionally, an independent sample t-test was conducted to compare differences between the two groups (I and II). Statistical significance was considered at a 5% probability level ($p \leq 0.05$) with a 95% confidence interval.

RESULT

A total of 30 participants were deemed eligible for statistical analysis based on the inclusion and exclusion criteria. These participants were randomly assigned into two groups: Group I (manual therapy Group) and Group II (TENS Group).

A paired t-test was performed to compare the NPRS scores within each treatment group, revealing a statistically significant reduction in pain levels ($p < 0.05$) for both groups. In the manual therapy group, the one-tailed paired t-test resulted in a t-value of 10, which was significantly higher than the critical t-value of 1.761 ($\alpha = 0.05$, $df = 14$), with a p-value < 0.05 , confirming a meaningful reduction in pain.

Similarly, in the TENS group, the one-tailed paired t-test yielded a t-value of 5.57, also exceeding the critical t-value of 1.761 ($\alpha = 0.05$, $df = 14$), with a p-value < 0.05 , further confirming statistical significance in pain reduction Table 2 and Fig. 2. To compare the improvement in NPRS values between the two groups, an independent t test was conducted.

The results showed a computed t-value of 5.89, which exceeded the critical t-value of 1.701 ($\alpha = 0.05$, $df = 28$), with a p-value of < 0.0001 as shown in Table 3. Since $p < 0.05$, the null hypothesis is rejected, indicating that manual therapy leads to significantly greater pain reduction compared to TENS when both are combined with moist heat pack and stretching exercise.

Groups	Pretreatment (mean \pm S.D.)	Posttreatment (mean \pm S.D.)	Improvement (mean \pm S.D.)	t-value	p-value
Group I- manual therapy	6.2 \pm 1.58	2.07 \pm 1.71	4.13 \pm 1.25	10	p < 0.05
Group II- TENS	6.27 \pm 1.22	4.33 \pm 1.40	1.93 \pm 0.73	5.57	p < 0.05

Table 2: Pain relief (mean improvement in NPRS values) within the two groups

Groups	Improvement Mean	Standard Deviation	Unpaired t-test	p-value
Group I- manual therapy	4.13	1.25	5.89	p < 0.0001
Group II- TENS	1.93	0.73		

Table 3: Pain relief (mean improvement in NPRS values) between the two groups compared

Similarly, a paired t-test was performed to compare the neck ROM for all movement parameters within each treatment group, revealing a statistically significant increase in neck ROM ($p < 0.05$) in both the groups. In both the groups, the one-tailed paired t-test resulted in the higher values of t-tests for each ROM parameters then the critical t-value of 1.761 ($\alpha = 0.05$, $df = 14$), with the p-values < 0.05, confirming the significant increase in neck ROMs as shown in Table 4 and Fig. 4. To

compare the improvements in neck ROMs between the two groups, an independent t test was applied. The test showed the computed t-values of each ROM, that are exceeding the critical t-value of 1.701 ($\alpha = 0.05$, $df = 28$), with a p-values < 0.05 for each ROM as shown in Table 5 and Fig. 5. Since $p < 0.05$, the null hypothesis is rejected, indicating that manual therapy leads to significantly greater reduction in pain levels and increase in neck ROMs than TENS.

Movement parameters	Groups	Pretreatment (mean \pm S.D.)	Posttreatment (mean \pm S.D.)	Improvement (mean \pm S.D.)	t-value	p-value
Flexion	Group I-manual therapy	45.67 \pm 5.41	50.6 \pm 4.34	7.67 \pm 2.96	2.75	p<0.05
	Group II-TENS	45.73 \pm 5.38	53.87 \pm 4.34	4.80 \pm 1.85	4.55	p < 0.05
Extension	Group I-manual therapy	54.8 \pm 6.13	65.8 \pm 5.74	9.73 \pm 4.00	13.03	p < 0.05
	Group II-TENS	58.93 \pm 2.47	64.73 \pm 2.55	5.67 \pm 1.45	16.28	p < 0.05
Lateral flexion (R)	Group I-manual therapy	38.73 \pm 6.06	42.87 \pm 2.67	6.80 \pm 4.51	3.97	p < 0.05
	Group II-TENS	39.53 \pm 4.37	44.00 \pm 4.61	3.40 \pm 1.25	7.04	p < 0.05
Lateral flexion (L)	Group I-manual therapy	35.47 \pm 4.03	42.33 \pm 2.23	6.87 \pm 4.14	10.94	p < 0.05
	Group II-TENS	39.27 \pm 3.87	42.67 \pm 4.66	4.69 \pm 1.57	5.37	p < 0.05
Rotation (R)	Group I-manual therapy	60.60 \pm 5.19	67.47 \pm 4.32	7.13 \pm 3.75	9.71	p < 0.05
	Group II-TENS	59.80 \pm 3.95	64.13 \pm 3.73	4.33 \pm 1.51	7.91	p < 0.05
Rotation (L)	Group I-manual therapy	61.67 \pm 5.04	68.27 \pm 3.70	7.27 \pm 4.11	9.40	p < 0.05
	Group II-TENS	59.27 \pm 3.26	63.67 \pm 3.31	5.00 \pm 2.17	9.47	p < 0.05

Table 4: Improvement in neck ROM within the two groups

Movement parameters	Groups	Improvement Mean	Standard Deviation	Unpaired t-test	p-value
Flexion	Group I-manual therapy	7.67	2.96	3.18	<0.05
	Group II-TENS	4.80	1.85		
Extension	Group I-manual therapy	9.73	4.00	3.69	<0.05
	Group II-TENS	5.67	1.45		
Lateral flexion (R)	Group I-manual therapy	6.80	1.25	2.81	<0.05
	Group II-TENS	3.40	4.51		
Lateral flexion (L)	Group I-manual therapy	6.87	4.14	1.91	<0.05
	Group II-TENS	4.69	1.57		
Rotation (R)	Group I-manual therapy	7.13	3.75	2.68	<0.05
	Group II-TENS	4.33	1.51		
Rotation (L)	Group I-manual therapy	7.27	4.11	1.89	<0.05
	Group II-TENS	5.00	2.17		

Table 5: Improvement in neck ROM between the two groups compared

DISCUSSION

In the general population, neck pain is very common. Neck pain is frequently brought on by chronic trapezius myalgia (CTM)²⁷.

This study aimed to assess and compare the efficacy of TENS and manual therapy for improving function and reducing pain in people

with trapezius myalgia. In order to compare the effects of manual treatment and TENS on pain alleviation and mobility in patients with trapezius myalgia, the main objectives were to investigate the effects of the MFR technique, ischemic compression technique, and high-frequency TENS on these measures.

Thirty subjects, ranging in age from 18 to 60, were included in this. They were split up into two groups at random and given various treatment regimens. Manual therapy, a moist heat pack, and stretching were administered to Group I, while TENS, a moist heat pack, and stretching were administered to Group II.

The results demonstrated that manual therapy was significantly more effective in reducing pain intensity and improving range of motion compared to TENS.

Manual therapy techniques have long been recognized as effective strategies in addressing myofascial pain syndromes. Myofascial release aims to stretch and elongate fascial tissues and reduce tightness caused by fascial restrictions. Ischemic compression, on the other hand, works through sustained pressure applied directly to myofascial trigger points, causing temporary ischemia followed by reactive hyperemia that can result in the inactivation of the trigger point.²⁸

In our study, manual therapy led to significant improvements in pain scores, echoing findings from a study by Ajimsha et al.¹³ (2015), who reported that myofascial release was effective in reducing pain and improving functional capacity in patients with chronic musculoskeletal pain. Similarly, Bron et al.¹⁰ (2011) showed that ischemic compression had a favorable impact on deactivating myofascial trigger points in the upper trapezius muscle, resulting in marked pain relief and enhanced ROM.

The neurophysiological basis of manual therapy's effectiveness can be explained by the gate control theory of pain and descending pain modulation mechanisms. Manual techniques stimulate mechanoreceptors and

proprioceptors, which can inhibit nociceptive input at the spinal cord level Bialosky et al.²⁹ (2009). Additionally, manual therapy has been shown to reduce sympathetic activity and stress responses, which are commonly heightened in patients with chronic myofascial pain.

A clinical trial conducted by Kumari & Sharma.²⁴ (2019) demonstrated that the application of myofascial release combined with ischemic compression significantly reduced pain intensity and disability in patients with upper trapezius trigger points compared to control interventions. These results align with our findings, supporting the view that manual therapy offers both mechanical and neurophysiological benefits in managing trapezius myalgia.

TENS is widely used for symptomatic pain relief in musculoskeletal conditions and functions primarily through two mechanisms: activation of large-diameter A-beta fibers that block nociceptive signals Melzack & Wall³⁰ (1965), and the stimulation of endogenous opioid release Sluka & Walsh³¹ (2003). However, while TENS can be effective for short-term pain relief, its effects are generally transient and may not address the root causes of chronic muscular dysfunction.

Our study supports this perspective, as patients receiving TENS showed less improvement in functional outcomes compared to the manual therapy group. This observation is consistent with a study by Rajfur et al.³² (2017), which showed that TENS resulted in moderate pain reduction in patients with musculoskeletal disorders, but lacked significant improvements in muscle function or mobility compared to hands-on therapies.

Further, Saeed & Alrawi³³ (2020) compared the effects of TENS and MFR in patients with upper trapezius myofascial pain and found that MFR resulted in significantly better outcomes in pressure pain threshold, range of motion, and functional scores. These findings suggest that while TENS can play a role in multimodal pain management, it may not be as effective as manual therapy in addressing the complex nature of myofascial trigger points.

Both groups in this study received moist heat and stretching as adjunctive treatments. Moist heat therapy is known to increase tissue extensibility, enhance blood flow, and reduce muscle spasm, making tissues more responsive to manual techniques or electrotherapy. Stretching exercises complement both modalities by promoting muscle lengthening and improving flexibility Knight et al.³⁴ (2001). Although these adjunctive treatments likely contributed to the overall improvement in symptoms across both groups, the manual therapy group showed superior outcomes, indicating that MFR and IC provide unique benefits beyond heat and stretching. This finding is consistent with the results reported by Nasb et al.³⁵ (2021), where the addition of MFR to a standard physiotherapy regimen led to greater improvements than the addition of TENS.

Clinical relevance:

From a clinical standpoint, the results of this study highlight the importance of incorporating manual therapy into treatment plans for trapezius myalgia. Given the condition's multifactorial origin—postural dysfunction, overuse, stress, and myofascial trigger point development—manual techniques provide a targeted, personalized, and effective intervention. Additionally,

manual therapy may foster better patient-practitioner interaction and engagement in treatment, potentially enhancing placebo responses and adherence.

Manual therapy techniques can be implemented in diverse clinical settings and offer a non-pharmacological alternative to managing chronic musculoskeletal pain. The findings encourage a shift toward more hands-on approaches for conditions characterized by trigger points and fascial tightness.

Limitations:

While this study presents compelling evidence in favor of manual therapy, some limitations should be acknowledged. The sample size, though adequate for initial comparison, was limited, and long-term follow-up was not conducted to assess the durability of treatment effects. Also, psychological and ergonomic factors were not controlled, despite their known contribution to trapezius myalgia.

Scope for future research:

Future research should include larger populations, multiple treatment sessions, and longer-term follow-ups to validate the sustained efficacy of manual therapy. Additionally, exploring the combination of manual therapy with exercise therapy, ergonomic modifications, and stress management could provide a more holistic approach to treatment.

CONCLUSION

The study found improvement in both groups when pain and mobility were assessed in patients with trapezius myalgia following the intervention period, utilizing the NPRS and range of motion scores. However, the group

that underwent manual therapy consisting of MFR and IC showed more significant results than the other group, which underwent TENS. Therefore, the individualized intervention of manual therapy is recommended for reducing pain and improving mobility in patients with trapezius myalgia.

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