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EFFECT OF INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION ON NON SPECIFIC NECK PAIN

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ABSTRACT

Background: Neck pain has been identified as one of the most common and debilitating musculoskeletal conditions. Non-specific neck pain are unrelated simple cases without any pathological origin. There are various non-drug-based interventions proven to work. This study has been chosen to assess the effectiveness of instrument-assisted soft tissue mobilization for non-specific neck pain.

Methods: This was a randomised controlled trial that included 30 people with nonspecific neck pain. Participants were randomly assigned to Group A and Group B. There were 15 people in each. Group A was treated with instrument-assisted soft tissue mobilization (IASTM) in conjunction with standard therapy. Group B received no additional treatment apart from the standard therapy. Interventions took 3 times a week for 4 weeks. Pre- and post intervention assessments of pain intensity and functional impairment were based on the Visual Analogue Scale (VAS) and the Neck Disability Index (NDI), respectively.

Results: Both groups showed significant improvements from baseline to four weeks ($p < 0.05$) in VAS and NDI scores. However, unpaired t-test analysis revealed that the group receiving IASTM plus standard therapy exhibited greater gains compared to the standard therapy group alone.

Conclusion: Instrument-assisted soft tissue mobilization offers a viable option for managing nonspecific neck pain, reducing discomfort, and enhancing functional outcomes.

Keywords: Non-specific neck pain; instrument-assisted soft tissue mobilization; Neck Disability Index; Visual Analogue Scale.

INTRODUCTION:

Neck pain represents a prevalent and distressing musculoskeletal issue. Its point prevalence ranges from 6% to 22%, rising to 38% among older adults, while lifetime prevalence spans 14.2% to 71%. Most neck conditions lack identifiable pathology or structural abnormalities, classifying them as non-specific. This absence hinders the development of a universal diagnostic standard for non-specific neck pain (NSNP). Consequently, NSNP diagnosis relies primarily on clinical presentation, excluding features suggestive of alternative pathologies or more severe forms.[1,2]

NSNP shares symptomatic overlap with whiplash-associated disorders (WAD) grades I and II, but without trauma as a trigger. The natural course of NSNP remains incompletely understood. While it often resolves

spontaneously within weeks, it can impose substantial limitations on daily activities, prompt extensive healthcare utilization, prolonged absences from work, and lasting impairments. As a result, it imposes considerable strain on patients, workplaces, and healthcare systems.[3]

The instrument-assisted soft tissue mobilization (IASTM) technique aims to promote connective tissue repair by breaking down excessive fibrous buildup and encouraging secondary collagen production through fibroblast activation. This process facilitates the breakdown and resolution of scar tissue, adhesions, and fascial limitations. Compared to conventional approaches, instrument-assisted soft tissue mobilization yields superior outcomes. These findings align with prior research indicating that, although immediate post-IASTM functional changes may not always appear, pain reduction leads to heightened muscle engagement. Such enhancements support better execution of routine tasks and ultimately lower disability levels. Current evidence supports IASTM using the M2T blade as a reliable tool for prompt pain relief in individuals with neck pain, particularly those experiencing upper trapezius tension.[4]

Instrument soft tissue mobilization serves as an adjunctive method to expand manual therapy options, optimizing patient recovery. It involves gliding instruments--typically contoured stainless steel tools--across tissue surfaces to detect and address densities, fibrotic areas, and tension patterns. This is especially useful for structures like joint capsules, tendons, ligaments, and neural coverings, which are challenging to palpate manually.[4,5]

Proponents argue that instrument use enhances detection of soft tissue irregularities via tactile vibrations. In contrast to manual soft tissue mobilization (STM), IASTM improves precision in identifying adhesions or restrictions over bare-hand techniques. The underlying mechanism likely involves controlled micro-injury to targeted tissues, initiating the inflammatory phase of tissue repair. Animal studies on IASTM healing pathways confirm elevated fibroblast activity, collagen production, alignment, and maturation. Instrument-assisted soft tissue mobilization outperforms standard protocols. This consistency matches a prior investigation showing IASTM's role in boosting muscle function through pain mitigation, thereby elevating daily capabilities and diminishing disability.[5]

The Neck Disability Index (NDI) stands as a widely accepted tool for assessing perceived functional limitations in neck pain. Riddle and Stratford reported strong associations between NDI scores and both physical and psychological components of the 36-item Short Form Health Survey (SF-36). They further confirmed the NDI's responsiveness in capturing meaningful shifts for patients meeting rehabilitation targets, resuming work, or involved in legal proceedings.[6]

Uncomplicated neck pain, absent significant neurological involvement, benefits from manual interventions (such as mobilization and manipulation) alongside therapeutic exercises (e.g., targeted physiotherapy routines). In the subacute stage, combining manipulation, physical modalities, and exercise addresses dysfunction, averts recurrence, and manages biomechanical issues.[7]

The Visual Analogue Scale (VAS) provides a validated and dependable measure for rating chronic pain intensity on a 2-5 scale. Several investigations support VAS reliability for acute pain assessment (ratings 6-8) in clinical settings. However, fewer studies examine its consistency for acute scenarios. Testing a VAS device in rheumatoid arthritis patients yielded a 0.88 correlation across two-hour repeated measures.[9]

Research involving individuals with cervical radiculopathy, conducted by Cleland and associates, demonstrated substantial decreases in disability through a conservative regimen that incorporated periodic cervical traction, manual interventions, and reinforcement of the deep cervical flexor muscles (2007). While therapeutic exercises play a crucial role in addressing chronic mechanical neck dysfunction, the comparative effectiveness of specific exercise types remains incompletely established. Despite the high prevalence of mechanical neck pain, existing literature exhibits notable deficiencies, lacking robust and definitive evidence to favor one conservative management strategy over another for this condition. Authentic investigations enhance the practical implementation and clinical application of manual therapies. Contemporary patterns in research and clinical settings suggest that groups of patients with neck pain tend to respond favorably to

integrated approaches combining mobility enhancement or manipulation, therapeutic exercises, and potentially traction modalities.[9,10]

Prior investigations indicate that neck-related disability correlates with persistent neck pain experiences. Contributing elements include physical aspects, such as reduced active range of motion (ROM), and psychological elements, like apprehension toward movement, anxiety, or depressive states. This interplay can be explained through a fear-avoidance framework, forming a self-perpetuating loop that affects patients both physically and mentally, leading to deconditioning. ROM limitations may partly stem from movement-related fears. Furthermore, ongoing neck pain is linked to diminished pressure pain thresholds (PPT) in muscles, including the upper trapezius.[11]

Comparing the results of comprehensive manual therapy techniques involving muscular MET, ischemic compression on trigger points and strain counterstrain on tender points in the trapezius to simple muscular MET in the trapezius in acute to subacute neck pain patients, Nagrale found significant improvements in both groups by the second and fourth weeks of the study in pain relief, lateral flexion and overall function. However, the multifaceted manual therapy protocol showed clinical significant superiority with high effect sizes in domains of pain and function.[12]

NEED FOR THE STUDY:

Prior investigations have involved myofascial release or the active release technique to handle neck pain. These approaches have some common principles to start with, and they include variations in procedures for bringing in diverse directional forces to work on the fascial distortions. The use of IASTM in treating myofascial pain gives the clinician a mechanical advantage. These instruments enable the practitioners to exert greater pressure on the tissues while putting the least amount of strain on his/her own hands and joints. Earlier work focused mostly on pain or on pain localized in the neck region, but this study is unique in focusing specifically on the impact of neck pain on the ability of patients to go about their daily lives.

AIM AND OBJECTIVES:

AIM: To explore the effects of instrument assisted soft tissue mobilization on non-specific neck pain.

OBJECTIVES: 1. To quantify the severity of neck pain on Visual Analogue Scale.

2. To ascertain the magnitude of the interference of neck pain in functional activities using the Neck Disability Index

HYPOTHESIS:

NULL HYPOTHESIS: No substantial difference in outcomes for non-specific neck pain between instrument-assisted soft tissue mobilization and standard care.

ALTERNATE HYPOTHESIS: Instrument-assisted soft tissue mobilization is helpful in the management of non-specific neck pain to a significant extent.

MATERIALS AND METHODS:

- Study Design: Experimental Investigation.
- Location: Malla Reddy Hospitals.
- Sample Size: 30 participants.
- Sampling Approach: Simple random selection
- Study Population: The study group consisted of male and female subjects with non-specific neck pain problems.
- Age Range: Participants who were between the ages of 25 to 40 years.
- Duration: Six months.

ELIGIBILITY CRITERIA: This study includes people aged 25 to 40 years of both genders. Persons having discomfort in the neck region lasting for more than 1 week and consisting of a VAS score between 5 and 8. Persons excluded who have had recent injuries, Hypersensitive skin, Stroke and, cardiovascular disorders, Spinal deformities and Referral pain.

ETHICS CONSIDERATION: The ethics committee used at the company was the Institutional Scientific and Ethics Committee of Malla Reddy Institute of Medical Science, Hyderabad (MRIMS/DHR- IEC-PG/MPT/2023/87).

MATERIALS: IASTM (Instrument Assisted Soft Tissue Mobilisation) tool**,** Assessment scales: Visual Analogue Scale (VAS) and Neck Disability Index (NDI), Cold Cream and Tissues.

DATA COLLECTION: Following ethical clearances, 30 persons who met the standards for inclusion were recruited. Study protocols were explained and written informed consent was obtained prior to the randomisation. Participants were equally distributed in Group A and Group B (15 each). Baseline demographics (name, age, gender, occupation) were taken. Initial and final (post-4 weeks) assessments were conducted using VAS to evaluate the pain severity and NDI for the functional impact.

OUTCOME MEASURES:

VAS (Visual analogue scale): Introduced in 1921, this instrument measures symptom intensity on a scale of the continuum, and which is common in the clinical and epidemiological contexts. The perception of pain is continuous ranging from no pain at all through extreme pain, appearing seamless to patients instead of discrete categories (e.g. none, mild, moderate, severe). VAS represents this gradient very well.

NDI (Neck disability index): It has 10 sections with 6 items in each section and a maximum score of 5 in each section with each section being assigned a score of zero at the first box and 5 at the final box. As an illustration, in the following sample, patients who indicate the first box would be allocated a "0" in this category; those who indicate the final box would be allocated a "5". In case one of the sections is not answered, then add the answered sections and divided with the total of the maximum numbers of questions that were answered. To illustrate this, given that nine (out of ten) sections were answered with the score of 15, then the mean score of these nine required answers divided by a maximum score of answers possible (hardly 10) would result in the answer 15/45 = 0.333. Move the decimal to the right and the index appears to be 33% at the end. This percentage can then be used to interpret the influence on ADLs.[30]

INTERVENTION: Both groups were given three sessions a week for four weeks (12 total). Experimental group (Group A) incorporated IASTM with the normal standard of care (Hot packs, Tens, ROM exercise). Patients sat comfortably; a lubricant (Vaseline or cold cream) as applied to cervical area. Each side was treated for 3-4 minutes. Scratching possible and mild warmth, which is countered with cream. Pre-treatment sensitivity of the skin is checked. IASTM at 30-60 degrees for 10-15 strokes (40-120 seconds) (key words here as to when to stop: when signaled by mild redness, try not to do more than you have already done) post ice. Prior studies have suggested approx 10 minutes administered in one session. Techniques were scanning, waving, snaking, seperation and bidirectional gliding.

Control group (Group B) standard care only (Hot packs, Tens, ROM exercises, isometric strengthening of the neck). Hot packs applied for 7 to 10 minutes. Tens applied for 10 minutes. ROM of forward/backward flexion, extension, lateral flexion (right/left), and bilateral rotation of the neck for 5 minutes. Isometric activities for 5 to 7 minutes. The total session takes around 30 to 35 minutes. The home program was suggested to all patients of control group (ROM, hot packs, isometrics).

STATISTICAL ANALYSIS: Frequencies/percentages summarize nominal data means ± SD for continuous data. Chi-square was used to test categorical associations. Paired t-test used to assess intra-group changes; unpaired t-test for inter-group differences. Significance set at $p < 0.05$. Data analyzed using IBM computerized software (SPSS Statistics version 20.0).

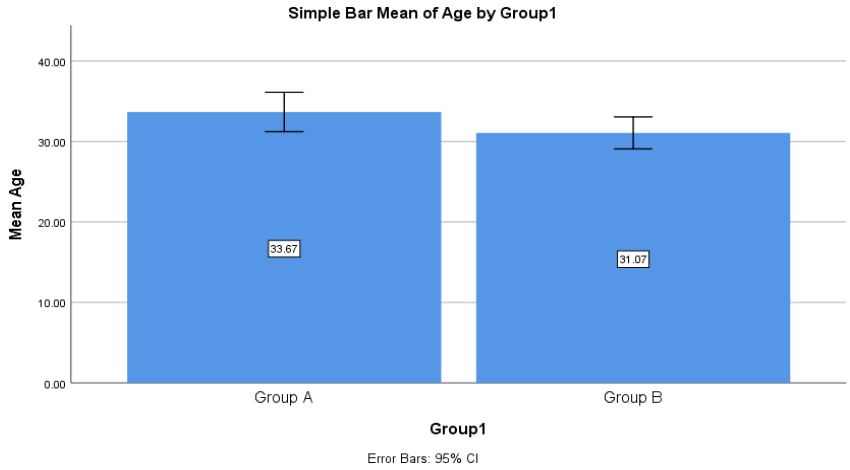
RESULTS:

Table 1: Age Comparison Between Groups A and B

Age	**Un-Paired t-test**			
Group	**Mean**	**SD**	**t value**	**P value**
Group A	33.67	4.42	1.768	0.088

Group B	31.07	3.59		

Figure 1

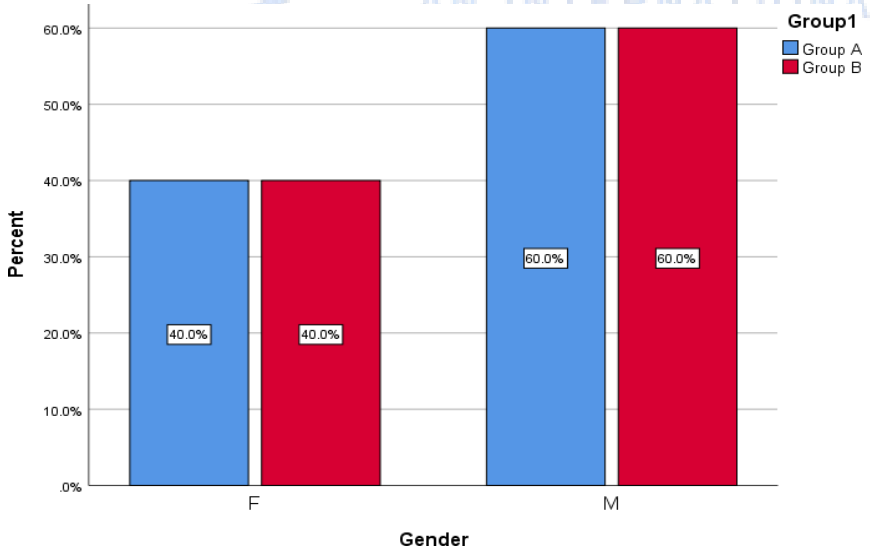


The above table and the figure show age distributions: Group A 33.67 ± 4.42 years, Group B 31.07 ± 3.59 years (starting from the table). There were no significant differences in variance between groups ($p > 0.05$), positioning the study for baseline comparability.

Table 2: Gender Comparison Between Groups A and B

Gender	**Group**		**Total**	**P value**
	A **No. (%)**	**B** **No. (%)**	No. (%)	
Male	6 (40)	6 (40)	12 (40)	1.000
Female	9 (60)	9 (60)	18 (60)	
Total	15	15	30	

Figure 2

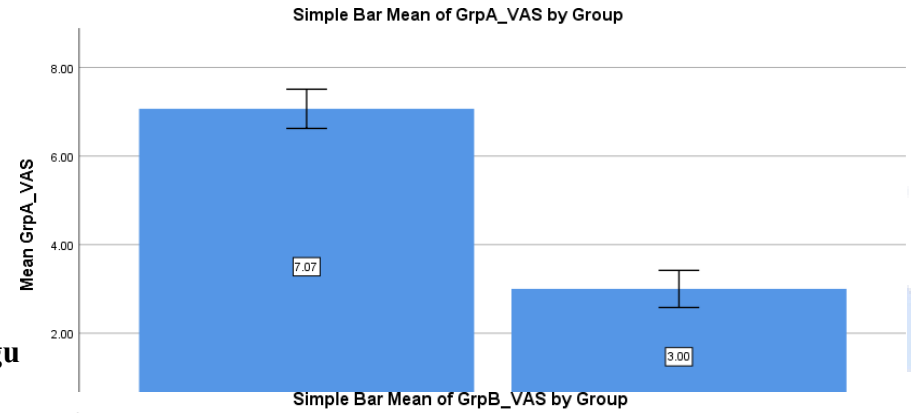


The above table and graph show the gender breakdown revealed 20 females (n=9) and 40% males (n=6). No significant difference ($p > 0.05$), hence similar compositions.

Table 3: Comparison of VAS scores within the groups

	Paired t-test			
Group A VAS	**Mean**	**SD**	**t value**	**P value**
Pre-Test	7.07	0.79	17.823	<0.001
Post-Test	3.00	0.76		
	Paired t-test			
Group B VAS	**Mean**	**SD**	**t value**	**P value**
Pre-Test	7.13	0.74	9.727	<0.001
Post-Test	5.27	0.88		

Figure 3



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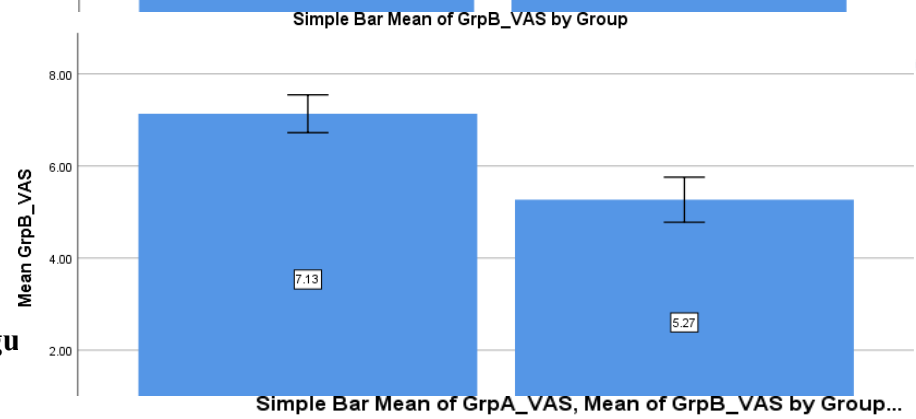

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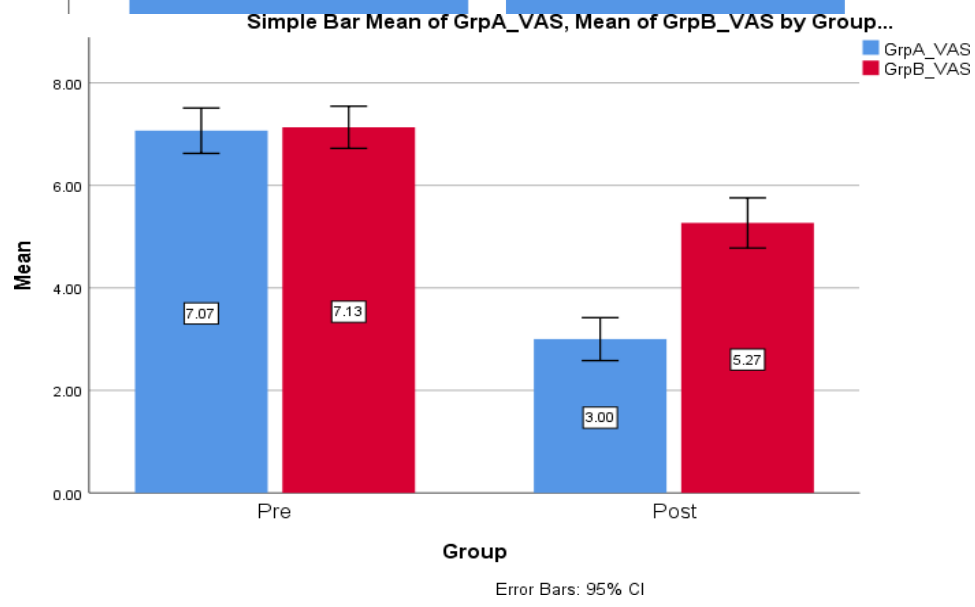


Intra-group analysis of the VAS scores showed significant decreases in both cohorts after treatment. Specifically, Group A had a pre-test mean of 7.07 ± 0.79 that dropped to a pre-test mean of 3.00 ± 0.76, and Group B went from a pre-test mean of 7.13 ± 0.74 to a pre-test mean of 5.27 ± 0.88. These reductions were at a p< 0.001 level of significance for both groups, showing treatment efficacy, but the progress of Group A was greater than that of Group B.

Table 4: Comparison of NDI scores within the groups

	Paired t-test			
Group A NDI	**Mean**	**SD**	**t value**	**P value**
Pre-Test	67.60	6.33	14.130	<0.001
Post-Test	38.00	7.07		
	Paired t-test			
Group B NDI	**Mean**	**SD**	**t value**	**P value**
Pre-Test	68.73	5.96	13.066	<0.001
Post-Test	57.27	6.49		

Figure 6

Figure 7

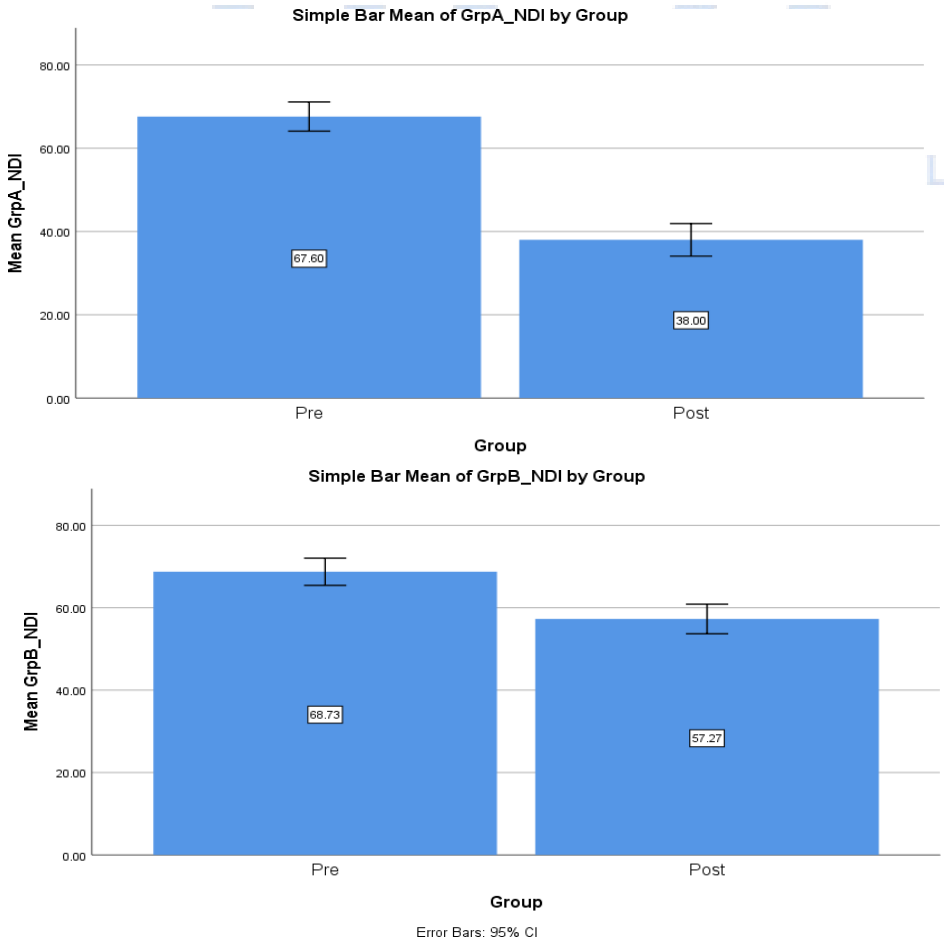
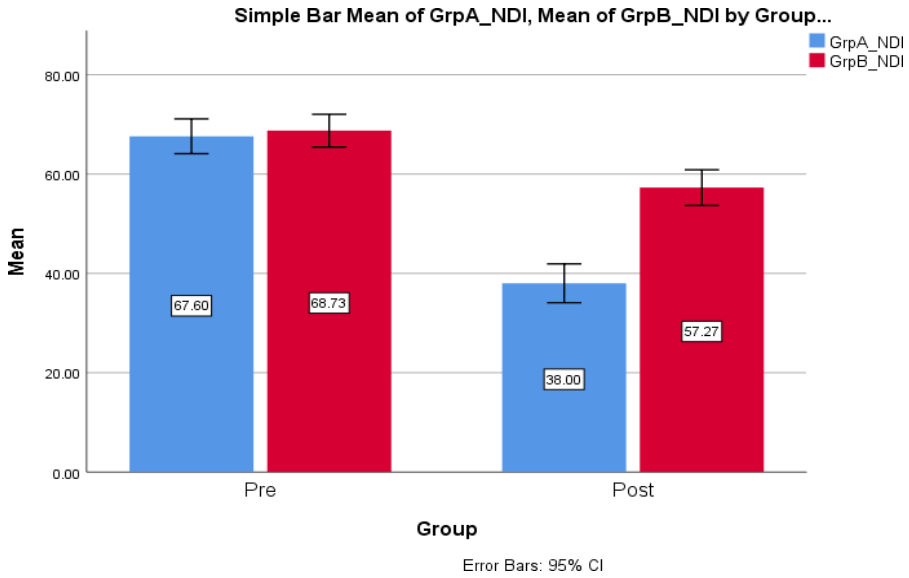


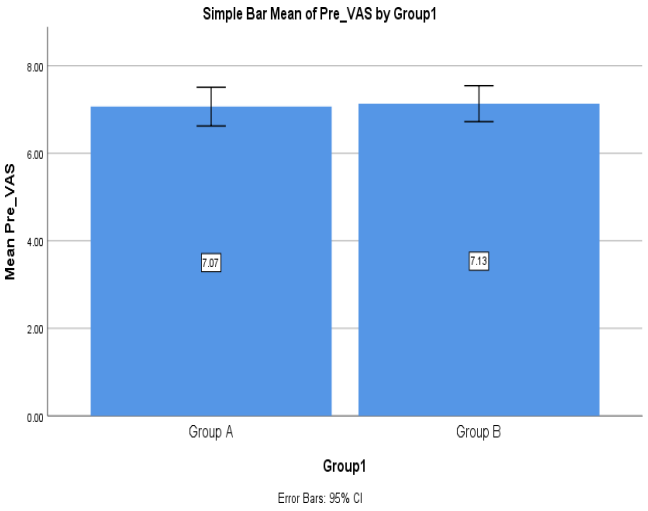
Figure 8



Functional gains involving proportions of groups revealed a significant increase in their NDI post four movements in the protocol. Group A mean of 67.60± 6.33 in pretest increased to 38.00± 7.07, and Group B mean of 68.73± 5.96 increased to 57.27± 6.49, with p< 0.001 in both cases. Group A showed better functional recovery than Group B.

Table 5: Comparison of VAS scores between the groups

VAS pre-test	**Un-Paired t-test**			
Group	**Mean**	**SD**	**t value**	**P value**
Group A	7.07	0.79	-0.237	0.815
Group B	7.13	0.74		
VAS post-test				
Group A	3.00	0.76	-7.549	<0.001
Group B	5.27	0.88		



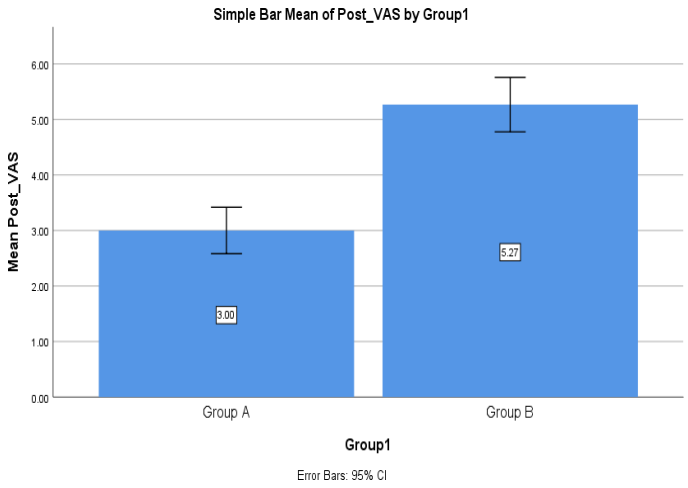
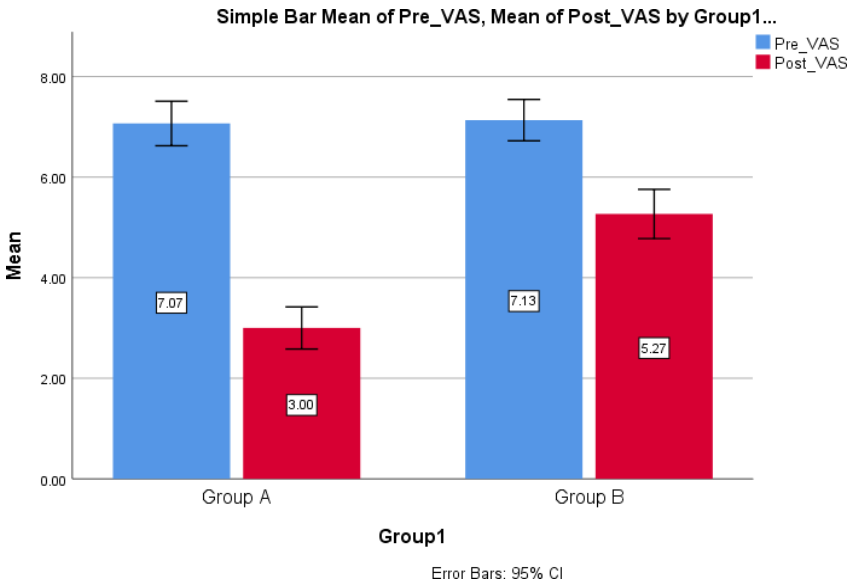


Figure 11



Based on the above table and graphs, it is noted that the pretest VAS in group A had a mean of 7.07 (0.79), and in pretest group B, the mean was 7.13 (0.74). Likewise, in posttest VAS group A mean was 3.00 (0.76), and in posttest group B mean was 5.27 (0.88). The significance of both these differences was statistically significant ($p<0.05$). Group A, however, improves on VAS better than Group B.

Table 6: Comparison of NDI scores between the groups

NDI pre-test	**Un-Paired t-test**			
Group	**Mean**	**SD**	**t value**	**P value**
Group A	67.60	6.33	-0.504	0.618
Group B	68.73	5.96		
NDI post-test				
Group A	38.00	7.07	-7.771	<0.001
Group B	57.27	6.49		

Figure 12

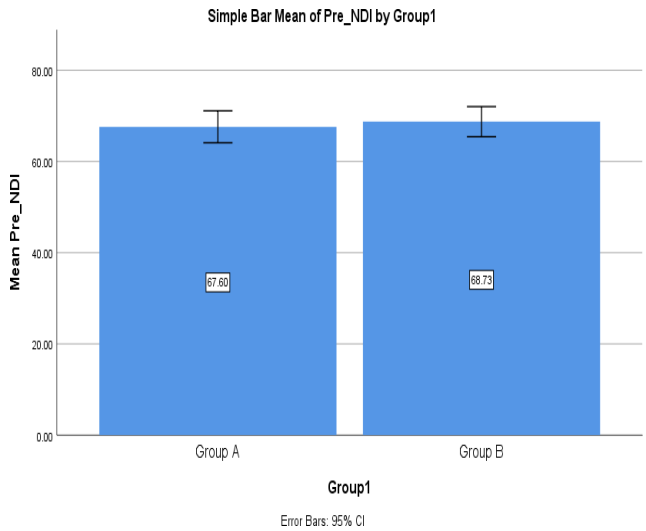


Figure 13

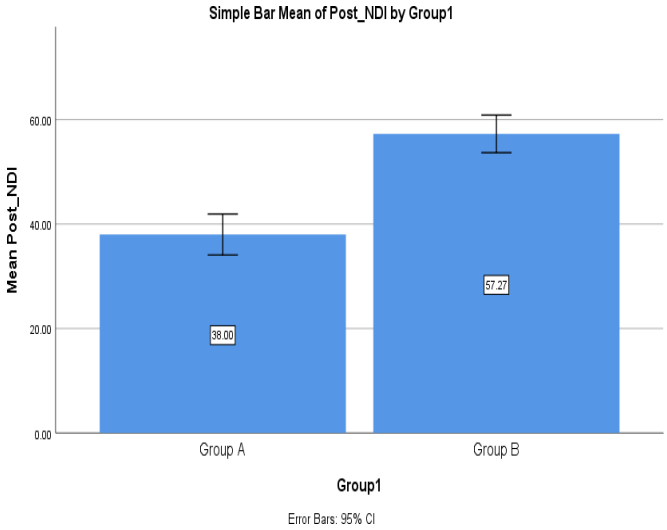
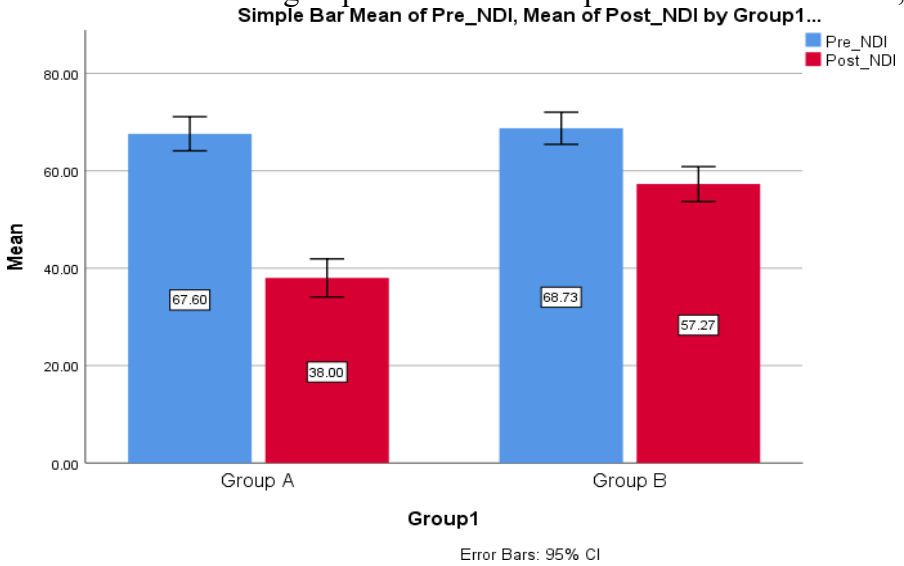


Figure 14

Results of NDI intergroup showed similar patterns to VAS results, meaning pretest results were similar



(p=0.618), whereas posttest results were highly significant (p<0.001) with Group A demonstrating significantly improved functional qualities compared to Group B.

DISCUSSION: Non-specific neck pain has similar symptoms to grade I and II whiplash-associated disorders, but without a traumatic onset. Although often it resolves within weeks after emergence, persistent disease can have a devastating effect on routine activities, increase demands on healthcare and prolong work absences and offer the foundation of chronic disability, placing enormous strain on individuals, employers and medical resources.[3] Theoretical foundation for post IASTM myofascial pain alleviation focuses on three known pathways: localised thermal elevation and increased circulation, specific tissue deformation and extension, and reduction of fascial adhesions and spasms. Recent justification for the circulatory hypothesis comes from the study by Portillo-soto et al. on the effects of IASTM (Graston technique) and massage on bovine dermal perfusion, measured by thermography.[3]

Practitioners need to assess the psychometric properties of a tool, including consistency and sensitivity to change, before it is adopted into clinical use. Instruments need sufficient dependability and authenticity in order to direct therapeutic choices. Herein, we discussed the reproducibility of NDI and NPRS in a subset of mechanical neck pain cases. Findings recommend NDI has fair to moderate reproducibility with less than the Dutch NDI benchmarks. Contrasting research has reported solid reproducibility for NDI using measures of correlation.[6] This investigation faced some limitations, including Modest sample volume and Absence of longitudinal follow-up.

CONCLUSION: Neck pain is a common, annoying musculoskeletal complaint, with its point prevalence of 6-22% rising to 38% for seniors and a lifetime incidence of 14.2 – 71%. Most cases avoid identifiable pathology or structural anomalies and, therefore, are extremely non-specific and make the assessment of NSNP difficult. Prior attempts were done with myofascial release and active release modality for pain relief of cervical pain, with common shared principles and multidirectional fascial manipulations. First, IASTM provides mechanical stress on myofascial stress on myofascial pai, which allows more profound tissue involvement without the tiredness of the clinical practitioner. More extensive research based on relatively large samples and extended follow-up periods should be encouraged.

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