



EFFICACY OF MYOFASCIAL RELEASE AND ULTRASOUND IN TRIGGER POINTS OF UPPER TRAPEZIUS MUSCLE ON PAIN, RANGE OF MOTION, DISABILITY AMONG SUBJECTS WITH MECHANICAL NECK PAIN

Physiotherapy

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ABSTRACT

Background: Mechanical neck pain is highly prevalent, affecting 45–54% of the population, and is frequently linked to poor posture, muscle imbalance, and myofascial trigger points in the upper trapezius. These trigger points contribute to localized pain, reduced cervical range of motion (ROM), and functional disability. **Objective:** To evaluate the effectiveness of combined myofascial release (MFR) and therapeutic ultrasound in reducing pain, improving ROM, and decreasing disability in individuals with mechanical neck pain associated with upper trapezius trigger points. **Methods:** Thirty participants (aged 20–45 years) with mechanical neck pain and at least one active trapezius trigger point were recruited through simple random sampling. Interventions consisted of MFR and ultrasound therapy, administered three times weekly for four weeks. Pain (Numerical Pain Rating Scale), cervical ROM (goniometer), and disability (Neck Disability Index) were measured pre- and post-intervention. **Results:** Post-treatment analysis demonstrated significant improvements ($p < 0.05$) in pain reduction, cervical ROM, and functional ability compared with baseline values. **Conclusion:** The combined application of MFR and therapeutic ultrasound is effective in alleviating pain, enhancing cervical mobility, and reducing disability in individuals with mechanical neck pain associated with upper trapezius trigger points.

KEYWORDS

Mechanical Neck Pain, Myofascial Release, Trigger Points, Ultrasound Therapy.

INTRODUCTION

Neck pain is a complex and widespread musculoskeletal condition, increasingly recognized as a major public health problem in the 21st century⁽¹⁾. Epidemiological studies report an annual prevalence ranging from 15% to 50%, with lifetime occurrence affecting nearly half of the population. The Global Burden of Disease 2010 study ranked neck pain as the fourth leading cause of years lived with disability⁽²⁾, underscoring its significant societal impact. Prevalence is consistently higher among females, peaking in middle age, and is frequently associated with comorbidities such as depression, headaches, arthralgia, and low back pain⁽³⁾.

Mechanical neck pain (MNP), often termed non-specific neck pain, is commonly aggravated by poor posture, sustained positions, and repetitive tasks⁽⁴⁾. Kanlayanaphotporn et al. define MNP as pain localized to the posterior neck, intensified by movement or prolonged⁽⁵⁾. Occupation strongly influences incidence: computer users, office workers, healthcare professionals, and drivers show particularly high rates of neck discomfort⁽⁶⁾.

Myofascial trigger points (MTrPs) in the upper trapezius are recognized as a major source of mechanical neck pain. These hypersensitive nodules within taut muscle bands cause localized and referred pain, restricted motion, and functional limitations⁽⁷⁾. Studies suggest that up to 85% of individuals may present with trapezius trigger points, with computer professionals especially vulnerable due to physical deconditioning, psychosocial stress, and poor ergonomics. MTrPs are classified as active or latent, with active points producing spontaneous or pressure-induced pain, while latent points are symptomatic only upon palpation^(7,8).

Conservative treatment options for MTrPs include both invasive (dry needling, injections, acupuncture) and non-invasive (manual therapy, electrotherapy, thermotherapy, ultrasound)⁽⁹⁾. Among manual therapies, myofascial release (MFR) is widely applied to improve tissue mobility and reduce trigger point activity. MFR involves sustained, low-load pressure to fascia and surrounding soft tissue, aiming to restore alignment, reduce spasm, and deactivate trigger points⁽¹⁰⁾.

Therapeutic ultrasound is another commonly employed modality in soft tissue rehabilitation. Through thermal and non-thermal effects, ultrasound enhances tissue healing, collagen synthesis, circulation, and segmental analgesia. It also provides a “micromassage” effect, facilitating fluid exchange and reducing muscular tightness⁽¹¹⁾.

MATERIALS AND METHODOLOGY

Materials Required: Couch, Pillows, Ultrasound, Numerical pain rating scale, Goniometer, Neck disability index, Gel, Cotton.

Study Design and Setting

An experimental study with a one-group pre-post design was conducted at the College of Physiotherapy, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati. Ethical approval was obtained from the Institutional Ethics Committee (IEC No. 1778). The study duration was four weeks.

Participants

Thirty participants (aged 20–45 years) with mechanical neck pain localized to the upper trapezius and at least one active trigger point were recruited from the outpatient department using simple random sampling. Inclusion criteria were pain intensity of 3–4 on the Numerical Pain Rating Scale (NPRS) and willingness to participate. Exclusion criteria included history of neck/shoulder surgery or trauma within six months, skin infections, neurological, cardiac, or metabolic disorders, fibromyalgia, inflammatory arthritis, and prior physiotherapy in the past three months. Written informed consent was obtained from all participants.

Intervention

Participants received combined myofascial release (MFR) and therapeutic ultrasound, three sessions per week for four weeks.

- **Myofascial Release:** Performed in prone lying, targeting the upper trapezius with sustained, low-load manual pressure along taut bands and trigger points until tissue release was achieved.
- **Ultrasound Therapy:** Applied in prone lying over the trigger point area using continuous mode at 3 MHz frequency, 1.5 W/cm² intensity, for 8 minutes.



Fig:1 Application of Myofascial Release Technique.

Outcome Measures

- Pain Intensity:** Assessed with NPRS (0–10 scale), which has established reliability (ICC = 0.76).
- Cervical Range of Motion (ROM):** Measured with a universal goniometer in flexion, extension, lateral flexion, and rotation, following standardized procedures. Reported intra- and inter-rater reliability for goniometry in cervical ROM is high (ICC 0.71–0.99).
- Functional Disability:** Evaluated with the Neck Disability Index (NDI), a 10-item self-report questionnaire (score range 0–50), with excellent reliability (ICC = 0.88).

Procedure

Baseline (pre-test) measurements were recorded for all outcomes prior to the intervention. After four weeks of treatment, the same outcomes were reassessed (post-test).

RESULTS

Results showed that there exists a statistically significant improvements in all outcome measures.(P≤0.01).

Table:1 Shows the Statistical Analysis Done by Paired T- Test.

Paired sample Statistics						
		Mean	N	Std. Deviation	t-value	p value
Pair 1	PAIN(NPRS) PRE-TEST	7.17	30	1.29	25.000	0.000
	PAIN(NPRS) POST-TEST	3.00	30	0.95		
Pair 2	FLEXION PRE-TEST	34.50	30	7.23	14.253	0.000
	FLEXION POST-TEST	43.33	30	6.61		
Pair 3	EXTENSION PRE-TEST	36.17	30	9.44	17.069	0.000
	EXTENSION POST-TEST	48.17	30	7.71		
Pair 4	LAT-FLEXION RIGHT PRE-TEST	30.83	30	6.58	13.260	0.000
	LAT- FLEXION RIGHT POST-TEST	39.33	30	5.53		
Pair 5	LAT-FLEXION LEFT PRE-TEST	31.17	30	7.03	12.577	0.000
	LAT-FLEXION LEFT POST-TEST	41.17	30	5.03		
Pair 6	ROTATION RIGHT PRE-TEST	41.67	30	11.17	23.127	0.000
	ROTATION RIGHT POST-TEST	56.83	30	12.21		
Pair 7	ROTATION LEFT PRE-TEST	41.67	30	13.73	12.970	0.000
	ROTATION LEFT POST-TEST	53.50	30	11.76		

Pair 8	FUNCTIONAL ACTIVITIES (NECK DISABILITY INDEX) PRE TEST	28.13	30	2.60	32.631	0.000
	FUNCTIONAL ACTIVITIES (NECK DISABILITY INDEX) POST TEST	13.50	30	2.99		



Graph:1 Represents the Pre and Post Test Scores of Variables.

DISCUSSION

The present study aimed to evaluate the efficacy of myofascial release (MFR) combined with ultrasound therapy in the management of upper trapezius trigger points among subjects with mechanical neck pain. Thirty participants were selected based on inclusion and exclusion criteria, randomized into a single experimental group, and treated with MFR and ultrasound for four weeks. Pre and post-treatment comparisons demonstrated significant improvements in pain, range of motion (ROM), and functional ability measured by the Neck Disability Index (NDI).

Epidemiological evidence shows that neck pain is highly prevalent and more common in women than men, with a substantial global burden of disability in a study by Kazeminasab et al., 2022; Maham Gull et al.(2021) also highlighted that nearly 73% of university students reported some degree of mechanical neck pain. This burden of disability emphasizes the importance of effective interventions.

Myofascial trigger points, especially in the upper trapezius muscle, are recognized as a primary source of pain in mechanical neck pain (Lavelle et al., 2011; Hayden et al., 2010). Lavelle and colleagues reported that the upper trapezius is among the most frequently affected muscles due to its role in posture maintenance. Pain associated with myofascial trigger points is often accompanied by weakness and restricted ROM, further impairing daily function.

Previous studies have established the role of MFR in reducing pain and improving mobility. Guo et al. (2023) and Cabrera-Martos et al. (2020) demonstrated that MFR significantly reduces pain and disability in chronic mechanical neck pain. Pawaria et al. reported MFR to be more effective than stretching in decreasing pain and disability in trapezius trigger points. Manheim et al. and Kostopoulos & Rizopoulos explained that MFR reduces fascial restriction, enhances blood flow, and promotes reflex muscle relaxation, thereby improving ROM.

Ultrasound therapy has also been validated as an effective treatment modality. Kavadar et al. (2018) conducted a placebo-controlled study and observed significant pain reduction with ultrasound. Liu et al. (2019) confirmed these findings in a meta-analysis, showing ultrasound improves muscle function in myofascial pain syndrome (MPS). Majlesi&Ünalán (2011) reported that high-power, pain-threshold ultrasound produced significant reductions in pain and improvements in ROM.

When applied together, MFR and ultrasound appear to have complementary effects. Aker et al. (2020) conducted a randomized controlled trial evaluating the combination of MFR and ultrasound in mechanical neck pain and reported superior outcomes compared to either modality alone. This supports the hypothesis that ultrasound enhances tissue extensibility and blood flow, thereby augmenting the effects of MFR.

The present study's findings are consistent with this body of evidence.

The observed improvements in pain reduction, ROM, and NDI scores reinforce that the combination of MFR and ultrasound therapy is an effective intervention for upper trapezius trigger points. Moreover, given its non-invasive nature and favorable outcomes, this approach may be considered a viable clinical option for patients with mechanical neck pain.

CONCLUSION

This study states that MNP is due to stress and strain on cervical musculature and associated trigger points which causes pain, reduced range of motion and functional activities.

According to the present results, the study concluded that the myofascial release along with ultrasound therapy are effective in reducing pain, improving range of motion and functional activities in mechanical neck pain individuals associated with trigger points of upper trapezius muscle.

Limitations

Sample size and duration is small.
There was no long term follow-up.
There is a lack of control group.

RECOMMENDATIONS

A larger sample size could be used in future studies to enhance the reliability and Generalizability of the findings.

Future research may benefit from extending the duration of the treatment protocol to better Assess long-term effects and also on comparing different treatment protocols to identify the Most effective approach for managing MNP.

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