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# IMMEDIATE EFFECTS OF INSTRUMENT-ASSISTED SOFT TISSUE MOBILIZATION VERSUS ISCHEMIC COMPRESSION ON PAIN AND RANGE OF MOTION IN TRAPEZITIS

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## ABSTRACT

**BACKGROUND**: Trapezitis is a common inflammatory condition among college students, often caused by poor posture, overuse of mobile devices, prolonged static positioning and sudden one-sided movements. It leads to pain, stiffness, and reduced cervical mobility. IASTM and IC are used for myofascial release, limited research compares their immediate effects. This study aims to provide evidence on the best technique for reducing pain and improving cervical ROM.

**AIM & OBJECTIVES:** To study the immediate effects of IASTM versus IC on pain by NPRS and ROM by digital goniometer in college students with upper trapezitis.

**METHODOLOGY:** 30 participants selected based on inclusion and exclusion criteria. They were divided into two groups: Group A received IASTM and Group B received IC. Both groups received a hot pack before treatment and active cervical spine exercises post-treatment. The subjects were evaluated using the NPRS and Digital-goniometer at pre and post-treatment intervals.

**RESULT:** Both groups demonstrated significant reductions in pain and improvements in ROM. However, between-group comparisons revealed no significant difference in pain reduction (IASTM: 3.46 ± 0.55 vs. IC: 3.47 ± 0.75; p = 1). IASTM resulted in significantly greater improvement in ROM (Left: 6.91 ± 0.68 vs. 2.97 ± 0.78; p = 0.000021, Right: 6.58 ± 0.08 vs. 3.65 ± 0.02; p = 0.000013).

**CONCLUSION:** Both IASTM and IC were effective in reducing pain and improving cervical range of motion in students with trapezitis. However, IASTM showed significantly greater improvements in ROM, indicating its superior effectiveness in enhancing mobility.

**KEYWORDS:** Upper Trapezitis, Instrument Assisted Soft Tissue Mobilization (IASTM), Ischemic Compression (IC).

**INTRODUCTION:** Trapizitis is a commonly seen condition in clinical practice. It refers to the pain and spasm in the neck due to the inflammation of the trapezius muscle.(Motimath et al., 2017)

Its prevalence is maximum in females with middle age and less common in males, fluctuating with a mean point prevalence of 13% and neck pain usually occurs in the upper trapezius muscle. Mechanical neck pain has a lifetime prevalence of 30-50% in the general world population. ("(PDF) Effectiveness of Upper Limb and Scapular Stabilization Exercises in College Students Suffering from Recurrent Trapezitis," 2024)

The pain typically results from overuse of the muscle in non-ergonomic posture, working in a static position, stress and tension, repetitive movements, sitting for prolonged periods without back support, too high keyboard on desks, long drives on bikes and cars, prolonged head bending activities (such as reading), activities with sudden one-sided movements. ("(PDF) Effectiveness of Upper Limb and Scapular Stabilization Exercises in College Students Suffering from Recurrent Trapezitis," 2024)

A recent study found that 66% of students exhibited signs of smartphone addiction, with 55% of males and 46% of females. Additionally, 46% of students used their smartphones for more than six hours daily. (Hada et al., 2024)

Smartphones are widely used by people of all age groups. A recent study found that 79% of individuals aged 18 to 44 uses their phones with their hands bent, leaving them with just a few hours of the day without their smartphones. (Mehta et al., 2023)

When students work at a study table or desk, they often develop a forward head posture (FHP). FHP is acknowledged as an internal factor leading to shoulder and neck pain dysfunction. ("(PDF) Effectiveness of Upper Limb and Scapular Stabilization Exercises in College Students Suffering from Recurrent Trapezitis," 2024)

The IASTM comprises various rigid instruments made from materials like plastic or steel, each with different shapes. Clinicians can use these tools manually, adjusting the pressure applied based on the depth required and the specific clinical situation. These devices are designed to apply longitudinal pressure along the path of the muscle and/or connective tissue fibres. (Pianese & Bordoni, 2022)

IASTM promotes the remodelling of connective tissue by encouraging the resorption of excess fibrosis. It triggers the repair and regeneration of collagen by recruiting fibroblasts, leading to the release and breakdown of scar tissue, adhesions, and fascial restrictions. ("Comparison between Effects of Instrument-Assisted Soft Tissue Mobilization and Manual Myofascial Release on Pain, Range of Motion and Function in Myofascial Pain Syndrome of Upper Trapezius — A Randomized Controlled Trial | Request PDF," 2024)

The ischemic compression technique involves applying sustained pressure with adequate force for a sufficient duration to reduce blood flow and alleviate muscle tension. When the pressure is released, blood returns to the area, helping to deactivate the trigger point. (Saadat et al., 2018)

This technique is recognized for its effectiveness in addressing Myofascial Trigger Points (MTrPs). MTrP bands and nodules form as a result of localized bulging and shortening of the sarcomere, creating "contraction knots" or "contraction discs." Ischemic compression helps reduce sarcomere height, leading to the lengthening of the sarcomere. Hou et al. found the effectiveness of ischemic compression in resolving MTrPs in the Upper

Trapezius muscle. ("Comparison between Effects of Instrument-Assisted Soft Tissue Mobilization and Manual Myofascial Release on Pain, Range of Motion and Function in Myofascial Pain Syndrome of Upper Trapezius — A Randomized Controlled Trial | Request PDF," 2024)

Trapezitis is increasingly common among college students due to non-ergonomic posture, prolonged screen time and sedentary lifestyles. Activities like extended studying or device use without ergonomic support often lead to muscle strain, trigger points, and restricted cervical mobility. Forward head posture, a frequent issue in students, further exacerbates trapezius muscle stress, leading to chronic pain and functional limitations. Despite the high prevalence of trapezitis in this population IASTM and IC are techniques used for myofascial release, and limited research compares their immediate effects. Early intervention is crucial in students, as untreated musculoskeletal pain can negatively impact concentration, academic performance, and overall quality of life. This study aims to provide evidence on the superior technique for reducing pain and improving cervical ROM, guiding clinicians in selecting the most effective intervention for faster recovery and preventing long-term complications.

**AIM**

To study the immediate effects of instrument-assisted soft tissue mobilization versus ischemic compression on pain and range of motion in trapezitis

**OBJECTIVES**

1. To find the immediate effects of IASTM on pain by NPRS and ROM by Digital goniometer in college students with upper trapezitis.
2. To find the immediate effects of Ischemic compression on pain by NPRS and ROM by Digital goniometer in college students with upper trapezitis
3. To compare the immediate effects of IASTM and IC on pain by NPRS and ROM by Digital goniometer in college students with upper trapezitis

**METHODOLOGY**

**Study design:** The Experimental Study

**Study setting:** LJ campus, Ahmedabad

**Study population**: College-going students with upper trepezitis

**Sample size:** 30

**Sampling method:** Random sampling (Computer generated method)

**Materials/ Equipment:** IASTM tool, Digital goniometer, Moisturizing cream (Vaseline petroleum jelly)

**Inclusion criteria:**

- Both males and females aged between 18 to25 years
- NPRS value between 4 to 8 (on activity) out of 10
- Participants with unilateral or bilateral trapezius tender point, and a pain duration of either sub-acute (10 days to 7 weeks) or chronic (>7 weeks)
- Who had at least one active trigger point present within a taut band in the upper trapezius muscle. (Mehta et al., 2023),

**Exclusion criteria:**

- disc disease, radiculopathy, Congenital torticollis, ankylosing spondylitis

- Any type of skin infection, Hypersensitive skin, open wound around the neck
- Recent fracture or dislocation of cervical vertebrae
- who had underwent any recent surgery of the cervical spine or shoulder
- Patients taking analgesics or those already undergoing physiotherapy (Mehta et al., 2023),

**Procedure:**

The study was conducted at L J OPD, Ahmedabad. A total of 30 participants were randomly divided into Group A (n=15) and Group B (n=15) and written informed consent was taken then baseline data and pre and post-intervention assessments were done.

**Intervention:**

The treatment began with the hot pack for 20 min over the upper trapezius region followed by IASTM in group A and Ischemic compression in group B. After the technique, exercises were given which included active range of motion exercises for the cervical spine (10 repetitions of each movement). The total duration of the treatment was 30 minutes for both Group A and Group B.

**Group A: IASTM**

Position of patient- sitting on chair hand supported on table and head resting on hand.

Position of therapist- behind the patient towards the involved side.

A moisturizing cream was applied on the skin for lubrication. Scanning for myofascial restrictions was done with the sharper side of the edge tool. The tool kept at an angle of 60°applied slow strokes on the muscle from origin to insertion (sweeping technique) for 30 seconds to 1 min. (Mehta et al., 2023)

**Figure: 1 IASTM technique**

**Figure: 2 The IASTM tool**

**Group B: ischemic compression:**

The muscle was lengthened to the point of increasing resistance within the comfort zone and then a gentle, gradually increasing pressure was applied until the tissue resistance is felt. The pressure was intermediate and maintained up to 60–

90 s until a relief of tension is felt under the palpating finger. Then, the pressure was increased until a new barrier was felt and held until tissue tension released. ("Comparison between Effects of Instrument-Assisted Soft Tissue Mobilization and Manual Myofascial Release on Pain, Range of Motion and Function in Myofascial Pain Syndrome of Upper Trapezius — A Randomized Controlled Trial | Request PDF," 2024)

**Figure: 3 Ischemic compression**

**Outcome measures:**

The outcome measures were evaluated at baseline and after completion of the treatment protocol. Pain intensity was assessed using the Numerical Pain Rating Scale and the cervical range of motion for lateral flexion was measured with a

Assessment:

1. The intensity of pain was assessed by a numerical pain rating scale.
    - The subjects were asked to rate their pain on a scale of 0–10 on the NPRS.
    - They were asked to rate the pain that was present at the time of evaluation before the treatment began and after treatment.
2. Evaluation of cervical range of motion of lateral flexion by Digital Goniometer.
    - Centre fulcrum of the goniometer over the spinous process of the C7 vertebra.
    - Align the proximal arm with the spinous processes of the thoracic vertebrae so that the arm is perpendicular to the ground.
    - Align the distal arm with the dorsal midline of the head, using the occipital protuberance for reference. ("Comparison between Effects of Instrument-Assisted Soft Tissue Mobilization and Manual Myofascial Release on Pain, Range of Motion and Function in Myofascial Pain Syndrome of Upper Trapezius — A Randomized Controlled Trial | Request PDF," 2024)

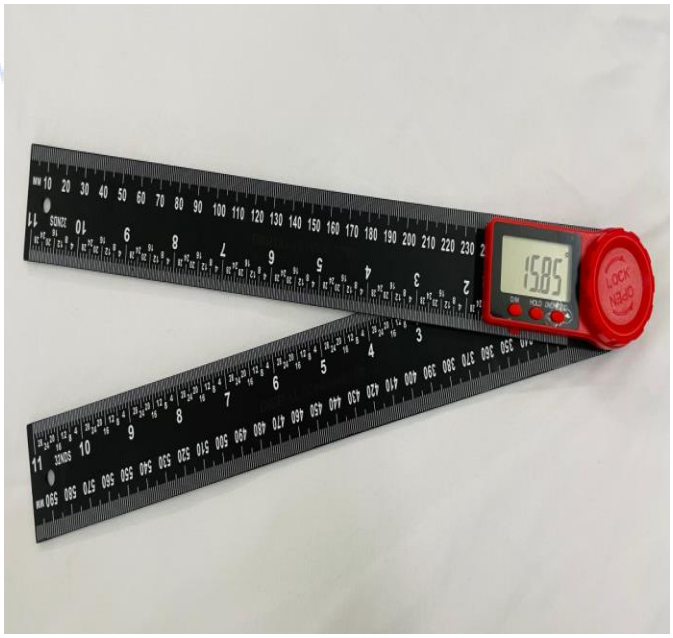
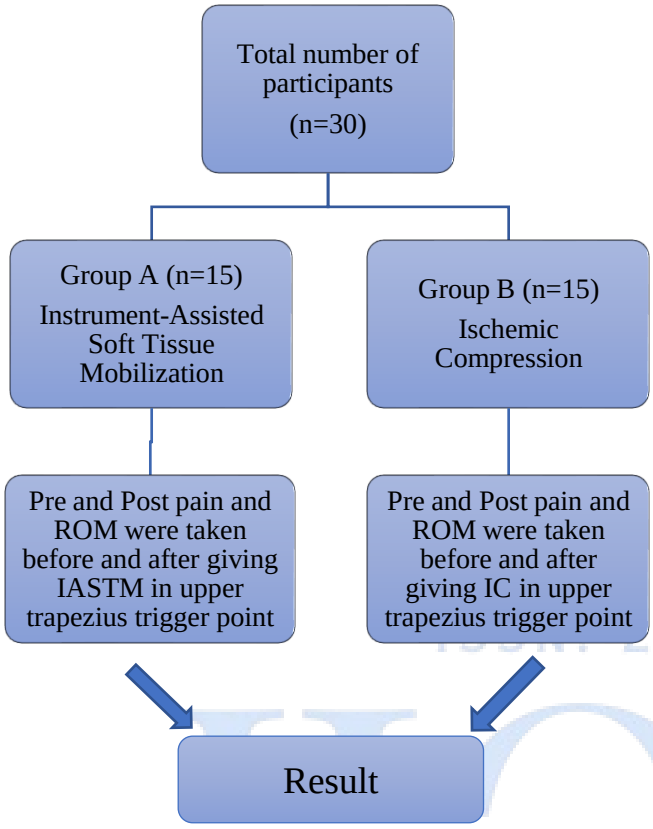


**Figure: 4 Digital goniometer**

**CONSORT CHART**




**Statistical analysis:**

Descriptive statistical analysis was obtained using frequency, percentage, mean, SD, CI, median and mode. The data was normally distributed; parametric tests were applied for statistical comparisons. Paired t-test was used for the comparison of Pre and post data within the group. An unpaired t-test was used for the comparison of data between Group A and Group B. All the statistical analysis was performed by using Microsoft Excel.

**RESULT:**

The mean age of participants in group A (IASTM) was 20.4 ± 2.38 years, while group B (IC) was 20.73 ± 2.08 years as presented in **Table 1**.

**Table 2** shows the results of within-group analyses, which compared pre-test and post-test values for both groups. Pain, as measured by the Numerical Pain Rating Scale (NPRS), significantly decreased in both groups, with highly significant p-values. Range of motion (ROM) also improved in both groups following the intervention, as evidenced by increased values and statistically significant p-values. All p-values were below 0.05, indicating that the observed differences between pre-test and post-test measurements were statistically significant.

**Table 3** provides a between-group analysis, comparing the outcomes between the IASTM and IC groups. In terms of pain reduction, both groups demonstrated nearly identical reductions in NPRS (IASTM: 3.46, IC: 3.47), with a p-value of 1, indicating no statistically significant difference between the groups regarding pain reduction. However, for ROM on the left side, the IASTM group showed a significantly greater improvement (6.91 ± 0.6) compared to the IC group (2.97 ± 0.78), with a p-value of 0.000021, suggesting that IASTM was more effective in improving ROM on the left side. Similarly, for ROM on the right side, the IASTM group exhibited a greater improvement (6.58 ± 0.08) compared to the IC group (3.65 ± 0.02), with a p-value of 0.000013, indicating that IASTM was more effective in improving ROM on the right side as well.

**Table: 1 Demographic data**

| | **Group A IASTM mean ± SD N=15** | **Group B IC mean ± SD N=15** |
|---|---|---|
| **Age** | 20.4 ± 2.38 | 20.73 ± 2.08 |
| **Gender** | | |
| **Male** | 4 | 4 |
| **Female** | 11 | 11 |

**Table: 2 Within-group analysis**

**Statistically significant difference with P<0.05.**

| | | **Pre Mean ± SD** | **Post Mean ± SD** | **P value** |
|---|---|---|---|---|
| Group IASTM | NPRS | 5.26 ± 1.75 | 1.8 ± 1.20 | 0.00001 |
| Group IC | NPRS | 4.93 ± 1.93 | 1.466 ± 1.18 | 0.0000003* |
| Group IASTM | ROM (Left) | 33.59 ± 6.075 | 40.50 ± 5.39 | 0.007* |
| Group IC | ROM (Left) | 36.14 ± 4.63 | 39.11 ± 3.85 | 0.001* |
| Group IASTM | ROM (Right) | 33.28 ± 5.52 | 39.86 ± 5.60 | 0.0018* |
| Group IC | ROM (Right) | 33.92 ± 3.94 | 37.57 ± 3.96 | 0.0026* |

**Here, NPRS= Numeric Pain Rating Scale, ROM= Range of Motion**

**Table 3: Between-group analysis**

| | **IASTM** | **IC** | **P value** |
|---|---|---|---|
| NPRS | 3.46 ± 0.55 | 3.47 ± 0.75 | 1 |
| ROM (Left) | 6.91 ± 0.68 | 2.97 ± 0.78 | 0.000021 |
| ROM (Right) | 6.58 ± 0.08 | 3.65 ± 0.02 | 0.000013 |

**DISCUSSION:**

The present study aimed to find out the effects of instrument-assisted soft tissue mobilization and ischemic compression in reducing pain on NPRS and improving the cervical range of motion in students with trapezitis. The results of the present study showed that both techniques are effective for reducing pain and improving ROM but IASTM produced better results with respect to pain and cervical range of motion.

Clinicians suggest that IASTM is a type of soft tissue mobilization technique that can target deeper tissues more effectively than manual therapy, helping to alleviate myofascial adhesions, tightness, fibrous nodules, scar tissue, and crystalline deposits.

IASTM creates a localized, mild injury to soft tissue, leading to small blood vessel damage and haemorrhagic changes. This process activates the body's inflammatory response and stimulates its natural healing mechanisms. (Mehta et al., 2023)

Ischemic compression induces a temporary local ischemic state, which is subsequently followed by hyperemic reperfusion upon decompression. The resultant increase in blood flow stimulates aerobic metabolism and adenosine triphosphate production, thereby contributing to therapeutic effects. Consequently, it is posited that the combination of reducing muscle shortening through physical stimulation at trigger points and the enhancement of blood flow leads to improved therapeutic outcomes.(Kim et al., 2013)

The study aligns with Basu et al.'s (2020) research on the effects of IASTM and ischemic compression on upper trapezius trigger points in badminton players. They found that IASTM was more effective in reducing pain, confirming the efficacy of IASTM as a treatment for reducing trigger point pain in athletes.(Basu et al., 2020)

The effects observed with IASTM in the present study are consistent with the findings of Gulick et al. (2017), who investigated the impact of IASTM on

the pressure pain threshold (PPT) of myofascial trigger points (MTrPs). Their study concluded that a 5-minute intervention using three IASTM techniques on the upper trapezius effectively increased the PPT of an MTrP after six treatment sessions over three weeks. (Gulick, 2018)

In a study by Laudner et al. (2014), the use of the Graston technique, a form of instrument-assisted soft tissue mobilization (IASTM), on the posterior shoulder muscles resulted in an improvement in the range of motion for both glenohumeral internal rotation and horizontal adduction. (Laudner et al., 2014)

The results of the current study are consistent with the findings of Dr Basavaraj Motimath et al.(2017), who investigated the immediate effects of Instrument Assisted Soft Tissue Mobilization (IASTM) using the M2T Blade technique for treating trapezitis. Their study concluded that IASTM with the M2T Blade technique is an effective method for achieving immediate pain reduction in individuals experiencing trapezitis and muscle spasm. (Motimath et al., n.d.)

This study has some limitations, such as a small sample size, the study only measured immediate effects, lacking long-term follow-up data, limited generalizability.

Future research could focus on a larger sample size, long-term follow-up and the use of objective pain measurement tool like Pressure algometer.

**CONCLUSION:**

Both Instrument-Assisted Soft Tissue Mobilization (IASTM) and Ischemic Compression (IC) were effective in reducing pain and improving cervical range of motion (ROM) in students with trapezitis. However, IASTM showed significantly greater improvements in ROM, indicating its superior effectiveness in enhancing mobility. These findings highlight the potential of IASTM as a preferred therapeutic approach for managing trapezitis and improving musculoskeletal function. However, the limited sample size constitutes a constraint, and it is advisable for future research to involve larger populations and incorporate long-term follow-up to enhance the robustness of these findings.

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