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EFFICACY OF INSTRUMENT-ASSISTED SOFT TISSUE MOBILISATION AND MANUAL MYOFASCIAL RELEASE ALONG WITH CONVENTIONAL THERAPY FOR NECK PAIN

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ABSTRACT

Cervical discomfort that lasts for at least a day and may radiate to one or both limbs is the hallmark of neck pain. A decrease in quality of life and a higher risk of functional disability are associated with neck pain in adults. Extended study sessions and prolonged sitting are common contributing factors, especially when combined with bad posture like leaning forward. This study investigated the efficacy of instrument-assisted soft tissue mobilisation (IASTM) with manual myofascial release (MMR) in treating young people's neck pain. Fifty (50) student participants, ages 18 to 23, participated in an experimental study conducted at Chennai's ACS Medical College and Hospital. Information on demographics, anthropometry, and the Numerical Pain Rating was among the data gathered. Scale (NPRS) scores and Neck Bournemouth Questionnaire (NBQ) scores were analysed using SPSS version 27. The average age of participants was 20.8 ± 1.39 years. Post-test NPRS mean scores were 3.15 ± 0.99 for Group A (MMR, p = .000***) and 2.8 ± 0.70 for Group B (IASTM, p = .000***). Post-test NBQ scores were 40.34 ± 4.28 for Group A (p = .000***) and 37.69 ± 15.41 for Group B (p = .000***). The results indicate that both interventions significantly improved range of motion and reduced pain over 12 weeks. However, participants who received instrument-assisted soft tissue mobilisation experienced greater improvement compared to those who underwent manual myofascial release.

KEYWORDS: Neck pain; instrument-assisted soft tissue mobilization; manual myofascial release; young adults.

INTRODUCTION

Neck discomfort is among the most prevalent musculoskeletal conditions affecting adults, though it can occur at any age.[1] It is defined as pain localised to the neck region, with or without radiation to one or both upper extremities, persisting for at least one day.[2] According to the 2017 Global Burden of Disease (GBD) study, musculoskeletal disorders rank as the second leading cause of disability worldwide.[3]

Studies indicate that the incidence of neck pain is significantly higher among medical students compared to non-medical students. Notably, female students experience a higher prevalence (41.6%) than male students (36.7%). Contributing factors include prolonged sedentary behaviour and extended periods of study, particularly when adopting poor posture such as hunching forward. Neck pain in this population is also associated with diminished quality of life and an increased risk of disability.[4-7]

Neck discomfort can arise from soft tissue trauma, frequently associated with whiplash injuries. More rarely, cervical spine disorders such as disc prolapse, inflammatory conditions, infections, or malignancies may also be involved and are often accompanied by

neurological symptoms. A wide range of therapeutic interventions exists for neck pain, including acupuncture, biofeedback, medications (e.g., analgesics, antidepressants, NSAIDs, epidural steroid injections, and muscle relaxants), early mobilisation, exercise, thermal therapies, manual manipulation, postural training (such as Alexander Technique, Pilates, or yoga), pulsed electromagnetic fields (PEMF), orthotic supports (soft collars, special pillows), spray and stretch techniques, surgery, traction, and transcutaneous electrical nerve stimulation (TENS).[8-9]

Myofascial Release Therapy (MRT) is a manual technique aimed at lengthening shortened soft tissue structures to restore normal function and alleviate discomfort.[10] MRT targets myofascial trigger points (MTrPs), tender nodules located in taut bands of skeletal muscle, by relieving microscopic adhesions within muscle and fascia.[11] The Numerical Pain Rating Scale (NPRS), which ranges from 0 ("no pain") to 10 ("worst possible pain"), is commonly used to assess pain severity and has demonstrated good test-retest reliability, particularly in evaluating non-specific or chronic neck pain.[12, 13]

Instrument-Assisted Soft Tissue Mobilisation (IASTM) is an emerging technique that addresses muscle tightness and soreness using specially designed tools. First described by Cyriax in 1982, this approach includes devices such as adhesion breakers, Graston tools, HawkGrips, the Fascial Abrasion Technique (FAT), and Functional and Kinetic Treatment with Rehab (FAKTR). The M2T blade, developed by Adam Broger, is a recent innovation offering a cost-effective, versatile tool for various treatment protocols.[13-14]

Cryotherapy, first introduced by Pusey in 1908, uses extreme cold to treat tissue injuries and inflammation. It is divided into local and whole-body applications and includes techniques like ice packs, cold whirlpools, vapour-coolant sprays, and ice massage. Cryotherapy is commonly used to reduce muscle spasms and inflammatory responses.[15-17]

Ultrasound therapy (UST) is one of the most frequently used modalities in physical rehabilitation. It is effective in treating a wide range of musculoskeletal conditions, including joint contractures, soft tissue injuries, muscle spasms, and pain. UST devices utilise piezoelectric crystals that convert high-frequency electrical currents into mechanical oscillations to deliver therapeutic effects at the tissue level.[8-19]

MATERIAL AND METHODS

This experimental study was conducted at ACS Medical College and Hospital, Chennai, with a total of fifty (50) student participants aged between 18 and 23 years. The study included the collection of demographic data and anthropometric measurements, as well as scores from the Numerical Pain Rating Scale (NPRS) and the Neck Bournemouth Questionnaire (NBQ). All participants received detailed information regarding the study and were required to sign an informed consent form prior to enrolment. The informed consent process was carried out at the training centres under the supervision of the principal investigator.

Ethical approval for the study was obtained from the Faculty of Physiotherapy, Dr. M.G.R. Educational and Research Institute, Chennai, through its Institutional Review Board (IRB Approval No.: 04/D/PHYSIO/IRB/2023-2024).

Data collection was conducted from 10th November 2023 to 25th June 2024. Participants completed an assessment form that included information such as age, gender, medical history (past and present), primary complaints, posture analysis, pain characteristics, neck range of motion, and associated symptoms.

Participants were selected using a convenience sampling method and were randomly divided into two groups.

- Group A: Received manual myofascial release (MMR) along with traditional physiotherapy.
- Group B: Received instrument-assisted soft tissue mobilisation (IASTM) in conjunction with traditional therapy.

All participants were fully informed about the treatment procedures and signed a second written consent prior to intervention. The study intervention was conducted in three phases.

1. Phase 1—Pretest Evaluation: Participants experiencing neck pain were identified and assessed, and baseline data were collected using the NPRS and NBQ outcome measures.
2. Phase 2—Intervention Phase: Participants underwent the assigned interventions (MMR or IASTM), each in combination with traditional physiotherapy. The intervention consisted of six sessions over a period of 12 weeks, with each session lasting 45 minutes. All sessions were supervised by a licensed physiotherapist.
3. Phase 3 – Post-test Evaluation: Upon completion of the intervention period, post-treatment assessments were conducted using the same outcome measures (NPRS and NBQ) to evaluate the effectiveness of the interventions.

Pre- and post-intervention data were analysed to determine the clinical effectiveness of MMR and IASTM in reducing neck pain and improving patient function.

Group A—Manual Myofascial Release (MMR)

Group A consisted of 25 participants who received manual myofascial release (MMR) therapy as part of the intervention protocol. Each session was conducted with the patient seated in a comfortable, upright position on a chair, with both feet flat on the floor to ensure postural stability during treatment. The therapist identified

myofascial trigger points (MTrPs) through palpation; these are hyperirritable nodules located in taut bands of skeletal muscle, often associated with referred pain and restricted movement. Once identified, deep transverse friction was applied directly to the trigger points using the therapist's right thumb, reinforced by the left thumb placed on top to apply sustained, controlled pressure. Each MMR session lasted approximately 10 minutes or more, depending on the patient's response and severity of symptoms. The intervention was **ABSTRACT**

Neck pain is a prevalent musculoskeletal condition affecting young adults, often associated with prolonged sedentary behavior and poor posture. This study aimed to compare the efficacy of instrument-assisted soft tissue mobilization (IASTM) and manual myofascial release (MMR) in conjunction with conventional therapy for managing neck pain in young adults. Fifty participants aged 18-23 years were randomly allocated to two groups: Group A received MMR, while Group B underwent IASTM, both alongside cryotherapy and ultrasound therapy. Pain intensity and functional disability were assessed using the Numerical Pain Rating Scale (NPRS) and Neck Bournemouth Questionnaire (NBQ) at baseline and post-intervention. After a 12-week intervention period, both groups demonstrated significant improvements in pain and function ($p < 0.05$). However, Group B (IASTM) exhibited superior outcomes, with lower post-intervention NPRS (mean = 2.8) and NBQ (mean = 37.69) scores compared to Group A (MMR) (NPRS mean = 3.15; NBQ mean = 40.34). These findings suggest that IASTM, when combined with conventional therapy, may be more effective than MMR in reducing neck pain and improving function among young adults. The enhanced efficacy of IASTM may be attributed to its ability to provide targeted and consistent pressure, allowing for deeper soft tissue mobilization. Integrating IASTM into treatment protocols could potentially optimize therapeutic outcomes for young adults with neck pain. However, individual variability in treatment response should be considered, and a patient-centered approach offering a range of modalities is recommended. Further research with larger sample sizes and long-term follow-up is warranted to validate these findings and refine clinical guidelines for managing neck pain in this population. administered six times per week for a duration of 12 weeks, following a hands-on, manual therapy approach. The primary aim of MMR was to reduce muscle tightness, relieve pain, and restore functional mobility in the cervical region by breaking down adhesions and releasing soft tissue restrictions. This method also enhances blood circulation in the affected area and promotes tissue healing.

Group B—Instrument-Assisted Soft Tissue Mobilisation (IASTM)

Group B consisted of 25 participants who received Instrument-Assisted Soft Tissue Mobilisation (IASTM) therapy using the M2T blade. Each session was conducted with the participant seated in a comfortable, supported position—leaning forward onto a treatment table with arms crossed to allow the head and neck to rest comfortably. Prior to treatment, the patient's skin was cleaned, and a thin layer of lubricant (Vaseline) was applied to reduce surface friction and allow smooth movement of the tool. The therapist used the M2T blade to palpate and assess soft tissue restrictions along the length of the cervical and upper thoracic muscles. Upon identifying areas of restriction typically felt as reverberations or resistance to movement, the sweeping technique was employed. This involved applying the blade in the direction of restriction, held at approximately a 45-degree angle to the muscle fibres. The technique was performed for approximately 10 minutes per session, allowing sufficient time to address myofascial tightness and improve tissue mobility. IASTM sessions were conducted six times per week over a 12-week period. This method aimed to break down fascial adhesions, stimulate local circulation, enhance soft tissue healing, and reduce pain and dysfunction in the cervical region.

Group A & Group B—Cryotherapy

As part of the traditional therapy component, cryotherapy was administered to both Group A and Group B participants. A cold pack was applied over the upper trapezius muscle to help reduce inflammation and prevent post-treatment muscle soreness or redness. Each session was conducted with the patient seated in a comfortable upright position, and the cold pack was applied for a duration of 20 minutes. Cryotherapy served as an adjunct treatment to enhance the effects of the primary interventions, manual myofascial release (Group A) and instrument-assisted soft tissue mobilisation (Group B).

Group A & Group B—Ultrasound Therapy

In addition to their respective manual or instrument-assisted therapies, participants in both groups received ultrasound therapy targeting the upper trapezius muscle. Patients were seated in a relaxed and comfortable position during the procedure.

An ultrasound transmission gel was applied to the treatment area to ensure effective conduction. The ultrasound was administered using the following parameters.

- **Frequency:** 3 MHz
- **Intensity:** 1.0 W/cm²
- **Mode:** Continuous (100% duty cycle)
- **Duration:** 10 minutes per session

Ultrasound therapy was used to promote tissue healing, improve circulation, and relieve muscle tension, serving as a supportive modality alongside the primary interventions.

RESULTS AND DISCUSSION

A comparison of the mean Numerical Pain Rating Scale (NPRS) scores between Group A (manual myofascial

release + cryotherapy + ultrasound) and Group B (instrument-assisted soft tissue mobilisation + cryotherapy + ultrasound) revealed that both groups exhibited a reduction in post-test scores, indicating a decrease in pain levels. Group A showed a mean post-test NPRS score of 3.15, while Group B demonstrated a mean score of 2.8, indicating greater pain reduction in Group B. This difference was statistically significant ($p < 0.05$), leading to rejection of the null hypothesis. Similarly, the Neck Bournemouth Questionnaire (NBQ) scores indicated improvement in both groups. Group A recorded a mean post-test NBQ score of 40.34, whereas Group B showed a lower mean score of 37.69, again reflecting better outcomes in Group B. The results were statistically significant ($p < 0.05$), and the null hypothesis was rejected. Within-group comparisons using paired *t*-tests revealed significant improvements in both groups on both NPRS and NBQ scores ($p \leq 0.05$), confirming the effectiveness of both interventions in reducing neck pain and associated disability.

Table 1: Comparison of Pre- and Post-test Mean and Standard Deviation Values Between Group A and Group B.

PARAMETERS		PRE-TEST			POST-TEST			SIGNIFICANCE
		MEAN	SD	t-Test	MEAN	SD	t-TEST	
Numerical Pain Rating Scale	GROUP A	7.4	.88258	.567	3.15	.9880	.567	.000***
	GROUP-B	7.25	.7864	-3.01	2.8	.69585	1.295	.000***
P value				.000***			0.01	.000***
Neck Bournemouth Questionnaire	GROUP-A	64.95	7.400	.146	40.34	4.282	.211	.000***
	GROUP-B	64.625	6.675	.211	37.69	5.253	1.749	.000***
P value				.000***			0.001	.000***

(* - P > 0.05 - Not Significant) & (** - P ≤ 0.05 - Significant).

The above table—1—reveals the mean, standard deviation (S.D.), t-test, degree of freedom (df), and p-value significantly improved with the Numerical Pain Rating Scale and Neck Bournemouth Questionnaire between Group A & Group B. Group B showed a significance of p-value 0.000 (P > 0.05).

This study evaluated the comparative effectiveness of manual myofascial release (MMFR) and instrument-assisted soft tissue mobilisation (IASTM), both administered alongside cryotherapy and ultrasound therapy, in managing neck pain among young adults. The findings indicate that while both treatment modalities led to significant reductions in pain and improvements in function, IASTM demonstrated superior outcomes compared to MMFR.

Terry Loghmani M et al. (2016) and Muskan Gupta et al. (2024), The enhanced effectiveness of IASTM may be attributed to its ability to provide more targeted and consistent pressure through specialised tools, potentially allowing for deeper soft tissue mobilisation. This mechanical advantage may explain its increased efficacy, particularly in a population prone to musculoskeletal strain due to prolonged sedentary behaviour and digital screen exposure.

Our results are consistent with previous research highlighting the benefits of IASTM in sports and rehabilitation settings. Studies have shown IASTM to be effective in improving range of motion, reducing pain, and accelerating recovery in individuals with soft tissue dysfunctions. Similarly, in the context of neck pain, the addition of IASTM to conventional therapies such as cryotherapy and ultrasound has been shown to yield clinically meaningful benefits (Hasan Gerçek et al. (2024)).

The practical implications of these findings are substantial. Neck pain is a common concern among young adults, often interfering with daily activities and diminishing their quality of life. This study provides evidence-based insight for clinicians, suggesting that integrating IASTM into treatment protocols may enhance therapeutic outcomes.

Nevertheless, it is essential to recognise individual variability in treatment response. A patient-centred approach that offers a range of modalities, including MMFR, IASTM, cryotherapy, ultrasound, and exercise, allows for tailored interventions based on patient preferences, clinical presentation, and therapeutic goals.

The findings align with a previous study titled "Comparative study of instrument-assisted soft tissue mobilisation and massage on neck pain," which reported greater improvements in neck pain and range of motion with IASTM compared to massage therapy.[24]

A randomised controlled trial comparing IASTM and manual MFR also supported these findings. Both interventions improved function and reduced pain, but IASTM showed a greater reduction in pain levels.[25]

Additionally, a systematic review on therapeutic ultrasound found that ultrasound, especially when combined with other modalities, contributed to short-term pain relief in cases of chronic neck pain. Although only one of four reviewed studies attributed significant improvement solely to ultrasound, its use as an adjunct remains justified.[26]

According to Soumik Basu et al. (2020), IASTM significantly reduced NPRS scores compared to ischaemic compression techniques. Bonsol et al. (2022)

further emphasised the superiority of IASTM over traditional soft tissue mobilisation techniques for neck pain in adults.

In the current study, Group B (IASTM + Cryotherapy + Ultrasound) showed superior outcomes in both NPRS (mean = 2.8) and NBQ (mean = 37.69) scores compared to Group A, which had NPRS (mean = 3.15) and NBQ (mean = 40.34). These results further validate the enhanced effectiveness of IASTM in reducing neck pain and improving functional outcomes in young adults.

CONCLUSION

This study concludes that a 12-week intervention programme incorporating manual myofascial release or instrument-assisted soft tissue mobilisation, alongside cryotherapy and ultrasound therapy, is effective in reducing neck pain and improving range of motion in young adults. However, IASTM yielded superior results in pain reduction and functional improvement compared to MMFR. Therefore, instrument-assisted soft tissue mobilisation can be considered a more effective intervention for managing neck pain among young adults when combined with traditional physiotherapy modalities. Further studies with larger sample sizes and long-term follow-up are recommended to validate these findings and refine clinical guidelines for musculoskeletal pain management.

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