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ORIGINAL ARTICLE

EFFECT OF INSTRUMENT ASSISTED SOFT TISSUE MANIPULATION VERSUS POSITIONAL RELEASE THERAPY ON PAIN AND FUNCTIONAL DISABILITY ON UNILATERAL UPPER TRAPEZITIS: A COMPARATIVE STUDY

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ABSTRACT:

Background: Trapezitis is an inflammation of the trapezius muscle leads to formation of myofascial trigger points which will get aggravated by improper posture which is causing pain, reduced range of motion and functional disability. Instrument assisted soft tissue manipulation and positional release therapy will help to release myofascial trigger points to restore the muscle structure and function.

Methodology: Randomized comparative clinical trial was conducted on 78 subjects identified with unilateral upper trapezitis were screened for eligibility and 60 subjects satisfied the inclusion and exclusion criteria and agreed to participate in the study were randomly allocated into two groups were Group A (n=30) received instrument assisted soft tissue manipulation and Group B(n=30) received positional release therapy. Both the groups received 3session/week for 4weeks. The outcome was measured during the first day and at the end 4th week of intervention using VAS and neck disability index for pain and functional disability. Data normality was assessed using the Shapiro-wilk test. With-in group comparisons were analyzed using paired t-tests. Statistical significance was set at $p<0.05$.

Results: Both groups demonstrated statistically significant improvements in pain and functional disability following intervention ($p < 0.001$). Group A showed a greater reduction in VAS and NDI scores compared to Group B. Between-group analysis revealed NDI score was 18.77±3.92 in group A and 14.90 ± 3.54 in group B ($t=4.012$, $p<0.001$) indicating that group A experience a greater reduction in neck disability index compared to group B and the mean VAS scores was statistically higher in group A(6.17 ± 1.12) compared to group B(3.93 ±0.94),indicating that group A experienced a greater reduction in pain compared to group B.

Conclusion: Both IASTM and PRT were effective in reducing pain and improing functional disability in unilateral upper trapezitis. However, IASTM demonstrated superior clinical outcomes compared to PRT.

Keywords: Upper trapezitis, instrument assisted soft tissue manipulation, positional release therapy, neck disability index, Visual Analogue Scale.

INTRODUCTION:

Pain in the shoulder and cervical region is the one of the prevalent musculoskeletal problems among working population[1]. With a frequency of 75.7%, neck pain is the most prevalent kind of pain in non-traumatic musculoskeletal conditions[2]. It has grown to be a serious health issue for both working individual and the general public[3]. 14.2–71% of people experience this problem at some point in their lives[4]. There are several pathologies that have been found to cause neck pain, and upper trapezitis is one of the common ones.

When the trapezius muscle becomes inflamed, it can cause pain and spasm in the neck, which is known as trapezitis[5]. The most common musculoskeletal disorder affecting workers who perform repetitive motions for extended periods of time while in an unpleasant neck position is caused by pain and spasms in the trapezius muscles [6,7].

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Because it can result in excruciating pain, limit range of motion (ROM), and inhibiting functional tasks, upper trapezitis should be treated as part of an extensive physical therapy program[8]. Upper trapezius muscle are more often gets uncomfortable and tight in neck region. As a result, returning the tight muscle to its normal length should be the main focus of the initial phase of the therapy[9].

Positional release therapy (PRT) is a passive, indirect manual treatment that relieves musculoskeletal pain and related dysfunctions by using comfort positions and sensitivity spots. Using palpation of tender areas as a guide, the affected section of the body is moved through all three planes of movement in this approach to find the position that is most comfortable (typically the shortened position of a muscle). Pressure applied to the comfortable posture (for 90 seconds in orthopedic patients and 3 minutes in neurologic patients) causes physiological reactions in tissues that are therapeutically significant, which alleviates pain, improves mobility, and resolves dysfunction [10]

Instrument-Assisted Soft Tissue Mobilization (IASTM) is a specialized manual therapy technique widely used for the management of myofascial trigger points and associated musculoskeletal pain. It involves the application of specially designed instruments to identify and treat soft tissue dysfunctions, with the objective of reducing pain and improving mobility and functional performance. The use of instruments also minimizes strain on the clinician's hands and allows precise access to deeper fascial layers and tissue restrictions [11].

IASTM instruments are typically constructed from stainless steel or similar materials and feature beveled edges and specific contours. These design characteristics enhance the clinician's ability to detect and treat adhesions, scar tissue, and fascial restrictions that may not be easily identified through manual palpation alone [12].

The application of IASTM generally follows a standardized rehabilitation protocol that includes examination, warm-up, IASTM application, stretching, strengthening exercises, and cryotherapy. A lubricant is applied to reduce skin friction and facilitate smooth instrument movement. Controlled mechanical pressure is applied along the direction of the affected soft tissues using techniques such as scraping and cross-friction massage to promote circulation, break down adhesions, and facilitate tissue healing. Mild treatment-related discomfort may occur but is typically followed by a reduction in pain and improvement in range of motion [13].

A key advantage of IASTM is its ability to target localized soft tissue dysfunctions with greater precision and consistency compared to conventional manual techniques. The ergonomic design of the instruments allows effective pressure application while reducing therapist fatigue. IASTM is often integrated with other therapeutic interventions, including stretching, strengthening exercises, and electrotherapeutic modalities, to enhance clinical outcomes [13].

Current literature supports the effectiveness of IASTM in the management of conditions such as tendinopathy, myofascial pain syndrome, and chronic musculoskeletal disorders. When performed by trained healthcare professionals, IASTM is considered a safe and effective intervention for improving pain, mobility, and functional recovery. Continued research is essential to further establish its clinical efficacy and optimize treatment protocols[13].

NEED OF THE STUDY

Unilateral upper trapezitis is a frequently encountered musculoskeletal disorder that leads to pain, muscle tightness, reduced cervical mobility, and functional limitations, especially in individuals exposed to prolonged sitting and poor posture.

Although Instrument-Assisted Soft Tissue Mobilization (IASTM) and Positional Release Therapy (PRT) are commonly used physiotherapeutic interventions for managing myofascial pain, there is limited comparative evidence regarding their effectiveness specifically in unilateral upper trapezitis. Most existing studies focus on nonspecific neck pain rather than isolated involvement of the upper trapezius muscle. Therefore, this study is needed to compare the effects of IASTM and PRT on pain intensity and functional disability using standardized outcome measures such as the Visual Analogue Scale and Neck Disability Index. The results will support evidence-based clinical decision-making and contribute focused research on trapezius-specific myofascial dysfunction.

METHODOLOGY:

The present study was conducted in the Outpatient Department of Physiotherapy at Acharya Institute of Health Sciences, Bangalore. Data collection for the study was carried out over a period of four weeks.

A randomized comparative clinical trial design was adopted to compare the effects of Instrument Assisted Soft Tissue Manipulation and Positional Release Therapy in individuals with unilateral upper trapezitis. Participants were randomly allocated into two groups using block randomization. Allocation concealment was ensured through the use of sealed opaque envelopes to minimize selection bias.

Ethical approval for the study was obtained from the Institutional Ethical Committee of Acharya Institute of Health Sciences, Bangalore (IEC Approval No: AIHS/MPT/ETHICAL REVIEW/3790/24). Prior to participation, all subjects were informed about the nature and purpose of the study, and written informed consent was obtained from each participant.

The sampling method used in the study was simple random sampling. The sample size was calculated based on a previous study conducted by Shweta Agarwal et al., which reported a standard deviation of the Neck Disability Index (NDI) in patients with upper trapezitis as 10.54. Using this value as a reference, the sample size estimation was performed considering a 95% confidence level, 80% statistical power, and an expected clinically significant difference of 7.8. Based on these parameters, the calculated sample size was 29 participants per group. To account for a possible attrition rate of 5%, the final sample size was adjusted to 30 participants per group. The formula used for calculation was:

$$N = 2 \times \frac{[Z(\alpha/2) + Z(\beta)]^2}{d^2}$$

where power = 80% (Zβ = 0.84), confidence level = 95% (Zα/2 = 1.96), and the expected difference (d) = 7.8.

During the screening process, a total of 78 individuals presenting with neck pain were assessed for eligibility. Out of these, 18 participants were excluded either because they did not meet the inclusion criteria or were unwilling to participate in the study. Finally, 60 eligible participants were recruited and randomly allocated into two groups, with 30 participants assigned to each group.

Participants included in the study were individuals aged between 18 and 45 years, both male and female, who were willing to participate. All subjects were diagnosed with unilateral upper trapezitis characterized by the presence of a taut band, trigger points, and localized tenderness. Participants also demonstrated restricted cervical range of motion between 0° and 15°, a Visual Analogue Scale (VAS) score between 5 and 10, and a Neck Disability Index score indicating moderate disability (15–24) to severe disability (25–34).

Participants were excluded if they were unwilling to participate or belonged to pediatric or geriatric age groups. Individuals with cervical radiculopathy or myelopathy were also excluded. Additional exclusion criteria included fractures in the cervical or thoracic region, scapula, clavicle, or humerus; cervical prolapsed intervertebral disc; spondylolisthesis; benign or malignant tumors; open wounds, unhealed scars, or early bruising in the treatment area; cervical instability or other degenerative cervical disorders; and any recent surgery involving the shoulder or cervical region.

Trigger points in the upper trapezius muscle were identified using standardized diagnostic criteria described by Janet G. Travell and David G. Simons. The identification involved the presence of a palpable taut band within the muscle, a hypersensitive tender spot within the taut band, reproduction of the patient's familiar pain upon palpation, and the presence of a local twitch response or jump sign.

Figure 1: Study tools

PROCEDURE

Seventy-eight subjects were screened from the OPD of Acharya Institute of Health Sciences and JMJ Hospital, of which 60subjects with unilateral upper trapezitis met the inclusion criteria and were recruited for the study. Pre-treatment measurements of pain and functional disability were recorded using the Visual Analog Scale (VAS) and Neck Disability Index (NDI). After explaining the procedure in a language, they could understand and obtaining written consent, participants were randomly assigned to Group A (Instrument Assisted Soft Tissue Manipulation) or Group B (Positional Release Therapy) using block randomization with allocation concealment via sealed opaque envelopes. Both groups received treatment thrice weekly for 4 weeks, with each 30-minute session including 10 minutes of the respective therapy, 15 minutes of strengthening and stretching exercises, and 5 minutes of cryotherapy. Post-treatment measurements of pain and functional disability were recorded.

The techniques followed were

GROUP A: INSTRUMENT ASSISTED SOFT TISSUE MANIPULATION (IASTM)

Step 1: Patient Assessment & Preparation

The therapist assessed history, symptoms, cervical ROM, pain intensity, trigger points, and tissue response (jump sign/redness). The procedure, purpose, and benefits were explained, and the patient was positioned comfortably with the upper trapezius exposed.

Step 2: Instrument Selection

A suitable IASTM tool (M2T stainless steel instrument) was selected.

Step 3: Lubricant Application

A thin layer of lubricant (ultrasound gel) was applied to allow smooth instrument glide.

Step 4: Identification of Treatment Area

Painful and dysfunctional areas of the upper trapezius were identified through palpation and clinical assessment.

Step 5: Treatment Technique

The instrument was held firmly and applied at a 30–60° angle. Parallel strokes to muscle fibers: 20 seconds Perpendicular strokes: 20 seconds Total: 40 seconds per cycle, repeated 3–5 times per session, three sessions per week for four weeks.

Step 6: Feedback & Adjustment

Patient feedback and tissue response were continuously monitored, with adjustments made to pressure and technique as needed.

Step 7: Post-Treatment Care

The area was cleaned, followed by cryotherapy for 5–10 minutes to reduce pain and inflammation. Post-treatment and home-care instructions were provided.

Step 8: Follow-Up & Documentation

Sessions were scheduled three times weekly for four weeks. Treatment details and patient responses were documented for evaluation.

Step 9: The patient was educated on stretching and strengthening exercises to maintain benefits and prevent recurrence.

Figure 2: Application of IASTM

GROUP B: POSITIONAL RELEASE THERAPY[PRT]

- Make sure patient and clinician relax
- Subject in supine position while therapist sitting/standing on the affected side.
- Checked for the trigger points in the upper fibers of the trapezius.
- The subject's head was laterally flexed toward the side of the trigger point. The therapist then grasped the subject's forearm on the affected side and abduct the shoulder to approximately 90°, adding slight flexion or extension to fine-tune the position. Once the ideal position of comfort is achieved, that position was held for a period of 90 seconds, followed by a passive return of the body part to an anatomically neutral position. This procedure was repeated 3-5 times per session, three times a week, for a duration of four weeks.

Figure 3: Positional release therapy

STRETCHING FOR UPPER TRAPEZIUS MUSCLE:[15]

1. Sit up straight in a sturdy chair with your head and neck in a neutral position, ears in line with shoulders.
2. Hold the underside with the arm of the tight side. pull the head back. bend the head away from the tight side and turn the head towards the tight side. It won't go very far. lean away from the arm holding onto the chair and reach with opposite arm to the top of head and gently pull to increase the stretch. Hold this for 30seconds.
3. Return your head and neck to the neutral position.
4. Repeat this exercise for 2 to 3 repetitions, twice every day for 4weeks.
5. Switch sides and repeat for 2 to 3 repetitions, twice every day for 4weeks.

Figure 4: Streching of upper trapezius muscles

STRENGTHENING EXERCISES:

1. ISOMETRIC SHOULDER SHRUGS:[16]

- Sit or stand with your back straight. Place your hands on the sides of your head and press your head into your hands while simultaneously trying to elevate your shoulders.
- Hold this contraction for several seconds and then relax. Repeat this exercise for 10 repetitions, twice every day for 4weeks.

Figure 5: Isometric Shoulder Shrugs

2. SHOULDER SHRUGS[16]

Stand or sit upright with your arms at your sides. Lift your shoulders towards your ears as high as you can, hold briefly, and then lower them back down. Repeat this exercise for 10 repetitions, twice every day for 4weeks. Later progress with weights (dumbbells or barbells) for added resistance after 5sessions.

Figure 6 : Shoulder shrugs

3. PRONE Y-T-W-I:[17]

- Lie face down on a bench or on the floor with your arms extended overhead in a Y position. Lift your arms off the ground while squeezing your shoulder blades together. Then move your arms to form a T, then a W, and finally an I position, each time lifting and squeezing your shoulder blades. Repeat this exercise 10 repetitions, twice every day for 4weeks.
- Later progress with weights (dumbbells or barbells) for added resistance after 5sessions.

Figure 7: Prone Y-T-W

4. UPRIGHT ROWS:[18]

Hold a barbell or dumbbells in front of your thighs with an overhand grip. Lift the weight towards your chin, keeping your elbows higher than your forearms. Repeat this exercise for 10 repetitions, twice every day for 4weeks.

Figure 8: Upright rows

5. FACE PULLS:[19]

· Attach a rope to a cable machine at about face height. Grasp the rope with both hands, step back, and pull the rope towards your face, keeping your elbows high and pulling your shoulder blades together. Repeat this exercise for 10 repetitions, twice every day for 4weeks.

Figure 9: Face pulls

RESULT

STATISTICAL ANALYSIS

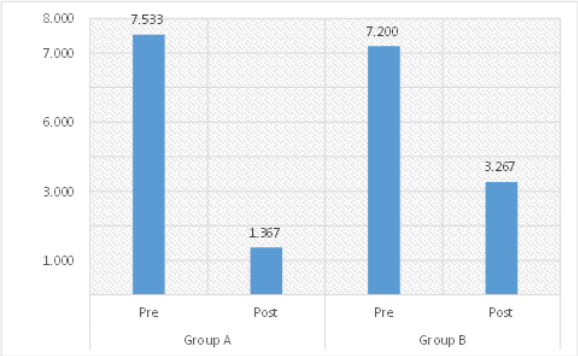
The statistical analysis was done using SPSS 23.0. The categorical variables were represented in frequency and percentage. Numerical variables were presented using mean and standard deviation. Pre post comparison was done using Paired sample t test. Comparison between groups was done using unpaired sample t test. Categorical variables were analyzed using Chi square test.

Table 1: Showing pre post comparison of VAS in Group A and Group B

		Mean	Std. Deviation	Average Improvement	t value	p value
Group A	Pre	7.533	0.819	6.167	30.245	p<0.001
	Post	1.367	1.033			
Group B	Pre	7.200	0.997	3.933	22.811	p<0.001
	Post	3.267	0.980			

In Group A, the VAS score significantly decreased from 7.53 ± 0.82 before the intervention to

1.37 ± 1.03 after the intervention, showing an average improvement of 6.17 points ($t = 30.245$, $p < 0.001$). In Group B, the VAS score reduced from 7.20 ± 1.00 to 3.27 ± 0.98, with an average improvement of 3.93 points ($t = 22.811$, $p < 0.001$). The analysis shows a significant improvement in VAS scores after the intervention in both Group A and Group B.



Graph 1: Representation of VAS in Group A and Group B

Table 2: Showing pre post comparison of NDI in Group A and Group B

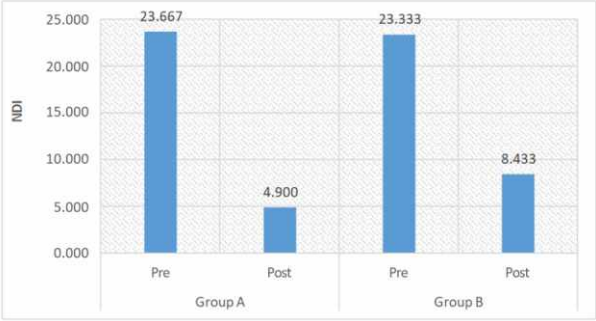
		Mean	Std. Deviation	Average Improvement	t value	p value
Group A	Pre	23.667	4.551	18.767	26.229	p<0.001
	Post	4.900	2.107			
Group B	Pre	23.333	4.787	14.900	23.077	p<0.001
	Post	8.433	2.750			

The NDI score in Group A showed a significant reduction from 23.67 ± 4.55 pre-intervention to

4.90 ± 2.11 post-intervention, with an average improvement of 18.77 points ($t = 26.229$, $p < 0.001$).

In Group B, the NDI score also decreased significantly from 23.33 ± 4.79 to 8.43 ± 2.75, showing an average improvement of 14.90 points ($t = 23.077, p < 0.001$).

The analysis shows a significant improvement in NDI scores after the intervention in both Group A and Group B.



Graph 3: Representation of NDI in Group A and Group B

DISCUSSION

The objective of the study was to compare the effect of instrument assisted soft manipulation with positional release therapy on neck pain and functional disability in patients with unilateral upper trapezitis. the outcome measures used were visual analogue scale and neck disability index measuring pain and functional disability. These outcomes were measured prior to the treatment and post the treatment for both the groups. A total of 60 subjects, both males and females who met inclusion criteria were recruited for the study. Out of this a total of 30 subjects in group A and 30 subjects in group B completed the treatment for 4 weeks (thrice/week). Group A was given instrument assisted soft tissue manipulation and group B was given positional release therapy.

The present study demonstrated that both Instrument Assisted Soft Tissue Manipulation (IASTM) and Positional Release Therapy (PRT) were effective in reducing pain and functional disability in individuals with unilateral upper trapezitis. However, participants who received IASTM showed greater reductions in Visual Analogue Scale and Neck Disability Index scores compared to those treated with PRT.

The superior outcomes observed with IASTM can be attributed to its direct mechanical influence on the soft tissues commonly involved in upper trapezitis, such as myofascial tightness, trigger points, and adhesions. By applying controlled mechanical stress, IASTM facilitates release of soft tissue restrictions, improves tissue extensibility, and enhances local circulation, resulting in more pronounced pain reduction and functional improvement. These findings are in agreement with previous studies reporting favorable outcomes following IASTM in myofascial pain and cervical musculoskeletal disorders.[20,21]

Although PRT was effective in reducing pain and improving function, its therapeutic action is primarily directed toward reducing neuro-muscular tone through positioning techniques. As PRT does not directly target deeper soft tissue restrictions, the magnitude of improvement observed was lower compared to IASTM. Overall, while both interventions demonstrated clinical effectiveness, IASTM produced superior outcomes in the management of unilateral upper trapezitis

LIMITATIONS

Study was conducted on a limited sample size of 60 participants from a single clinical setting, which may restrict the generalizability of the findings to a wider population. The intervention period was limited to 4 weeks with no long-term follow-up to evaluate the sustained effects of the treatments.

CONCLUSION

The present study demonstrated that both Instrument Assisted Soft Tissue Manipulation (IASTM) and Positional Release Therapy (PRT) were effective in reducing pain and functional disability in individuals with unilateral upper trapezitis. Comparative analysis showed greater improvement in Visual Analogue Scale and Neck Disability Index scores in the IASTM group when compared to the PRT group.

These findings indicate that both interventions are beneficial in the management of unilateral upper trapezitis, with IASTM producing greater reductions in pain and disability within the scope of this study.

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Conflict of Interest: There is no Conflict of Interest.

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