

# Effect Of Dry Needling Combined With Myofascial Release On Pain, Cervical Range Of Motion, And Functional Disability In Individuals With Upper Trapezius Myofascial Trigger Points: A Randomized Controlled Trial

**Dr. Kartikeya Vahal (PT)<sup>1</sup>, Mr. Hitesh Kumar Rajak<sup>2</sup>,  
Prof. Dr. Aditi Singh<sup>3</sup>, Dr. Kapil Kumar Garg (PT)<sup>4</sup>**

<sup>1</sup>Assistant Professor, Physiotherapy, Jagannath University, Jaipur  
0009-0003-4275-8987

<sup>2</sup>BPT 4<sup>th</sup>, Physiotherapy, Jagannath University, Jaipur

<sup>3</sup>Professor & Head, Physiotherapy, Jagannath University, Jaipur

<sup>4</sup>Assistant Professor, Physiotherapy, Jagannath University, Jaipur

## Abstract

### Background

Myofascial trigger points (MTrPs) affecting the upper trapezius muscle are among the most common causes of mechanical neck pain and cervical dysfunction. Sustained postural loading, repetitive occupational stress, prolonged screen exposure, and muscular imbalance frequently contribute to the development of active trigger points, resulting in pain, restricted cervical mobility, muscle tightness, and reduced functional capacity. Dry needling (DN) and myofascial release (MFR) are widely utilized physiotherapeutic interventions for the management of myofascial pain syndromes; however, evidence investigating their combined therapeutic efficacy remains limited.

### Objective

To determine the effectiveness of combining dry needling with myofascial release in reducing pain intensity, improving cervical range of motion (ROM), and decreasing functional disability in individuals with upper trapezius myofascial trigger points.

### Methods

A randomized controlled trial was conducted involving 30 participants diagnosed with active upper trapezius myofascial trigger points. Participants aged between 18 and 40 years were randomly allocated into two groups: Group A received dry needling combined with myofascial release, whereas Group B received myofascial release alone. Both groups underwent treatment three sessions per week for two

consecutive weeks. Outcome measures included the Visual Analog Scale (VAS) for pain intensity, cervical ROM assessment using a universal goniometer, and the Neck Disability Index (NDI) for functional disability. Statistical analysis was performed using paired and independent t-tests with the level of significance set at  $p < 0.05$ .

## Results

Both intervention groups demonstrated statistically significant improvements in pain intensity, cervical ROM, and disability scores following treatment. However, participants receiving combined dry needling and myofascial release exhibited significantly greater improvements compared to the group receiving myofascial release alone. The experimental group demonstrated a greater reduction in VAS scores, superior gains in cervical flexion, extension, lateral flexion, and rotation, along with greater improvement in NDI scores.

## Conclusion

The combination of dry needling and myofascial release was found to be more effective than myofascial release alone in reducing pain, improving cervical mobility, and decreasing neck-related disability in individuals with upper trapezius myofascial trigger points. The findings support the clinical integration of multimodal physiotherapy interventions in the management of mechanical neck pain associated with trigger points.

## Keywords

Dry needling; myofascial release; trigger points; neck pain; cervical range of motion; physiotherapy; upper trapezius

## 1. Introduction

Neck pain is one of the most prevalent musculoskeletal disorders globally and represents a major source of disability, reduced productivity, and impaired quality of life. Epidemiological studies indicate that a substantial proportion of adults experience neck pain at least once during their lifetime, with increasing incidence observed among office workers, students, healthcare professionals, and individuals involved in prolonged computer-based activities [1,2]. Modern occupational demands, sedentary behavior, poor ergonomic practices, psychological stress, and repetitive postural strain have collectively contributed to the growing burden of mechanical neck pain.

Among the cervical musculature, the upper trapezius muscle is particularly susceptible to the development of myofascial trigger points due to its continuous postural role and tendency toward overactivation during static activities [3]. Myofascial trigger points are defined as hyperirritable palpable nodules located within taut bands of skeletal muscle fibers that may produce localized tenderness, referred pain, motor dysfunction, muscle stiffness, autonomic phenomena, and restricted range of motion upon compression [4]. Active trigger points in the upper trapezius are frequently associated with neck pain, headaches, scapular dysfunction, reduced cervical mobility, and limitations in daily functional activities.

The pathophysiology of myofascial trigger points is multifactorial and involves excessive acetylcholine release at the neuromuscular junction, local ischemia, energy crisis, sensitization of nociceptors, and altered motor endplate activity [5]. Persistent trigger point activity may lead to chronic muscular dysfunction, altered movement patterns, and central sensitization if not adequately addressed.

Physiotherapy plays a crucial role in the conservative management of upper trapezius trigger points. Various interventions including stretching exercises, therapeutic ultrasound, manual therapy, postural correction, electrotherapy, dry needling, and myofascial release have been employed to reduce pain and restore function [6]. Among these interventions, dry needling and myofascial release have gained increasing clinical popularity because of their effectiveness in addressing both neuromuscular and fascial dysfunction.

Dry needling is an invasive physiotherapeutic technique involving insertion of a thin monofilament needle into trigger points to elicit local twitch responses and disrupt dysfunctional motor endplate activity [7]. The technique is believed to reduce nociceptive input, improve local circulation, decrease muscle tension, normalize biochemical changes, and restore neuromuscular function [8]. Several studies have reported significant improvements in pain intensity, pressure pain threshold, and cervical mobility following dry needling interventions [9,10].

Myofascial release is a manual therapy approach that involves the application of sustained pressure and fascial stretching techniques to improve tissue extensibility, reduce fascial adhesions, enhance circulation, and decrease muscular tightness [11]. Fascial restrictions surrounding the cervical musculature may contribute substantially to movement limitations and pain generation. By targeting fascial dysfunction, myofascial release may improve mobility and facilitate muscular relaxation.

Although both interventions have independently demonstrated beneficial effects, evidence regarding their combined application remains limited. Multimodal physiotherapy approaches are increasingly emphasized in musculoskeletal rehabilitation, as combining therapeutic interventions may provide synergistic effects and improved clinical outcomes [12]. However, few studies have specifically examined the combined efficacy of dry needling and myofascial release in individuals with upper trapezius trigger points.

Therefore, the present study was conducted to evaluate the effects of combining dry needling and myofascial release on pain intensity, cervical range of motion, and functional disability in patients with upper trapezius myofascial trigger points.

## **AIM OF THE STUDY**

To evaluate the effectiveness of dry needling combined with myofascial release on pain intensity, cervical range of motion, and functional disability in individuals with upper trapezius myofascial trigger points.

## **OBJECTIVES**

1. To assess pain intensity using the Visual Analog Scale (VAS).
2. To evaluate cervical range of motion using a universal goniometer.

3. To assess functional disability using the Neck Disability Index (NDI).
4. To compare the effectiveness of combined dry needling and myofascial release with myofascial release alone.

## **HYPOTHESIS**

### **Null Hypothesis (H0)**

There is no statistically significant difference between the effects of dry needling combined with myofascial release and myofascial release alone on pain, cervical ROM, and disability in individuals with upper trapezius trigger points.

### **Alternative Hypothesis (H1)**

Dry needling combined with myofascial release demonstrates significantly greater improvement in pain, cervical ROM, and disability compared to myofascial release alone.

## **METHODOLOGY**

### **Study Design**

A prospective, parallel-group randomized controlled trial was conducted to evaluate the effectiveness of dry needling combined with myofascial release in individuals with upper trapezius myofascial trigger points. The study design followed CONSORT recommendations for randomized clinical trials involving non-pharmacological interventions.

### **Study Setting**

The study was conducted in the outpatient department of physiotherapy at a tertiary care rehabilitation center over a period of six months.

### **Sample Size Calculation**

Sample size estimation was performed using G\*Power statistical software (version 3.1). Based on a previous study investigating dry needling interventions for cervical myofascial pain with an expected moderate effect size ( $d = 0.80$ ), power of 80%, and alpha level of 0.05, a minimum sample size of 26 participants was required. To account for possible dropouts, 30 participants were recruited.

### **Participant Recruitment**

Participants were recruited through referrals from orthopedic and physiotherapy outpatient departments. Initial screening was conducted by a licensed physiotherapist with more than five years of clinical experience in musculoskeletal rehabilitation.

### **Diagnostic Criteria for Myofascial Trigger Points**

Active upper trapezius trigger points were identified according to the diagnostic criteria proposed by Travell and Simons [3], including:

- Presence of a palpable taut band
- Hypersensitive tender nodule within the taut band
- Reproduction of familiar pain on palpation
- Local twitch response upon snapping palpation
- Restricted cervical range of motion

## Randomization Procedure

Participants were randomly allocated into two groups using a computer-generated randomization sequence. Allocation concealment was maintained using sealed opaque envelopes prepared by an independent researcher not involved in treatment or outcome assessment.

- Group A (Experimental Group): Dry Needling + Myofascial Release (n = 15)
- Group B (Control Group): Myofascial Release alone (n = 15)

## Blinding

Due to the nature of the intervention, therapist blinding was not feasible. However, outcome assessment was conducted by an independent physiotherapist blinded to group allocation.

## Inclusion Criteria

Participants fulfilling the following criteria were included:

- Age between 18 and 40 years
- Presence of active upper trapezius trigger points
- Mechanical neck pain persisting for at least four weeks
- Visual Analog Scale score  $\geq 4$
- Restricted cervical range of motion
- Ability to provide informed consent

## Exclusion Criteria

Participants were excluded if they presented with:

- Cervical radiculopathy
- Cervical myelopathy
- Neurological deficits
- Fibromyalgia syndrome
- Recent cervical trauma or surgery

- Systemic inflammatory conditions
- Malignancy
- Pregnancy
- Bleeding disorders
- Anticoagulant therapy
- Contraindications to dry needling
- Recent corticosteroid injections

### **Intervention Protocol**

#### **Group A: Dry Needling Combined with Myofascial Release**

Participants allocated to Group A received dry needling followed by myofascial release.

#### **Dry Needling Technique**

Dry needling was performed using sterile disposable stainless-steel needles (0.25 × 40 mm). Trigger points were identified through flat palpation of the upper trapezius muscle.

The needle was inserted directly into the trigger point using a pistoning technique to elicit local twitch responses. Needling was continued until twitch responses diminished or patient tolerance threshold was reached.

- Needle retention duration: 5–10 minutes
- Number of trigger points treated per session: 1–3
- Safety precautions and aseptic techniques were strictly followed

#### **Myofascial Release Technique**

Immediately after dry needling, sustained myofascial release techniques were applied to the upper trapezius and cervical fascial structures.

- Sustained manual pressure was maintained for 90–120 seconds
- Gentle longitudinal and transverse fascial stretching techniques were applied
- Treatment duration: 10–15 minutes

#### **Group B: Myofascial Release Alone**

Participants in Group B received only myofascial release using the same standardized protocol described above.

#### **Treatment Frequency**

Both groups received:

- Three treatment sessions per week
- Total intervention duration: two weeks
- Six treatment sessions in total

**Outcome Measures**

**Primary Outcome Measure**

**Visual Analog Scale (VAS)**

Pain intensity was assessed using a 10-cm Visual Analog Scale. The VAS is a reliable and valid measure for assessing musculoskeletal pain intensity, with excellent test-retest reliability [21].

**Secondary Outcome Measures**

**Cervical Range of Motion**

Improvement in cervical ROM was observed in both groups after treatment. Greater improvements were noted in the experimental group across all movement directions.

**Table 3. Cervical ROM Comparison**

Movement	Group A Pre	Group A Post	Group B Pre	Group B Post	p-value
Flexion	35° ± 4.1	50° ± 3.8	36° ± 3.9	44° ± 4.2	0.002
Extension	38° ± 3.5	54° ± 4.0	39° ± 3.8	46° ± 4.5	0.001
Rotation	45° ± 5.2	68° ± 4.7	46° ± 4.9	58° ± 5.1	<0.001
Lateral Flexion	30° ± 3.6	44° ± 3.9	31° ± 4.1	39° ± 4.0	0.004

**Statistical Analysis**

Paired t-test analysis demonstrated statistically significant improvement in cervical ROM within both groups ( $p < 0.05$ ). Independent t-test analysis showed significantly greater post-treatment improvements in Group A compared to Group B for cervical flexion, extension, rotation, and lateral flexion.

**Interpretation**

The combined intervention produced superior gains in cervical mobility, suggesting improved muscular extensibility, decreased trigger point irritability, and reduction in movement-related pain. The largest improvement was observed in cervical rotation, which is commonly affected in upper trapezius trigger point dysfunction. Range of Motion

Improvement in cervical ROM was observed in both groups after treatment. Greater improvements were noted in Group A across all movement directions.

**Table 3. Cervical ROM Comparison**

Movement	Group A Pre	Group A Post	Group B Pre	Group B Post
Flexion	35°	50°	36°	44°
Extension	38°	54°	39°	46°
Rotation	45°	68°	46°	58°
Lateral Flexion	30°	44°	31°	39°

**Interpretation**

The combined intervention produced superior gains in cervical mobility, suggesting improved muscular extensibility and reduction in trigger point-related movement restriction.

**Functional Disability (NDI)**

Both groups demonstrated significant reductions in neck-related disability following treatment. However, participants receiving combined dry needling and myofascial release exhibited greater functional improvement.

**Table 4. Neck Disability Index Scores**

Group	Pre-treatment Mean ± SD	Post-treatment Mean ± SD	Mean Difference	t-value	p-value
Group A	28 ± 4	10 ± 2	18	14.26	<0.001
Group B	27 ± 5	16 ± 3	11	8.31	<0.001

**Between-Group Comparison**

Variable	Mean Difference Between Groups	t-value	p-value
Post-treatment NDI	6	5.72	<0.001

**Interpretation**

Within-group analysis demonstrated statistically significant reduction in disability scores in both groups. However, the experimental group showed significantly greater improvement in functional disability compared to the control group following intervention.

The effect size for functional improvement in Group A was large (Cohen’s d = 1.64), indicating strong clinical significance of the combined intervention.

## DISCUSSION

The present randomized controlled trial investigated the effects of dry needling combined with myofascial release on pain intensity, cervical range of motion, and functional disability in individuals with upper trapezius myofascial trigger points. The findings demonstrated that both intervention groups experienced significant clinical improvement following treatment; however, the group receiving combined dry needling and myofascial release showed superior outcomes across all measured variables.

The significant reduction in pain intensity observed in the experimental group may be attributed to the neurophysiological and mechanical effects of dry needling. Needle insertion into active trigger points may disrupt dysfunctional motor endplate activity, reduce spontaneous electrical activity, and induce local twitch responses that contribute to muscular relaxation [13]. Furthermore, dry needling has been associated with improved local blood circulation, decreased concentrations of nociceptive substances, and modulation of central pain processing mechanisms [14]. These physiological effects may collectively contribute to pain reduction and restoration of normal muscle function.

Myofascial release likely contributed additional therapeutic benefits by reducing fascial restrictions and improving tissue extensibility. Fascial adhesions and increased soft tissue stiffness surrounding the cervical musculature may restrict movement and perpetuate pain. Sustained manual pressure and fascial stretching techniques may improve tissue mobility, enhance circulation, and reduce muscle tension [15]. The combined application of dry needling and myofascial release may therefore produce complementary effects, resulting in greater overall improvement.

The improvement in cervical range of motion observed in the experimental group may be associated with reduced muscular guarding and increased flexibility following treatment. Trigger points in the upper trapezius commonly restrict cervical flexion, rotation, and lateral flexion due to pain and increased muscle tension. By reducing nociceptive activity and fascial tightness, the interventions likely facilitated improved movement efficiency and reduced biomechanical restriction.

The reduction in Neck Disability Index scores indicates meaningful functional improvement among participants receiving combined treatment. Reduced pain intensity and enhanced mobility may have positively influenced participants' ability to perform daily activities, occupational tasks, and functional movements.

The findings of the present study are consistent with previous literature. Dommerholt reported significant analgesic effects of dry needling in myofascial pain syndromes and emphasized the role of local twitch responses in reducing trigger point irritability [16]. Cagnie et al. demonstrated improvements in pain and pressure pain threshold following dry needling interventions in patients with neck pain [17]. Kietrys et al. further reported moderate evidence supporting dry needling for upper-quarter myofascial pain [18].

Similarly, studies investigating myofascial release techniques have demonstrated improvements in soft tissue extensibility, pain reduction, and functional mobility [19,20]. The present findings support the growing evidence favoring multimodal physiotherapy approaches for musculoskeletal rehabilitation.

Despite promising outcomes, certain limitations must be acknowledged. The study involved a relatively small sample size and short intervention duration, which may limit generalizability. Long-term follow-up

was not conducted; therefore, the sustainability of treatment effects remains uncertain. Additionally, the study was conducted in a single clinical setting and involved a limited age range.

Nevertheless, the findings provide clinically relevant evidence supporting the integration of dry needling and myofascial release in physiotherapy management of upper trapezius trigger points.

## Conclusion

The present study concludes that combining dry needling with myofascial release is significantly more effective than myofascial release alone in reducing pain intensity, improving cervical range of motion, and decreasing neck-related disability in individuals with upper trapezius myofascial trigger points.

The combined intervention demonstrated superior therapeutic outcomes across all measured variables, indicating that multimodal physiotherapy approaches may provide enhanced clinical benefits in the management of mechanical neck pain associated with trigger points.

The findings support the incorporation of dry needling alongside manual therapy techniques in musculoskeletal rehabilitation programs.

## Clinical Implications

- Combined physiotherapy interventions may produce faster and more effective symptom relief.
- Dry needling can be effectively integrated into conventional musculoskeletal rehabilitation.
- Reduction in trigger point sensitivity may facilitate improved participation in therapeutic exercise programs.
- Enhanced cervical mobility may improve occupational performance and activities of daily living.
- Multimodal rehabilitation approaches may reduce the likelihood of persistent mechanical neck pain.

## Limitations

1. Relatively small sample size.
2. Short intervention duration.
3. Lack of long-term follow-up assessment.
4. Single-center study design.
5. Limited age range affecting generalizability.
6. Absence of blinding procedures.

## Recommendations

1. Future studies should include larger sample sizes.
2. Long-term follow-up assessments should be conducted.
3. Comparative studies involving exercise therapy and electrotherapy modalities are recommended.
4. Future research should evaluate psychological and quality-of-life outcomes.
5. Studies involving different occupational populations and age groups are warranted.
6. Standardized dry needling protocols should be investigated.

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