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Original Research Article

# Effect of Instrument Assisted Soft Tissue Mobilization on Neck Pain and Range of Motion in Patients with Chronic Upper Trapezitis – A Randomised Control Trial

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## ABSTRACT

**Background:** Trapezitis is an inflammation of the trapezius muscle that leads to the development of myofascial trigger points, often aggravated by poor posture, repetitive strain, or prolonged desk work. A forward head posture further exacerbates muscle tension, resulting in pain, stiffness, and a reduced range of motion. In addition to dry needling and instrument-assisted soft tissue mobilization, other therapeutic approaches such as stretching exercises, postural correction, and strengthening techniques can help alleviate symptoms and prevent recurrence. Lifestyle modifications, including ergonomic adjustments and stress management, also play a crucial role in long-term recovery and muscle health.

**Methodology:** Sixty patients with neck pain and a positive jump sign were randomly assigned to two groups. Group A received conventional therapy, while Group B underwent instrument-assisted soft tissue mobilization (IASTM) in addition to traditional therapy. Group B received three treatment sessions over 10 days.
Both groups were provided with Interferential Therapy (IFT), hot pack therapy, and self-trapezius stretching exercises.

**Result:** Both groups showed statistically significant improvement, but the IASTM group was more effective in reducing pain and improving range of motion. Based on the results of the present study, both IASTM and conventional therapy are effective in treating upper trapezitis. However, IASTM has shown greater effectiveness in reducing pain and improving the range of motion. This suggests that IASTM may be particularly beneficial for addressing latent trigger points, as it is applied to the muscle belly. Additionally, IASTM helps reduce local pain, enhances range of motion, and influences neuronal activity. It impacts soft tissues by inducing microtrauma, which stimulates fibroblast proliferation, thereby promoting tissue repair.

**Conclusion:** IASTM is a highly effective treatment option for reducing pain and improving the range of motion in patients with upper trapezitis. Compared to conventional therapy, IASTM proves to be a more effective approach in enhancing muscle function and promoting tissue healing, making it a valuable therapeutic intervention.

**KEY WORDS:** Instrument-assisted soft tissue mobilization, Myofascial trigger point, Trapezitis.

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## BACKGROUND

Musculoskeletal pain is one of the most common types of pain, with neck pain being particularly prevalent [1]. In the present generation, approximately 60%-90% of individuals exhibit poor postural habits, often carrying the head in a forward position with rounded shoulders [2]. This faulty posture is frequently observed in individuals with desk jobs, leading to increased strain on the upper trapezius, commonly referred to as forward head posture [3].

Trapezitis is an inflammation of the trapezius muscle, resulting in pain that persists even at rest and worsens with activity. Inflammation in the muscle leads to spasm and tightness, contributing to the formation of discrete nodules within taut bands of skeletal muscle, known as myofascial trigger points [4]. These trigger points are hyperirritable and can cause spontaneous pain. Active trigger points generate pain even at rest, while latent trigger points cause pain only upon palpation. Repetitive microtrauma, combined with predisposing factors like FHP, can further lead to muscle spasm, tightness, and the activation of trigger points [5].

The symptoms of upper trapezitis include pain in the posterior neck region and along the collar line, which may radiate to the neck, occiput, shoulders, back, and arms. Trigger points are always present within taut muscle bands and can be identified through palpation [6]. The most frequently occurring trigger points in the upper trapezius are located midway between the spine and scapula and near the shoulder tip. Palpation of these trigger points often elicits a severe pain response, leading to the characteristic "jump sign," where the patient winces or withdraws the shoulder [7,8].

The primary physical therapy interventions for managing pain and trigger points include electro-analgesics such as Interferential Therapy (IFT), Transcutaneous Electrical Nerve Stimulation (TENS), ultrasound, laser therapy, stretching exercises, Instrument-Assisted Soft Tissue Mobilization (IASTM), and deep friction massage [9-12].

IASTM is a non-invasive therapeutic approach based on the principles of James Cyriax's cross-frictional massage. It involves the use of specially designed instruments to manipulate the skin, myofascial structures, muscles, and tendons through various direct compressive stroke techniques. This technique promotes myofascial release, reducing pain and tightness

While also minimizing strain on the therapist's hands. For effective treatment, a lubricating gel is typically applied before using the instrument, which has different treatment planes to target specific areas [13].

The controlled microtrauma induced by IASTM stimulates a localized inflammatory response, initiating the reabsorption of excessive fibrosis or scar tissue and facilitating a cascade of healing activities. This process helps remodel affected soft tissues, lengthen fascia, and break adhesions, ultimately reducing pain and improving function. Studies have demonstrated that IASTM is effective in decreasing pain and enhancing the range of motion in individuals with upper trapezitis [14].

Despite the evidence supporting the benefits of IASTM, there is limited research comparing its effectiveness with conventional therapy in treating upper trapezitis. Most studies have focused on either traditional treatment or IASTM individually, but have not directly compared the two approaches.

**Need for the Study:** There is a growing need to establish the efficacy of IASTM in comparison to conventional therapy for treating upper trapezitis. While traditional treatments, including electrotherapy modalities and stretching exercises, are commonly used, the additional benefits of IASTM in reducing pain, improving range of motion, and facilitating tissue healing require further exploration. Hence, this study aims to compare the effectiveness of IASTM and conventional therapy in improving pain and functional outcomes in individuals with upper trapezitis, thereby providing a clearer understanding of its therapeutic benefits.

## METHODOLOGY

The study was a randomized controlled trial conducted to evaluate the effectiveness of IASTM in patients with chronic upper trapezitis.

The research was carried out at a physiotherapy clinic over six months in 2023.

A sample size of 60 was determined using G*Power software (version 3.1.9.4), based on a large effect size of 0.8, a power of 0.8, and an á level of 0.05 for statistical significance. The clinical diagnosis of upper trapezitis was based on the participant's pain history and a positive "jump sign." All subjects were given a clear explanation of the treatment before participation, and written informed consent was obtained.

Screening of subjects was conducted based on the inclusion criteria, and participants were as-

-signed to two groups. Group allocation was done using a simple convenience sampling method, with patients assigned to groups via the envelope method. Blinding of accessor was done. Baseline data, including pain and range of motion (ROM), were recorded before the first session. Post-treatment values of outcome measures were recorded after the second session (Day 5) and the third session (Day 10).

**Group A** received conventional therapy, including Interferential Therapy (IFT), hot pack therapy, and stretching exercises.

**Group B** received IASTM in addition to conventional therapy, including IFT, hot pack therapy, and stretching exercises.

**Inclusion Criteria:**

1. Both males and females Age between 20 to 60 years.

2. Patients willing to undergo treatment and comply with the treatment protocol

3. Male and female participants with a positive "jump sign."

4. Chronic neck pain persisting for more than three months.

**Exclusion Criteria:**

1. Any recent cervical surgery.

2. Spinal pathology.

3. History of cervical fracture.

4. Allergy.

5. Severe diabetes mellitus.

6. Any hematological problems

7. Patients currently undergoing other physiotherapy treatments for upper trapezitis outside the study.

Intervention Protocol:

**Instrument-Assisted Soft Tissue Mobilization (IASTM):** The patient was seated on a chair with their hand supported on a table and their head resting on the hand. The therapist positioned themselves behind the patient on the involved side. To begin the treatment, a hot pack was applied for 15 minutes to help relax the muscles. Once the treatment area was properly exposed, a gel was applied to ensure smooth movement and reduce friction. The Instrument-Assisted Soft Tissue Mobilization (IASTM) instrument was then used at a 45-degree angle, with slow strokes applied along the muscle from origin to insertion using the sweeping technique for a duration of three minutes.

**Control Group (Conventional Therapy):**

**1. Hot Therapy:**

The treatment began with hot therapy for all participants.

**Patient Position:** The patient was seated with hands supported on a table and the neck resting on the hand.

**Technique:** Hydrocollator packs wrapped in 2-3 layers of Turkish towel were applied.

**Duration:** 20 minutes per session, once daily for 10 sessions.

**2. Interferential Therapy (IFT):**

**Parameters:** Base frequency of 20 Hz and sweep frequency of 40 Hz.

**Mode:** Applied in a 2-pole mode.

**Duration:** 15 minutes per session.

**Purpose:** Used as an electro-analgesic for pain reduction.

**3. Stretching Exercises:**

**Self-Trapezius Stretch:** The patient lifted one hand over the head, resting the opposite hand on the back or holding onto a chair.

The head was laterally flexed to one side while applying gentle overpressure using the hand on the head.

**Hold Time:** 30 seconds.

**Repetitions:** 3 repetitions, performed three times a day.

**Statistical analysis:** The equal distribution of patients in each group was assessed using the Shapiro-Wilk test for normality. Since the data followed a normal distribution, parametric tests were performed as presented in the results. The statistical analysis for inter- and intra-group comparisons was conducted using the paired and unpaired t-test.

## RESULT

The study included a total of 60 participants, with 30 subjects in each group. Table 1 shows demographics and Table 2 Test of Normality for

the Groups of the study. The NPRS (Numerical Pain Rating Scale) values measured after treatment were significantly lower than before treatment in both groups ($p < 0.001$). However, Group B (IASTM + Conventional Therapy) showed greater pain reduction compared to Group A (Conventional Therapy alone) (Table 3).

Regarding lateral flexion range of motion (ROM), both groups showed a significant improvement post-treatment ($p < 0.001$). However, Group B (IASTM) demonstrated a significantly greater improvement in ROM compared to Group A (Table 4).

**Table 1:** Distribution of Gender in all three groups.

| | Group a | Group b | P value |
|---|---|---|---|
| Males | 10 | 9 | 0.904 |
| females | 20 | 21 | |
| Total | 30 | 30 | |

**Table 2:** Test of Normality for the Groups.

| Variables | Time | Group A Z-value | Group A p-value | Group B Z-value | Group B p-value |
|---|---|---|---|---|---|
| NPRS | Day 1 | 0.2 | 0.08 | 0.18 | 0.13 |
| | Day 5 | 0.14 | 0.2 | 0.21 | 0.05 |
| | Day 10 | 0.16 | 0.2 | 0.21 | 0.05 |
| ROM | Day 1 | 0.14 | 0.2 | 0.15 | 0.2 |
| | Day 5 | 0.2 | 0.07 | 0.15 | 0.2 |
| | Day 10 | 0.18 | 0.17 | 0.21 | 0.05 |

**Table 3:** Within and between groups comparison of NPRS mean reduction scores from Day 1-5 and Day 1-10.

| Interval | Group A Mean | Group A SD | Group B Mean | Group B SD | p-value |
|---|---|---|---|---|---|
| Day 1-5 | 2.22 | 0.88 | 2.94 | 1.06 | <0.028* |
| Day 1-10 | 4.31 | 0.95 | 5.78 | 0.95 | <0.001* |
| t-value | 10.202 | | 10.425 | | |
| p-value | <0.001* | | <0.001* | | |
| Effect size | 2.55 | | 2.61 | | |

**Table 4:** Within and Between Group Comparisons of ROM Mean Reduction Scores from Day 1-5 and Day 1-10.

| | Group A Mean | Group A SD | Group B Mean | Group B SD | f-value | p-value |
|---|---|---|---|---|---|---|
| | 3.5 | 1.26 | 6.75 | 1.77 | 12.224 | <0.001 |
| | 7.06 | 2.08 | 11.63 | 2.94 | 10.695 | <0.001 |
| | 9.938 | | 10.442 | | | |
| | <0.001* | | <0.001* | | | |

## DISCUSSION

The findings of the present study indicate that both IASTM and conventional therapy are beneficial in the management of upper trapezitis. There was a statistically significant difference in pain intensity reduction and improvement in lateral flexion range of motion within each group from Day 1 to Day 10. However, when comparing the two groups, IASTM was found to be more effective in increasing range of motion and functional improvement than conventional therapy.

Superficial heating agents were provided in both groups. Studies have shown that heat therapy increases local blood supply, promotes vasodilation, and helps in the removal of metabolic waste. Additionally, it reduces the excitability of nociceptive nerve endings, thereby relaxing soft tissues and alleviating muscle spasms [15]. In the present study, hot packs were applied at the beginning of each session, which may have contributed to the observed reduction in pain and increase in range of motion in both groups.

Interferential Therapy (IFT), an electro-analgesic modality, was used in both groups to aid in pain reduction. The results demonstrated a decrease in Numerical Pain Rating Scale (NPRS) scores across all participants, suggesting that IFT played a role in alleviating pain [16,17].

IASTM was particularly effective in reducing local pain intensity, increasing range of motion, and enhancing neuronal activity [18]. This technique enables therapists to identify and address soft tissue injuries and musculoskeletal dysfunctions efficiently. IASTM works by creating controlled microtrauma, which stimulates the proliferation of fibroblasts and promotes tissue repair.

Clinical evidence suggests that IASTM improves myofascial mobility and alleviates local ischemia by enhancing blood flow to the treated area.[19] Additionally, it reduces therapist hand strain and fatigue, making it a practical and sustainable treatment approach [20].

Conventional therapy, including self-stretching of the trapezius muscle, was also included in the treatment protocol. Stretching helps relax the muscles, reduce stiffness, and improve overall flexibility, which may have contributed to the improvements observed in both groups [21,22].

Based on the results of this study, IASTM proved to be more effective than conventional therapy in enhancing the range of motion and overall functional outcomes in patients with upper trapezitis [23]. The ability of IASTM to target both active and latent trigger points by acting on muscle length may contribute to its superior efficacy. The mechanical effects of IASTM help detach actin-myosin bridges and lengthen

sarcomeres, thereby improving muscle extensibility and range of motion more effectively than conventional therapy alone [24].

**Limitations:** This study's limitations include a small sample size, short duration, and lack of therapist blinding, which may have introduced bias. The absence of a standardized method to measure IASTM force led to potential treatment variability. Additionally, the lack of long-term follow-up restricted the assessment of sustained effects.

**Future Scope:** Future studies should include a larger sample size and implement blinding to improve the study's validity. The use of standardized equipment to measure IASTM force would ensure consistency in treatment application. Long-term research is needed to evaluate the sustained benefits of IASTM, along with its effects on muscle length, flexibility, and neuromuscular adaptations in patients with chronic trapezitis.

## CONCLUSION

The findings of this study indicate that both Instrument-Assisted Soft Tissue Mobilization (IASTM) and conventional therapy are effective in reducing pain and improving neck range of motion in patients with chronic upper trapezitis. However, IASTM demonstrated superior outcomes in enhancing the range of motion and functional recovery, likely due to its myofascial release effects and improved tissue mobility. Given its effectiveness, IASTM should be considered a valuable addition to conventional physiotherapy for managing chronic upper trapezitis. Further research with larger sample sizes and long-term follow-ups is recommended to validate the sustained benefits of this approach in clinical practice.

## ABBREVIATIONS

**FHP-** Forward Head Posture

**IASTM-** Instrument Assisted Soft Tissue Mobilization IFT- Interferential Therapy

**TENS-** Transcutaneous Electrical Nerve Stimulator

**Authors' contributions:**

Mahadevi Patil, Mayur Ajmera, and Priyanka Nikhare equally contributed to this manuscript, right from the concept to the research reporting.

**Conflicts of interest:** **None**

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