



# Effect of Instrument Assisted Soft Tissue Mobilization on Pain Pressure Threshold in Latent Trigger Points: A Pilot Study

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## ABSTRACT

**Background :-** Myofascial Trigger Points are hypersensitive spots in skeletal muscles which are painful on compression. They are classified as active or latent, where latent trigger points are prevalent even in healthy individuals and has been suggested to be potential precursor to Active MTrPs ultimately progressing to pain. Upper Trapezius is a posture muscle and has a high susceptibility for overuse, especially in college students who often acquire improper posture and are exposed to repetitive physical stress. Instrument assisted soft tissue Mobilization which is proven to be effective in treating MTrPs provides therapist a mechanical advantage to treat with deeper force transmission to the tissues.

**Methods :-** 10 college going physiotherapy students with a mean age of  $23.20 \pm 0.79$  years were included in the study after meeting all inclusion and exclusion criteria. All participants received treatment of Moist Heat Pack, followed by IASTM application using Graston<sup>®</sup> tool and self-stretching exercises to upper trapezius of the neck and Neck Isometric exercise. Pain pressure threshold was measured using algometer at baseline and after 10 sessions of intervention.

**Results :-** After 10 sessions of interventions with 6 sessions of IASTM applications, the findings revealed a statistically significant outcome in Pain Pressure Threshold.

**Conclusion :-** This study concludes that IASTM is an effective intervention for the treatment of LTrPs in college going students.

**Keywords :-** Latent Trigger Points, IASTM, Myofascial Trigger Points, Upper Trapezius, Pain Pressure Threshold.

## INTRODUCTION:

A Myofascial Trigger Point (MTrP) is defined as a hypersensitive spot in a skeletal muscle associated with a taut band which is painful on compression and refers pain in characteristic pattern for each muscle.<sup>[1]</sup> They can be activated directly by muscle overload, trauma and prolonged muscle contraction<sup>[1,2]</sup>. This type of tissue dysfunctions in musculoskeletal system happens due to continuous exposure to abnormal, adverse physical conditions during rest or in vocation leading to pain and injury in body especially in neck and shoulder.<sup>[3]</sup> Repetitive tasks with long static loads can also lead to Myofascial Pain Syndrome with MTrPs.<sup>[3]</sup>

In accordance to clinical manifestation, MTrPs are classified into Active and Latent Trigger points. Active MTrPs are those in which local and referred pain reproduce the symptoms described by the patient and the pain is recognized as usual and familiar, In contrast Latent Trigger Points (LTrPs) are those in which local and referred pain do not produce any familiar or usual symptoms for the individual.<sup>[1]</sup> They are not only prevalent in subjects with Musculoskeletal pain, but also prevalent in healthy subjects indicating a source of sensory-motor dysfunction.<sup>[4]</sup> The primary clinical relevance of LTrPs has been suggested to be potential precursor to Active MTrPs ultimately resulting in pain condition later.<sup>[5]</sup>

Upper Trapezius is a posture muscle and has a high susceptibility for overuse.<sup>[6]</sup> In previous studies, active and latent trigger points have been found in Upper Trapezius of symptomatic participants with shoulder pain, subacromial impingement, mechanical neck pain and chronic headaches.<sup>[7]</sup> The prevalence of LTrPs was found to be 23% and 20% in Left and Right Upper Trapezius respectively.<sup>[7]</sup>

No laboratory test or imaging technique has been established to diagnose MTrPs; however, several methods like thumb palpation, Pressure Pain Threshold (PPT), Surface Electromyography etc. are used.<sup>[8]</sup> An increase in PPT has been proposed as a suitable and reliable parameter in treating MTrPs.<sup>[9]</sup>

From Physiotherapy point of view, there are many approaches to treat MTrPs. Among Manual therapies; Stretching, Muscle Energy Technique (MET), Myofascial Release Technique (MFR), Kinesio-taping, and among Electrotherapeutic Modalities; TENS, LASER, Thermotherapy and in Invasive technique Dry Needling are common approaches. [10-12]

Instrument Assisted Soft Tissue Mobilization (IASTM) is a practical technique based upon the rationale introduced by James Cyriax. But in spite of utilizing digital cross friction like in Myofascial Release, IASTM is given using specially designed instrument. The instrument is bevelled in edges which minimizes the force applied by therapist but maximizes the force delivered to tissues. [6,13] In summary, the instrument provides therapist a mechanical advantage to treat with deeper force transmission. IASTM is theorized to increase vibration sense which also helps therapist to detect altered tissue properties. [13]

Previous studies have shown that effectiveness of IASTM in treating MTrPs, but no study has been done to find the efficacy of IASTM in Latent Trigger Points, that's why this study was to evaluate the effectiveness of IASTM on pain pressure threshold in latent trigger points in college going students.

## MATERIALS AND METHODS:

This study was conducted on Physiotherapy students at the National Institute for Locomotor Disabilities (Divyangjan), Kolkata, India. Approval of Institutional Ethical Committee (IEC) was taken before commencement of the study. The study employed a pilot design. To be eligible participants had to meet all inclusion criteria like: College students between the age groups of 18 to 30 years of both genders, having minimum one palpable nodule and hypersensitive tender spot in taut band present in Upper Trapezius muscle. Participants were excluded if any active Trigger points are found in Upper Trapezius, having history of any musculoskeletal injury in Cervical spine, presence of red flag sign like malignancy, diagnosed musculoskeletal condition like Fibromyalgia, neurological conditions like Stroke, Rheumatoid disorder and participants continuing other physiotherapeutic treatment in past months, subjects are not willing to take treatment or any adverse reactions while taking treatment.

Written consent of all subjects was taken prior to the intervention. 12 asymptomatic college students were approached initially with study proposal. Thereafter, through a primary assessment out of 12 participants by meeting all the above-mentioned inclusion and exclusion criteria, 10 participants of both genders were recruited in the study. Blinded Assessor with 10 years of clinical experience was associated with the assessment.

## OUTCOME MEASURES:

In this study, Pain sensitivity was measured by Pain Pressure Algometer at baseline and after 10 sessions of intervention. Subjects had to report when the feeling of pressure first changes into pain, during gradual pressure application through algometer by the therapist, perpendicular to the LTrPs such as the superior insertions of Upper trapezius muscle. The mean of 3 trials for each location was recorded by 30-second resting interval to avoid error and used for statistical analysis. The instrument was calibrated prior to intervention. Also, LTrPs were marked with piece of athletic tape to confirm consistency of subsequent treatments. The reliability of algometry has been found high (intraclass correlation coefficient, 0.91; 95% confidence interval [CI], 0.82-0.97) and the rate of the pressure exerted by the instrument should be constant at an approximate rate of  $1 \text{ kgcm}^{-2}\text{s}^{-1}$ .

## INTERVENTIONS:

All subjects received superficial heat by Moist Heat Pack for 10 minutes followed by IASTM using tools over LTrPs of Upper Trapezius Muscle in a multidirectional stroking fashion applied to the skin at  $45^\circ$  for 5 minutes. Subjects were in a comfortable position during treatment. IASTM was administered by a certified practitioner with 6 years of clinical experience and trained of using the same over patients. Emollient (anti-allergic) was applied to prevent skin irritation prior to Graston® application.

Each IASTM session included 2 minutes of sweeping (longitudinal strokes performed parallel to the muscle fibers), 1 minute of swivel (pivoting or rotating back & forth with knob directly over the LTrPs), 2 minutes of fanning (one end of the instrument was held in place & the other end moved through a semi-circular pattern). Graston® tool was washed in alcohol-based sanitizer before and after every treatment session.

Thereafter, subjects were asked to perform gentle self-stretching exercises to the tight, upper trapezius of the neck (30 secs hold for 5 repetitions) and Neck Isometric exercise (10 secs hold for 3 repetitions). All participants received IASTM 3 sessions per week for 2 weeks i.e. on 1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup> and 10<sup>th</sup> session. On 2<sup>nd</sup>, 4<sup>th</sup>, 7<sup>th</sup> and 9<sup>th</sup> day, subjects only received Moist Heat Pack and performed above mentioned self-exercise protocol. All the participants were advised to perform same Self-stretching exercise and Neck Isometrics exercise for another time at home daily.

## STATISTICAL ANALYSIS:

Primary analysis consisted descriptive statistics to calculate Mean and Standard Deviation. Student T test was used to compare the difference in Pain Pressure Threshold between pre and post intervention period. The level of significance was set at  $p < 0.05$  and the analysis was performed using SPSS version 22.

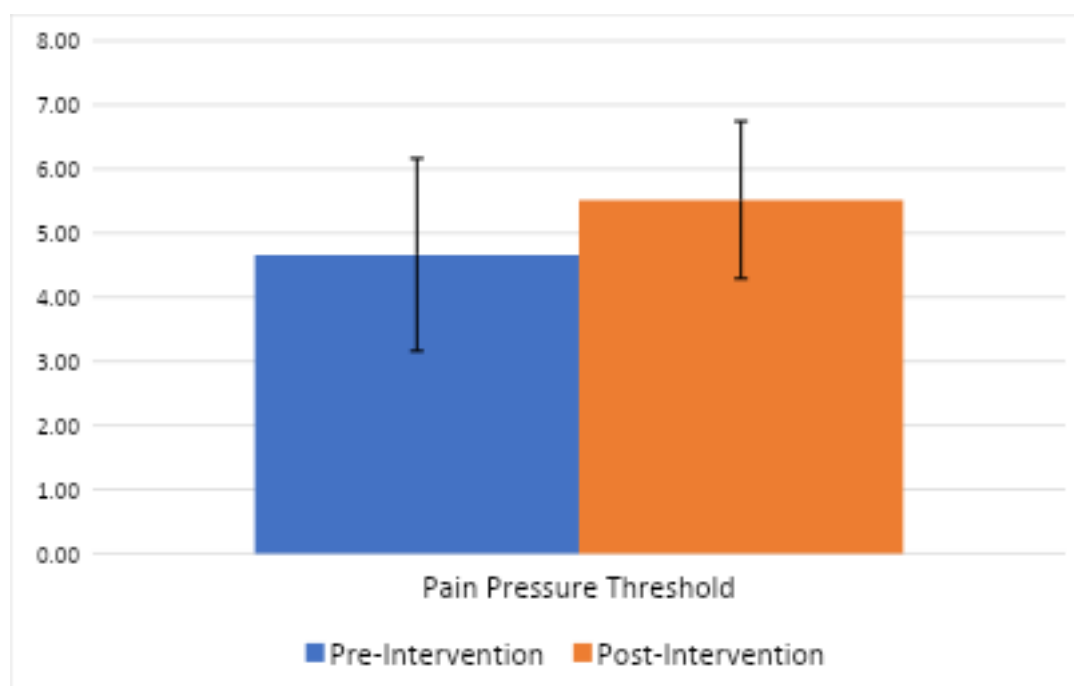
**RESULTS:**

Pain Pressure Threshold was measured at the baseline and after 10 sessions of treatment. The collected data was analysed using t-test. 10 subjects with a mean age of  $23.20 \pm 0.79$  years (mean  $\pm$  SD) were included in the study. Among the participants, 7 subjects are female and rest are male. The Pre-post mean changes are listed in Table 1 and Figure 1.

The findings clearly revealed that, after 10 sessions of interventions with 6 sessions of IASTM applications, a statistically significant outcome in Pain Pressure Threshold can be seen in all subjects.

**Table 1: Pre and Post Intervention comparison of Pain Pressure Threshold**

| Outcome Measure | Mean $\pm$ SD   | t - value | df | p - value |
|-----------------|-----------------|-----------|----|-----------|
| Pre - PPT       | 4.66 $\pm$ 1.50 | -2.984    | 9  | 0.015     |
| Post - PPT      | 5.51 $\pm$ 1.22 |           |    |           |



**Figure 1: Pre and Post Intervention comparison of Pain Pressure Threshold**

**DISCUSSION:**

Latent Trigger point is chronic and often occurring in Upper Trapezius muscle due to musculoskeletal dysfunctions in Cervical spine and Scapular Muscle, even in healthy individuals. In a study, Lucas et al.<sup>[17]</sup> found that, around 78.8% of healthy adults had at least one trigger point in upper trapezius muscle. With the influence of physical stress, it can often transform into Active Myofascial Trigger Point. These individuals may not have any kind of referred pain but they exhibit clinical features of muscle weakness, muscle stiffness, restricted ROM and accelerated fatigue<sup>[11]</sup>.

In our study, we recruited 10 physiotherapy college students with a mean age of  $23.20 \pm 0.79$  years who often acquire improper posture and are exposed to repetitive physical stress while rehabilitating patients in our department<sup>[18]</sup>. The subjects received Moist Hot Pack for 10 minutes, IASTM for 5 Minutes and then Self-stretching and Neck Isometric exercises.

Results revealed that, application of IASTM with Moist Heat Pack as an adjunct had a statistically significant effect in treating the Latent Trigger points, present in Upper Trapezius muscle. Similar results were found in the studies done by Gulick et al.<sup>[19]</sup> where the patients with Upper Traps MTrPs were treated with IASTM protocol, but in this study, the researcher did not differentiate between Active TrPs and Latent TrPs.

Thermotherapy already has proven vasodilation effects, resulting in a more relaxed muscle. Coupled with this, specially designed IASTM tool with bevelled edges minimizes the force used by the practitioner, but maximizes the force delivered to the tissue which results in a deeper penetration to the tissues when compared to digital cross friction. Studies with electron microscopy revealed that, after IASTM application, there is an improved collagen fibre bundle formation and realignment. This realignment of the collagen fibre results in decreased cell matrix adhesion within the MTrP causing reduction in pain<sup>[20]</sup>. With thermotherapy and IASTM, exercise like stretching can also help subjects in relieving pain by releasing the taut band<sup>[6]</sup>. Hence, the net reduction in PPT observed in our study is multifactorial and dependent on all of above.

**CONCLUSION:**

This study concludes that IASTM alongside Moist heat pack is an effective intervention for the treatment of Latent Trigger Points in college going students.

**LIMITATION:**

This Pilot study was conducted to test the efficacy of IASTM on pain in LTrPs. The generalizability of this study is limited due to the sample size and study design. Hence further studies employing greater number of participants and having control groups should be adopted to ensure more generalized results. A true representation of the population could also be obtained if study is conducted in multiple centres, as the physical stress on students varies depending on case load in different hospitals.

A follow up study could also be carried out to determine the time frame for which the efficacy obtained lasts in the subjects.

Recent studies demonstrated a restricted Range of Motion, Muscle weakness and accelerated muscle fatigue present in the subjects with LTrPs. Hence, the effect of IASTM on Range of motion and Function in LTrPs could also be explored.

**CONFLICT OF INTEREST:**

None.

**ACKNOWLEDGEMENT :**

We are able to declare that there has been no financial support for this project. We would like to express our sincere thanks to students and the college authority to allow me to attend for data collection.

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