

Effectiveness of Integrated Neuromuscular Inhibition Technique and Instrument Assisted Soft Tissue Mobilisation in the Management of Upper Trapezius Myofascial Trigger Points

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Abstract

Background: This study was designed to inspect the effectiveness of Integrated Neuromuscular Inhibition Technique (INIT) and Instrument Assisted Soft Tissue Mobilisation (IASTM) on Upper Trapezius Myofascial Trigger Points.

Purpose: To compare the effectiveness of integrated neuromuscular inhibition technique and instrument assisted soft tissue mobilization in the management of upper trapezius myofascial trigger point

Materials and Methods: Sixty subjects with Active Trigger Points (53 females and 7 males) were divided randomly into two equal groups. Group "A" received INIT three times/week while Group "B" received IASTM once/week for two weeks. Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI) and Active Cervical Range Of Motion (CROM) were used to evaluate subjects at two intervals (Pre-Treatment and Post-Treatment).

Results: Statistical analysis show that there is a significant change within-group for NPRS, NDI and CROM (Lateral Flexion) pre and post treatment with a $p < 0.0001$ for both Groups A and B. Between-group analysis is statistically significant with $p = 0.0026$ for NPRS, $p = 0.0569$ for NDI and $p < 0.0001$ for AROM thus with superiority for INIT in reducing pain and improving ROM.

Conclusion: Integrated Neuromuscular Inhibition Technique is more effective than Instrument Assisted Soft Tissue Mobilisation in the Management of Upper Myofascial Trigger Points.

Key Word: Integrated Neuromuscular Inhibition Technique (INIT), Instrument Assisted Soft Tissue Mobilisation (IASTM), Myofascial Trigger Points.

Introduction

The cervical spine is the most intricate region of the spine, and so are the muscles of that region.

Neck and shoulder muscles work as a unit, every upper extremity movement will be reflected in the neck musculature. There is substantial evidence that

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such ergonomic risk factors as repetition, awkward posture, contact stress and force if exceeds workers biomechanical capabilities, it may lead to work-related mechanical neck pain¹.

Integrated Neuromuscular Inhibition Technique (INIT) is used to decrease the pain intensity, increase the function and range of motion due to the increased blood supply by intermittent pressure, muscle relaxation by strain-counterstrain and tone reduction by muscle energy technique².

Instrument Assisted Soft Tissue Mobilisation (IASTM) is the use of a specially designed instrument to mobilize soft tissue, with the aim of reducing pain and improving the range of motion and function. IASTM minimizes stress on practitioner's hand and enables greater penetration and better access to fascia and release restrictions³.

AIM

To compare the effectiveness of Integrated Neuromuscular Inhibition Technique and Instrument Assisted Soft Tissue Mobilisation in the Management of Upper Trapezius Myofascial Trigger Points.

Material and Method

It was an experimental study conducted on 60 subjects with Upper Trapezius Trigger Points, age between 20-26 yrs was taken from NDMVP hospital. Convenient sampling with random allocation method was used in the study.

Inclusion criteria:

- Age group 20 to 26 years².
- Pain of more than 3 but not more than 7 on Numeric Pain Rating Scale (NPRS)^{4,5}.
- Average time of computer work of at least 14hours/week^{6,7}.
- Reduced cervical range of motion (Lateral flexion)².

Exclusion criteria:

- Received treatment for upper trapezius trigger points in the past 3 months².

- Cervical spine surgery in the previous 12 months^{8,9}.
- Whiplash injury in the previous 6 months¹⁰.
- Malignancy².
- Fractures of the cervical spine in the previous 12 months⁷.
- Cervical radiculopathy².
- Bilateral upper trapezius trigger points².

Outcome measures:

Assessment was performed at baseline (before starting of treatment) and after two weeks of study.

- Numeric Pain Rating Scale (NPRS)^{4,5,11}
- Neck Disability Index (NDI)^{2,12}
- Active Cervical range of motion^{2,4,13}

Procedure

Participants were included considering the inclusion and exclusion criteria. Procedure was explained to the participant & participants were then asked to sign the consent form. Assessment of all the included participants was done according to the assessment form. Participants were randomly divided into two groups i.e group 'A' and 'B'. Assessment was performed at baseline and after 2 weeks of study.

Group A: Integrated Neuromuscular Inhibition Technique (INIT):

1. Ischemic compression technique: *Subject position:* To reduce tension at the upper fiber of trapezius the subject was positioned at supine. *Therapist position:* To perform Ischemic compression to the upper trapezius, the therapist stood at the head of the couch near the affected side. *Technique:* The therapist used a pincer grip moved throughout the fibers of the upper trapezius and made note of any active trigger points. Once the trigger point was identified, therapist applied an intermittent ischemic compression by using thumb and index finger (pincer grip). The pressure was applied in an interrupted pathway five seconds on and five seconds off then continuously for 90secs depending on the tolerability of subjects. *Repetitions:* 1 time/session¹⁴. *Duration:* 3 sessions/week for 2 weeks¹⁵



Fig 1: Ischemic Compression

2. Strain- Counterstrain technique: *Subject Position:* To reduce tension at the upper fiber of trapezius the subject was positioned at supine. *Therapist Position:* To perform Strain- Counterstrain to the upper trapezius, the therapist stood at the head of the couch near the affected side. *Technique:* The therapist applied pressure at trigger point and the subject was asked about the level of pain. The subject's head was laterally flexed towards the affected side passively by one hand of the therapist. The other hand held the subject's forearm and moved the affected side shoulder passively to 90degree of abduction and external rotation. The position was maintained for 90 secs. After 90secs the subject was brought back to original position passively and slowly. The therapist asked the patient about the degree of pain. A sense of "ease" was noted as the tissues reached the position in which pain vanished from the palpated point nearly by 70%. *Repetitions:* 1 time/session¹⁶. *Duration:* 3sessions/week for 2 weeks.¹



Fig 2: Strain Counter Strain

3. Muscle Energy Technique (MET): *Subject position:* To reduce tension at the upper fiber of trapezius the subject was positioned at supine. *Therapist Position:* The therapist stood at the head of the couch near the affected side. *Technique:* The subject was asked to laterally flex the neck to opposite side just short of the restriction barrier. The affected side shoulder was stabilized by one hand of the therapist and the other hand on the mastoid area at the side of the head. The subject was requested to move the stabilized shoulder and ear towards each other. The contraction was maintained for 10 sec with 20% of maximum voluntary contraction, followed by 5 seconds of relaxation. The muscle was stretched by laterally flexing the neck to opposite side. The stretch was maintained for 30 secs. *Repetitions:* 3 times/session². *Duration:* 3 sessions/week for 2 weeks¹⁵.



Fig 3: MET and Upper Trapezius Stretching.

GROUP B: Instrument Assisted Soft Tissue Mobilisation (IASTM):

Subject position: The subject was seated in a comfortable position with his forehead resting on his or her forearm on a table in front of him or her. *Therapist position:* The therapist stood behind the subject near the affected side. *Technique:* A lubricant was applied to the skin prior to the treatment. First the tool was used to find the areas of restriction. Sweeping technique- The M2T blade was used at an angle of 45 degrees to apply slow stroke along the upper trapezius muscle from its origin to insertion. *Treatment duration:* 3 mins. The technique was performed without causing any discomfort or pain to the subject. The muscle was passively stretched by laterally flexing the neck to opposite side. The stretch was maintained for 30 secs and was repeated 3 times. *Duration:* 1 session/week for 2 weeks¹⁷.



Fig. 4: IASTM Technique and Upper Trapezius Stretching

Home exercise programme:

1. **Chin tucks**¹: The subject held the position for 10 secs and then relaxed. *Repetitions:* 10 repetitions/day for 2 weeks¹⁸.
2. **Shoulder shrugs**¹: The position was held for 2secs.. *Repetitions:* 10 repetitions/day for 2 weeks¹⁸.
3. **Neck Isometrics**¹:
 - *Neck Flexion*:. The position was held for 5-8secs.
 - *Neck Extension*: The position was held for 5-8secs.
 - *Neck Lateral Flexion*: The position was held for 5-8secs.
 - *Neck Rotation*: The position was held for 5-8secs and was repeated the same for left side rotation.
 - *Repetitions:* 10 repetitions/day for 2 weeks¹⁸.
4. **Self Stretch**^{1,3}: The stretch was held for 30 secs. *Repetitions:* 3 times/session³. *Duration:* 5 times/week for 2 weeks³.

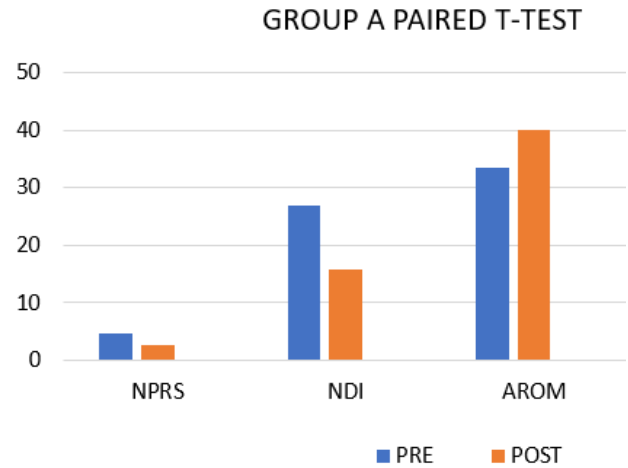
Ergonomic Advices:

Ergonomic advices are used to improve workspaces and minimize the risk of injury¹.

- ❖ General Ergonomics modifications:
 - Neck should not be maintained in a fixed position for long.
 - Lifting heavy weight on head and shoulder should be avoided.
 - Holding phone in between neck and shoulder should be avoided.
 - Good posture during work should be maintained.

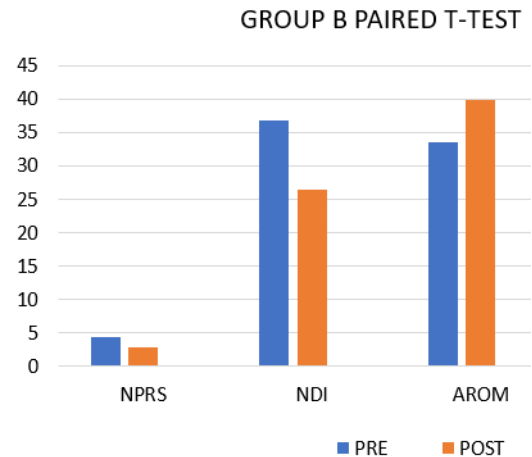
- ❖ Ergonomics modifications for computer users:
 - Top of the monitor should be positioned at eye level.
 - Head should be neutral and chin parallel to the ground.
 - Back should be rested comfortably against the backrest at the chair.
 - Chair with good lumbar support should be used.
 - Elbows should be bent at 90degree and should close to the body.
 - Fingers must be relaxed and wrist should be neutral.

DATA ANALYSIS



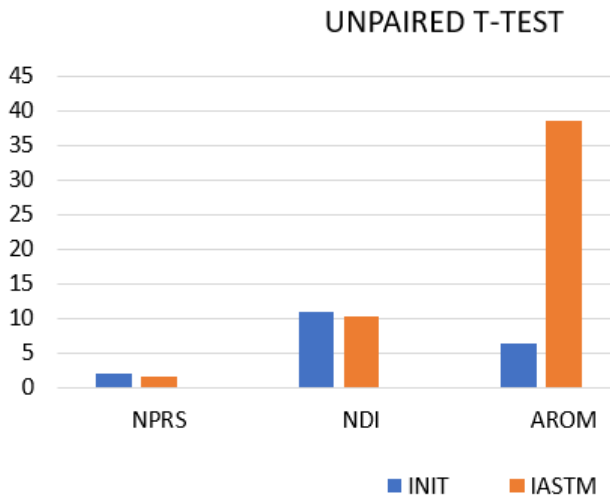
Graph No. 1:

INTERPRETATION: Graph No.1 shows that the values are extremely statistically significant.



Graph No. 2:

INTERPRETATION: Graph No.2 shows that the values are extremely statistically significant.



Graph No. 3:

INTERPRETATION: Graph No.3 shows that the value are extremely statistically significant

Result

- The study was conducted on 60 subjects. Both the group had 30 subjects each.
- For NPRS, the mean was 2.10 for Group A (INIT) and 1.60 for Group B (IASTM), p value was =0.0026 and t value was =3.1514 which shows that the result was very statistically significant.
- For NDI, the mean was 11.07 for Group A (INIT) and 10.32 for Group B (IASTM), p value was =0.0569 and t value was =0.7503 which shows that the result was not quite statistically significant.
- For AROM, the mean was 6.47 for Group A (INIT) and 4.70 for Group B (IASTM), p value was <0.0001 and t value was =1.77 which shows that the result was extremely statistically significant.

Discussion

The purpose of this study was to compare the effectiveness of Integrated Neuromuscular Inhibition Technique and Instrument Assisted Soft Tissue Mobilisation in the Management of Upper Trapezius Myofascial Trigger Points.

In this study, 60 subject were assigned, 30 were

in Group A and 30 in Group B. Group A received INIT 3 sessions/week and Group B received IASTM 1 session/week for a duration of 2 weeks. Both these groups received same set of Home Exercise Program and Ergonomic Advice.

The outcome measures were NPRS, NDI and AROM performed at baseline and after 2 weeks of study.

According to Graph no.2, IASTM is effective in reducing the pain and disability and improving ROM. This may come from its ability to induce tissue micro-trauma, thus resulting in regional inflammatory process and increases the release of fibroblast. In, addition, the friction between tissue and the instrument increases the local temperature which improves tissue oxygenation and removes local waste metabolites. M2T blade is been used to soften tight fascia by applying rhythmic strokes over the fascia till the adhesions and cross-linkages are broken and release of the fascia occurred³.

According to Graph no.3 the present study shows improvement in both the groups i.e. INIT and IASTM for all measured variables but the superiority for INIT in reducing the pain and functional disability and improving ROM.

The effect of INIT is the result of combined effect of three manual treatment techniques. Firstly, Intermittent Ischemic Compression-Alternating pressure allows a pumping effect, a flushing, as compression is released. It allows a circulatory influence on the ischemic tissues. Lighter compression, meets tissue tension, engaging the restriction barrier and allows gentle stretching of the affected tissues. It plays its role in reduction of pain by stimulation of A-beta fibres that affects the pain gate during pressure and increase circulation when the pressure is released. This allows a drainage of the cellular metabolic byproducts commonly associated with the pain production in the MTrP. Thus, this technique restores a normal metabolic functioning of the tissue which is affected. Ischemic Compression decreases the sensitivity of painful nodules in muscles and the local pressure works to equalize the length of sarcomeres in the involved TrP and consequently decreases the pain.

Secondly, Strain-Counterstrain allows improvement of function and ROM by placing the muscle at the passive shortened position. This technique acts on the muscle spindle mechanism and its associated reflex mechanism (which controls spasm) to promote more normal firing of the spindle and a more normal level of tension in the muscle which results in more normal relationship within the various soft tissues surrounding that area. This resetting occurs only when the muscle is at ease, thus works to reduce the hyperactivity of the myotatic reflex arc and to reduce overwhelming afferent nerve impulses leading to overflow of neurotransmitters.

Finally, MET plays an important role in improving the function by working on autogenic inhibition of muscle and increases ROM by changes in muscle extensibility- reflex relaxation, viscoelastic changes and stretch changes. After 7-10 secs of an isometric contraction, muscle tension increases and activates the Golgi Tendon Organ (GTO) leading to relaxation of the muscle by autogenic inhibition thus allowing for an effective stretching of the muscle.^{1,2,9,19,20}

The consequence of this research came in agreement with Alshaymaa S Abd El-Azeim, , Salah Eldin B Ahmed et.al (2018) who concluded that the subjects who received INIT found a more significant improvement in VAS, Arabic Neck Disability Index and CROM in patients with Upper Trapezius Myofascial Trigger Points².

Dr. Pooja Wakde, Dr. Deepak Anap concluded that INIT was effective in decreasing the pain and disability, improving muscle strength and ROM in participants with sub-acute trapezitis¹⁸.

Abdul Rashad, Erum Tanveer, et.al concluded that INIT was found to be effective in reducing pain and improving CROM in patients with Upper Trapezius Trigger Points²¹.

Amit V Nagrale, Paul Glynn, et.al concluded that INIT has proven to be more beneficial in relieving pain, reducing stiffness and improving functional stability as compared to MET in isolation in patients with Upper Trapezius Trigger Points²⁰.

Conclusion

Integrated Neuromuscular Inhibition Technique

is more effective than Instrument Assisted Soft Tissue Mobilisation in the Management of Upper Trapezius Myofascial Trigger Points.

Ethical Clearance: Taken from institutional ethical committee

Funding: Self

Conflict of Interest: Nil

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