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ORIGINAL ARTICLE

Effectiveness of Manual Myofascial Release Versus Instrument Assisted Soft Tissue Mobilization (IASTM) in Patients with Chronic Neck Pain - RCT

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Author`s Contribution

[2, 3, 4] Substantial contributions to the conception or design of the work for the acquisition, analysis or interpretation of data for the work, [2 3] Drafting the work or reviewing it critically for important intellectual content, [2 5] Final approval of the version to be published, [2] Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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A B S T R A C T

Background: Chronic neck pain, affecting nearly 50% of the global population annually, is a significant global burden. While Instrument Assisted Soft-tissue Mobilization (IASTM) has shown effectiveness in treating musculoskeletal injuries, there is a scarcity of evidence comparing it with Manual Myofascial Release (MMFR).

Objective: To compare IASTM with Manual Myofascial Release in terms of pain, disability, and cervical range of motion in patients with chronic neck pain.

Methodology: This randomized control trial (RCT) included 30 participants 18-45 years of age with chronic neck pain from Foundation University College of Physical Therapy and Fauji Foundation Hospital Rawalpindi. Out of the total 30 participants, 15 were randomly allocated to each group using coin toss method: experimental group (IASTM with stretching) and control group (Manual Myofascial Release with stretching). Informed consent, demographic and anthropometric data were taken. Participants were assessed at the baseline and post assessment was done lastly after the 6th session. The primary outcome measuring tools were Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI) and universal goniometer for measuring pain, neck function and cervical range of motion respectively.

Results: Among 30 participants (70% females, 30% males) with chronic neck pain lasting nearly 12 months, inter-group analysis revealed no significant difference ($p>0.05$) between IASTM and Manual Myofascial Release for NPRS, NDI, and Cervical Range of Motion, except for cervical rotation to the right. Intra-group analysis indicated both techniques had a significant impact ($p<0.001$).

Conclusion: Manual Myofascial Release and Instrument Assisted Soft-tissue Mobilization are equally effective in treating patients with chronic neck pain in terms of pain, neck function and cervical range of motion.

Keywords: Myofascial Release, Neck pain, Neck Disability Index.

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Introduction

Neck pain ranks among the top musculoskeletal issues globally, largely due to lifestyle and work-related factors, and is ranked as the 6th leading cause of disability worldwide. It is typically divided into two main categories: traumatic, which encompasses conditions like whiplash-associated disorders (WAD), and non-specific non-traumatic neck pain.[1,2] Neck pain significantly impacts patients, families, societies, and industries globally.

The critical sorting of all the possible factors that contribute to any chronic pain pays a major role in its management at both

individual and community levels. The treatment of such chronic disorders should incorporate all aspects including lifestyle patterns, health issues and other social and demographic features that might affect its occurrence. Although the prevalence of neck pain is invariable in the literature but it generally spans over 29 to 60% almost in smaller samples. This prevalence has globally escalated to almost 20% between the years 2005 till 2015.[3] Symptomatic and therapeutic methods for neck pain are often ineffective due to its multifactorial causes. Kinematic measures during cervical extension are significantly affected by the severity of pain.[2] Traditional management for neck pain includes physiotherapy and pharmacotherapy, but a multidisciplinary biopsychosocial approach is more effective, improving self-care abilities, maladaptive beliefs, activities, and disability.[4]

Manual therapy for chronic neck pain includes manipulation, soft tissue management (massage, myofascial release, acupressure), and acupuncture, targeting psychological factors like anxiety and stress, with treatments improving muscle function, reducing pain intensity, and increasing parasympathetic reaction, thereby lowering psychological stress.[5] The deep cervical fascia contributes to chronic cervico-craniofacial pain, leading to musculoskeletal dysfunction. Fascial Manipulation addresses this through movement and palpation. Chronic neck pain involves localized pain, reduced range of motion, and altered posture, breathing, and function. Patients with significant neck disability may have increased pain threshold and chronicity.[6,7]

Myofascial release, a commonly used strategy for chronic musculoskeletal impairments, focuses on movement-based stretching to reduce pain and enhance functional abilities.[5,8] Both manual therapy and manual soft tissue release effectively alleviate pain and disability in individuals with chronic occupation-related mechanical neck pain, with manual release showing notable improvement along with enhanced neck range of motion and quality of life.[9]

Contrary to this Instrument Assisted Soft Tissue Mobilization (IASTM) uses stainless-steel instruments to assess and treat soft tissue abnormalities, promoting fibroblast proliferation and breaking down adhesions. Recommended for various musculoskeletal conditions, companies offer unique treatment protocols and instruments, including Augmented Soft tissue Manipulation (ASTYM), Fascial Abrasion Technique, Graston Technique, and HawkGrip.[10,11] The Graston Technique typically spans one to 10 sessions without medication, incorporating cardiovascular exercise and heat treatment. Specific tools target scar tissue, promoting healing by inducing minor trauma and inflammation. Physiological changes include increased vascularity and reduced tissue viscosity, making IASTM efficient in rehabilitation and preventing musculoskeletal disorders.[12–14] IASTM has shown superior effectiveness in alleviating pain, operational debility, and range of motion compared to traditional treatments for mechanical neck pain, a leading cause of disability globally.[15] However, a comparative study on the effect of IASTM and Myofascial Release in chronic neck pain is yet to be established. For which this study aims to compare manual and instrument-guided approach in patients with chronic neck pain in terms of improvement in pain, cervical range of motion, and disability.

Methodology

The Randomized Controlled Trial (Clinical Trial Registry number NCT05502406) commenced from March 2022 with the initial phases of literature review and topic selection, continuing until March 2023, encompassing data collection, analysis, and reporting of results. The sample size, initially calculated as 26 (13 participants each in Control and Experimental Groups) using Open Epi Sample Size calculator based on mean and standard deviation values from a reference study, was ultimately achieved as 30 participants (15 in each group).[16] Inclusion criteria involved both males and females aged 18-45 years with chronic neck pain lasting over 3 months, scoring 5 or more on the Numeric Pain Rating Scale. Exclusions comprised individuals with a history of specific injuries or diagnoses such as cervical radiculopathy, disc prolapse, fibromyalgia, myopathy, myelopathy or any other systemic or vascular syndrome. Ethical clearance was obtained, and participants were selected through convenient sampling, then randomized into Group A (Manual Myofascial Release) and Group B (IASTM) using a coin toss method.

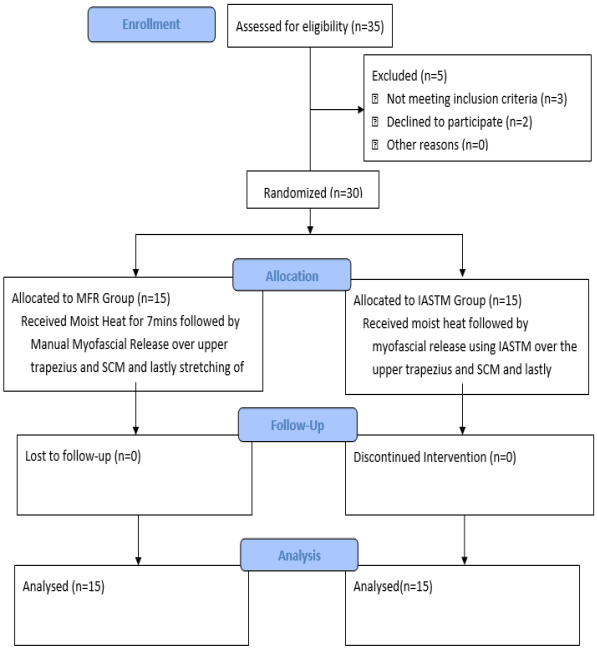

Figure 1: CONSORT Diagram

Table 1: Intervention Details	
Intervention Protocol Group A: Manual Myofascial Release	**Intervention Protocol Group B: IASTM Myofascial Release**
Baseline NPRS, NDI and cervical range of motion was noted of the enrolled participants.	Baseline NPRS, NDI and cervical range of motion was noted of the enrolled participants.
Heat therapy using moist heat from hydrocollator pack was given for 10min over the neck region.	Heat therapy using moist heat from hydrocollator pack was given for 10min over the neck region.
Manual Myofascial release over the upper trapezius and sternocleidomastoid muscle, using the velvet glove technique. The client is positioned in the supine or sitting as tolerated, using the back of in the form of loose fist the therapist gives longitudinal strokes over the upper trapezius and sternocleidomastoid. The treatment is given for 5 to 7 minutes	IASTM Release: Using the GT4 IASTM tool, gentle sweeping strokes were applied over the upper trapezius and sternocleidomastoid muscle for nearly 3mins from origin to insertion followed by deep fanning strokes to release the fascial adhesions, for an added 2mins.
Therapeutic Exercises: Passive stretching to upper trapezius and sternocleidomastoid muscle was given by the therapist at a frequency of 10 reps with 5 second hold to the stretched position to retain the length gain in the musculature.	Therapeutic Exercises: Passive stretching to upper trapezius and sternocleidomastoid muscle was given by the therapist at a frequency of 10 reps with 5 second hold to the stretched position to retain the length gain in the musculature.

Baseline pain, cervical range of motion (ROM), and neck disability scores were recorded using Numeric Pain Rating Scale (NPRS), goniometer, and Neck Disability Index (NDI), respectively. Group A received Manual Myofascial Release targeting the cervicodorsal fascia over the upper trapezius and sternocleidomastoid muscles using the velvet glove technique for 5 to 7 minutes, while Group B underwent IASTM with gentle sweeping strokes for 3 minutes over the upper trapezius and sternocleidomastoid muscle from origin to insertion, followed by deep fanning strokes using the GT4 IASTM tool for 2 minutes to release fascial adhesions. Both groups received passive stretching of the upper trapezius and sternocleidomastoid muscles, consisting of 10 repetitions with a 5-second hold in the stretched position to maintain length gain. Treatments were administered thrice weekly on alternate days for 2 weeks, totaling 6 sessions.

Following treatment completion, participants were reassessed for pain, cervical ROM, and neck disability. Statistical analysis was conducted using the Statistical Package of Social Sciences (SPSS) for further interpretation of results.

Results

Majority of the participants were middle aged unmarried (73.5%), working (76.7%) females (70%), majority of the participants were employed and had been experiencing intermittent neck pain (60%), from almost a year. (Table 2) The normality of pain, neck disability, and cervical range of motion in both IASTM and MMFR groups was assessed, revealing that only NDI and Cervical Rotation (Rt) were normally distributed with $p>0.05$, while all other variables were non-normally distributed with $p<0.05$. For inter-group analysis, non-normally distributed variables ($p<0.05$) were analyzed using the non-parametric Mann-Whitney U test and reported in Median and Interquartile Range. Meanwhile, normally distributed variables ($p>0.05$) were analyzed via Independent Sample T-test and reported in Mean±SD. Results indicated no statistically significant difference between the groups regarding pain intensity, neck disability, and cervical range of motion (except for cervical rotation to the right) at terminal assessment. Specifically, cervical rotation to the right significantly improved more in the Manual Myofascial Release Group (42.86±6.52) compared to the IASTM group (36.0±7.39) with $p<0.05$. (Table 3)

For intra-group analysis, normally distributed variables were assessed using Paired Samples T-test, while non-normally distributed variables were analyzed through Wilcoxon Signed Rank Test. Results indicated a significant difference between baseline and terminal assessment for each specific variable in both groups. All variables demonstrated improvement in both groups ($p<0.05$) (Table 4)

Table 2: Descriptive Statistics				
		Mean ± SD		
Type of Variable		**Study Sample**	**IASTM Group**	**MMFR Group**
Age(years)		30(9)	32(7)	25(9)
Height(cm)		162 (10.5)	162(23)	162(10)
Duration of Pain (months)		12 (31)	12(42)	12(19)
Categorical Variables			**Percentage/ Frequency**	
Gender Distribution	**Males**	30% (n=9)	46.7%(n=7)	13.3% (n=2)
	Females	70% (n=21)	53.3%(n=8)	86.7% n=13)
Marital Status	**Unmarried**	73.5%(n=22)	13.3(n=2)	46.7%(n=7)
	Married	26.5 %(n=13)	86.7%(n=13)	53.3%(n=8)
Occupation	**Employed**	76.7% (n=23)	80% (n-12)	73.3% (n=11)
	Unemployed	23.3% (n=7)	20%(n=2)	26.7% (n=4)
Pattern of Neck Pain	**Constant**	40% (n=12)	40% (n=6)	40% (n=6)
	Intermittent	60% (n=18)	60% (n=9)	60% (n=9)

Instrument Assisted Soft-tissue Mobilization (IASTM), Manual Myofascial Release (MMFR)

Table 3: Independent Sample T-test and Man-Whitney U test for Between Group Analysis			
Variables	**IASTM Group (Mean ± SD)**	**MMFR Group (Mean ± SD)**	**p value** Independent Sample T-test
NDI (Baseline)	17.14±4.9	21.82±7.8	0.068
NDI (Terminal)	7.21±11.6	3.30±7.7	0.058
Cervical Rotation Right (Baseline)	28.00±8.38	34.0±6.324	0.038*
Cervical Rotation Right (Terminal)	36.0±7.39	42.86±6.52	0.013*
Variables	**IASTM Median (IQR)**	**MMFR Median (IQR)**	**p value** Man-Whitney U test
NPRS (Baseline)	7 (1.25)	7(2)	0.873
NPRS (Terminal)	3(2)	4(2)	0.468
Cervical Flexion (Baseline)	25(5)	25(5)	0.732
Cervical Flexion (Terminal)	35(11)	35(5)	0.349
Cervical Extension (Baseline)	27.5(7.3)	30(5)	0.617
Cervical Extension (Terminal)	30(6)	35(10)	0.348
Cervical Side bending Left (Baseline)	27.5(9)	25(15)	0.204
Cervical Side Bending Left (Terminal)	34.5(5)	30(10)	0.132
Cervical Side Bending Right (Baseline)	32.5(10)	30(10)	0.024*
Cervical Side Bending Right (Terminal)	39.5(10)	35(5)	0.152
Cervical Rotation Left (Baseline)	25(10)	25(10)	0.144
Cervical Rotation Left (Baseline)	36.5(17.75)	45(10)	0.265

Instrument Assisted Soft-tissue Mobilization (IASTM), Manual Myofascial Release (MMFR), Neck Disability Index (NDI), Numeric Pain Rating Scale (NPRS)
Significance level: p<0.05*

Table 4: Paired Sample T-test and Wilcoxon Signed Rank Test for Within Group Analysis			
Study Group Variable	**Baseline Assessment (Mean ± SD)**	**Terminal Assessment (Mean ± SD)**	**p-value** Paired Sample T-test
Cervical Rotation (Rt):			
IASTM Group	27.46±8.33	35.2.5±7.66	<0.001***
MMFR Group	34.00±6.32	42.86±6.523	<0.001***
NDI:			
IASTM Group	17.5±4.98	7.53±3.41	<0.001***
MMFR Group	21.80±7.82	11.66±7.77	<0.001***

Study Group	Baseline Assessment Median (IQR)	Terminal Assessment Median (IQR)	p-value Wilcoxon Signed Rank Test
NPRS			
IASTM Group	7 (1)	3(2)	<0.001***
MMFR Group	7 (2)	4(2)	<0.001***
Cervical Flexion ROM			
IASTM Group	25 (5)	35 (10)	<0.001***
MMFR Group	25 (6)	35 (5)	<0.001***
Cervical Extension: ROM			
IASTM Group	30 (5)	30 (5)	<0.001***
MMFR Group	30 (5)	35 (10)	<0.001***
Cervical SB (Lt):			
IASTM Group	25 (8)	34 (5)	<0.001***
MMFR Group	25 (15)	30 (10)	<0.001***
Cervical SB (Rt):			
IASTM Group	35 (10)	40 (10)	<0.001***
MMFR Group	25 (10)	35 (5)	<0.001***
Cervical Rotation (Lt):			
IASTM Group	25 (10)	35 (17)	<0.001***
MMFR Group	30 (10)	40 (10)	<0.001***

Instrument Assisted Soft-tissue Mobilization (IASTM), Manual Myofascial Release (MMFR), Significance level: p<0.001***

Discussion

The study concluded that there was no statistically significant difference between the two groups regarding pain, neck disability, and cervical range of motion. However, within-group analysis revealed significant improvements in baseline and terminal findings of all outcome variables (pain intensity, neck disability, and cervical range of motion) in both groups. In line with these findings, a study conducted in Mumbai, India in March 2022 aimed to assess the impact of IASTM versus Manual Myofascial Release on Levator Scapulae in chronic neck pain patients. The study concluded that both techniques were equally effective in addressing chronic neck pain in terms of pain intensity, neck disability, and cervical range of motion.[17] In contrast to our findings, a study conducted in Bahawalpur, Pakistan, in 2021 concluded that IASTM combined with other stretching exercises is more effective than routine physical therapy in treating neck pain associated with upper cross syndrome.[18]

The disparity in results between this study and ours may be attributed to the difference in treatment protocols. While the routine physical therapy group solely received moist heat and stretching exercises, the IASTM group received additional treatment in the form of Instrument-guided myofascial release alongside conventional therapy. In a study conducted on Feb 2021 the impact of IASTM combined with neuromuscular exercises on correcting forward-headed posture and functionality in patients with postural neck pain was assessed, twenty diagnosed participants with mechanical neck pain and forward-headed posture were evenly divided into two groups. Group A received IASTM treatment alongside neuromuscular exercises, while Group B underwent classical massage in conjunction with the same exercise regimen. The study concluded that the combination of IASTM and a structured neuromuscular exercise protocol could enhance postural adaptations and functional status in patients with mechanical neck pain.[19]

A systematic review conducted in 2019, upon the effects of Instrument Assisted Soft Tissue Mobilization, in which they had included a total of 12 articles all of which were Randomized Control Trial that had assessed pain, range of motion and patient reported improvement in function, in which IASTM was compared against at least one treatment group. It was concluded that there is adequate data that concludes the effectiveness of IASTM in terms of range of motion, pain, and patient functioning, however there was no profound difference between IASTM and other treatment protocols. The findings of this systematic review are like the results of this study that although there is significant improvement in patients' pain, neck disability and cervical ROM after IASTM. However, there is no significant difference between IASTM against Manual Myofascial Release.[10] In 2022 the effects of IASTM and cupping therapy were assessed in almost 30 middle aged participants with neck and upper back tightness. The study concluded that although

both treatments have immediate short-term effects on pain and disability, there is a need to determine the interval and frequency of such treatments. Also, the statistical analysis had concluded that the results of both the treatments were similar. The study although comparing IASTM against a different treatment protocol, supports the findings of the current study that IASTM when compared with other similar techniques gives parallel beneficial effects.[20]

A meta-analysis issued in November 2022, had discussed the effects of manual soft tissue therapy on pain amongst patients with chronic neck pain. It had included almost 12 RCT's with a total of nearly 600 patients, belonging to the age of 20 to 85 years. The analysis concluded that manual soft tissue therapy is effective in relieving pain among patients with chronic neck pain, also different tools may modulate the effect of the given treatment.[21] The result of the current study supports the findings of this systematic review, as there was significant improvement in participants pain after manual myofascial release, compared to baseline, when assessed though Numeric Pain Rating Scale. On September 2020 the cost efficacy of Manual Myofascial Release along with Manual Therapy was assessed in workers with mechanical neck pain. A total of nearly 60 participants were enrolled, among which intensity of pain, neck disability, quality of life, cervical range of motion, craniovertebral angle were studied as outcome variables. The study had concluded that myofascial release is more cost-effective than Manual Therapy in participants with occupation related mechanical neck pain. It had significantly reduced the frequency of physiotherapy sessions along with the daily allowance a worker receives due to this ailment. Also, the treatment itself does not cost any additional expense on the health care system. These specific findings synchronize with the findings of the current study, that conventional treatment along with manual myofascial release does cause a significant improvement in participants' pain, neck disability and cervical range of motion among patients with chronic mechanical neck pain.[22]

A similar study conducted on January 2018, had studied the effect of myofascial release on pressure pain threshold and pain in patients with neck pain. The study had enrolled nearly forty participants' which were sorted into two groups; one was given myofascial release therapy and the other had been given classical massage along with electrotherapy. The results of the study had concluded that myofascial release gives more significant results in terms of short term improvement in pain and pressure pain threshold than a multimodal program including electrotherapy with classical massage.[23] Blinding couldn't be incorporated which can be amended in future relevant research projects to further improvise the generalizability of findings.

Conclusion

This study had concluded that in terms of effectiveness of Instrument Assisted Soft Tissue Mobilization against Manual Myofascial Release among patients with chronic neck pain, both the techniques were equally effective, and no single technique gives more improved outcomes compared to the other, in terms of pain, disability and cervical range of motion. However, both the techniques are effective in treating chronic neck pain with respect to pain, neck disability and cervical range of motion.

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