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Assisted Soft Tissue Mobilization on Neck Disability in Patients with Upper Trapezius Trigger Points: A Quasi-Experimental Study

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ABSTRACT

Myofascial trigger points in the upper trapezius are a common trigger of mechanical neck pain that is often associated with functional impairment assessed through the NDI. IASTM is universally used in the treatment of myofascial dysfunction; nevertheless, the literature on its role in disability outcome in clinical practice is scarce. **Objectives:** To assess the utility of an IASTM-based protocol in terms of NDI in trigger point patients of the upper trapezius compared with traditional physiotherapy. **Methods:** A non-randomized controlled quasi-experimental study was conducted, participants were recruited and not randomly assigned to either Group A (IASTM; n=25) or Group B (conventional physiotherapy; n=25). Group A (IASTM; n=25) and Group B (conventional physiotherapy; n=25) were randomly allocated 50 participants who had active upper trapezius trigger points lasting 3 months or more, of neck pain, which were determined using G*Power 3.1. The assessment of NDI was conducted at baseline and also at the end of the intervention period. Between-group comparisons were done with a significant level of p less than 0.05. **Results:** The groups had no differences in baseline NDI scores (Group A: 31.28 ± 5.09; Group B: 30.96 ± 5.32; p=0.82). Group A experienced a much lesser degree of disability than Group B (9.04 + 4.03 vs 20.12 + 4.64; p<0.001). Group A (mean= 22.24points) showed a higher reduction in NDI compared to Group B (mean= 10.84 points). **Conclusions:** A program of IASTM led to much better neck-related disability (NDI) than traditional physiotherapy in the patients who showed upper trapezius trigger points.

INTRODUCTION

Neck pain is a highly prevalent musculoskeletal condition and represents a major contributor to disability worldwide. Findings from the Global Burden of Disease analyses demonstrate that neck pain accounts for a substantial share of years lived with disability (YLDs) across adult age groups, emphasizing its considerable impact on population health [1]. In Pakistan, occupational exposure to prolonged sitting, sustained forward-head/rounded-shoulder postures, and suboptimal workstation ergonomics is common in working-age adults. Karachi-based data from intensive computer users (software engineers) show a considerable burden of neck pain and identify ergonomic and lifestyle factors as significant correlates, supporting the clinical relevance of workplace-associated neck pain locally [2]. A key myofascial contributor to mechanical neck pain is the presence of upper trapezius MTrPs. Evidence syntheses indicate that active and latent myofascial trigger points are frequently observed in neck-

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and shoulder-related disorders; however, the quality of prevalence studies varies, and standardized diagnostic rigor is often limited [3, 4]. To improve diagnostic consistency, an international Delphi consensus proposed a minimal core set of clinical criteria for trigger point identification (e.g., taut band, hypersensitive spot, referred pain), which can be operationalized in outpatient settings for eligibility screening and baseline characterization [4, 5]. Conventional physiotherapy remains first-line care for many presentations of neck pain and commonly includes education, exercise (mobility, strengthening/endurance), and manual therapy when indicated. These approaches are supported by contemporary clinical practice guidelines for neck pain management, but persistent disability can remain in subgroups where myofascial dysfunction and pain sensitization are prominent [1]. In this context, Instrument-Assisted Soft Tissue Mobilization (IASTM) has gained popularity as a targeted myofascial technique intended to apply controlled mechanical loading via specialized instruments. Proposed mechanisms include modulation of nociception/mechanoreceptor input, changes in local circulation/temperature, and connective-tissue remodeling, but published clinical standards and reporting consistency have historically varied [6]. Although IASTM has been studied across musculoskeletal conditions, disability-focused outcomes in upper trapezius trigger-point populations remain comparatively less represented, particularly in routine outpatient practice in low and middle-income settings. Experimental trials in related neck pain/upper trapezius MTrP contexts suggest that adding IASTM-type interventions can improve pain and functional outcomes compared with comparator interventions, supporting the rationale for further pragmatic-controlled studies using standardized disability measures such as the NDI [7].

Myofascial trigger points located in the upper trapezius are the common cause of neck pain and functional disability, and inconsistent results have been reported with the use of conventional physiotherapy alone. The scientific data on the comparison of IASTM with traditional physiotherapy in terms of the decrease in neck disability is scarce, especially in the Pakistani clinical environment. This study aimed to test the efficacy of an IASTM-based protocol on neck-associated functional disability, as identified by the Neck Disability Index on patients who received treatment in Karachi clinics.

METHODS

A quasi-experimental clinical trial study that compared the outcomes of an intervention group administered an IASTM-based protocol and a comparison group of physiotherapy. Rehabilitation researches are supposed to be controlled experimental designs that heighten causality when determining the effectiveness of the treatment [1]. Conceptual alignment Reporting. In line with a CONSORT recommendation on transparent trial reporting (allocation, outcomes, and description of analysis), reporting was conceptually linked [8]. The research was done in both outpatient physiotherapy clinics that are in the public and privately based in Karachi, Pakistan, to capture normal clinical case-mix and care pathways of local practice. The selection of Karachi clinics was supported by the recorded neck pain among the high-intensity computer users in the city and the applicability of the risk exposures of ergonomics [2]. The research activity was performed within a specified period of data collection between 21 February 2025 and 16 July 2025, which included both participant recruitment, baseline, intervention, and post-intervention outcome assessment. A priori calculation was made of the a priori sample size based on the calculation of G Power (v3.1.9.7) with the following values: Effect size: d = 0.8, alpha = 0.05, and power = 0.80, which gave a required sample size = 52 samples (26 samples/group). To take into account the possible attrition and clinical feasibility, a final sample of 50 participants (25 in each group) [9]. A sample of 50 participants who satisfied the eligibility criteria were enrolled and randomly assigned in a 1:1 ratio, with 25 patients in the IASTM group and 25 patients in the conventional physiotherapy group. An assessor not aware of the group assignment recorded the outcomes in order to minimize detection bias in patient-reported outcomes [10]. Adults older than 25 years with a history of neck pain of 3 months or longer and unilateral active upper trapezius trigger points were selected. Standard clinical examination was used to identify trigger points, which minimized the risk of misclassification. Exclusion criteria were within the past cervical surgery, cervical radiculopathy/myelopathy, risk of bleeding, local skin infection/ lesions above the area of treatment, severe sensory impairment, incapability to make informed consent, and other factors that can lead to some risks during the IASTM therapies [11]. The protocol applied to participants in the IASTM group was in accordance with the multimodal IASTM paradigms, such as a short warm-up, instrument scanning strokes to detect tissue restriction, deeper instrument-aided strokes in the area of the upper trapezius, followed by stretching and load progressive ones. The traditional physiotherapy group had been treated based on the focus on the modulation of symptoms and re-establishment of the movement ability (e.g., superficial heat and cervical range-of-motion exercises), a reflection of evidence-based packages of management of neck pain according to guidelines [1]. The two groups were treated during a 4-week period of treatment with a standard frequency of sessions. The Urdu version of the NDI-U was used in measuring neck-related

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functional disability, a validated 10-item scale that is suitable in Pakistani contexts [12]. Interpretation was done based on clinically meaningful change thresholds [13]. Written informed consent was obtained from all the participants, and the study was conducted with regard to the internationally recommended principles in the context of conducting research with human subjects, which are aligned with the Declaration of Helsinki.

IBM SPSS Statistics (version 26.0) was used to analyze this data. The Shapiro-Wilk test and Levene test were used to assess the assumptions of normal distribution and equality of variances, respectively, and the results obtained show that parametric testing was used (Shapiro-Wilk p.05; Levene p.05). Independent-samples t-tests were used to compare the results of post-intervention between-group and change scores. All tests were two-sided with statistical significance of $p<0.05$, and 95% confidence intervals and effect size estimates (Cohen's d) given on the main comparisons.

RESULTS

The mean age was 38.40 ± 8.10 years in Group A (n=25) and 39.10 ± 7.60 years in Group B (n=25), with no significant between-group difference (p=0.72). Mean BMI was 26.90 ± 3.40 kg/m^2 in Group A and 27.30 ± 3.20 kg/m^2 in Group B, again showing no significant baseline difference (p = 0.61). Overall, these results suggest that the two groups were comparable at baseline for age and BMI before intervention (Table 1).

Table 1: Demographic Characteristics (Age and BMI)

Variables	Group A (n=25)	Group B (n=25)	Total (N=50)	p-value
Age (Years), Mean ± SD	38.40 ± 8.10	39.10 ± 7.60	38.75 ± 7.78	0.72*
BMI (kg/m^2), Mean ± SD	26.90 ± 3.40	27.30 ± 3.20	27.10 ± 3.27	0.61*

A total of 50 participants were included and allocated equally into Group A (n=25) and Group B (n=25). At baseline, the two groups were comparable for neck-related disability (NDI), with no statistically significant between-group differences in pre-treatment scores (NDI pre: p=0.829). Neck-related disability, measured using the Neck Disability Index (NDI; 0–50), was comparable between groups at baseline. Group A had a pre-treatment NDI of 31.28 ± 5.09, while Group B had 30.96 ± 5.32, with no statistically significant between-group difference (p=0.829). Following the intervention period, both groups improved, but Group A demonstrated substantially greater reduction in disability. Post-treatment NDI decreased to 9.04 ± 4.03 in Group A compared with 20.12 ± 4.64 in Group B, and the between-group difference at post-treatment was statistically significant (p=0.001). The estimated mean improvement was –22.24 points in Group A versus –10.84 points in Group B (Table 2).

Table 2: Neck Disability Index (NDI) Outcomes

Groups	NDI Pre (Mean ± SD)	NDI Post (Mean ± SD)
Group A	31.28 ± 5.09	9.04 ± 4.03
Group B	30.96 ± 5.32	20.12 ± 4.64
p-value	0.829	0.001

DISCUSSION

This study demonstrated that an IASTM-based protocol (Group A) was associated with significantly greater improvement in neck-related functional disability than conventional physiotherapy (Group B), as reflected by the NDI. Baseline equivalence between groups (p=0.82) strengthens the interpretation that the greater post-treatment reduction in disability observed in Group A (p=0.001) is attributable to the intervention rather than pre-treatment imbalance. From a clinical interpretation perspective, NDI change thresholds reported in the literature help contextualize whether improvements exceed measurement error and represent meaningful change. Pool et al. reported a minimal detectable change (MDC) of ~10.5 points on the 0–50 NDI scale in non-specific neck pain, supporting that changes above this level are unlikely due to measurement noise [14]. Saltychev et al. similarly reported an MDC around 10 points and advised that a ~10-point change can be considered clinically meaningful in typical mechanical neck pain presentations [15]. In this context, Group A's mean NDI improvement (≈ 22 points) clearly exceeded these thresholds, while Group B's improvement (≈ 11 points) was around the MDC/clinical-meaningfulness boundary, suggesting that both groups improved, but Group A achieved a more robust and clearly meaningful functional recovery. The findings of this study align with prior controlled studies where IASTM interventions have been associated with improvements in NDI in related populations, including trials involving active upper trapezius trigger points and chronic neck pain where NDI was an outcome [16]. Since the NDI captures functional impact (personal care, lifting, reading, headaches, work, driving, sleep, recreation), the larger drop in Group A supports that the intervention likely provided benefit beyond symptom relief, translating into better daily activity performance. The recent evidence also contributes to the possible effectiveness of IASTM with neck pain and associated functional outcomes. A massive systematic review and meta-analysis indicated that IASTM had a significant beneficial effect on disability, intensity of pain, and range of motion in people with neck pain compared to non-IASTM control interventions, but no significant differences with other common physiotherapy interventions [17]. Randomized trials involving the use of IASTM in conjunction with exercise therapy have yielded superior results in pain and muscular endurance of the

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chronic neck pain patients compared to that of exercise alone, and show that IASTM can further augment rehabilitation outcomes of manual therapy alone [18]. Also, an RCT that compared IASTM and the muscle energy technique concluded that both of these interventions were important to reduce the disability and enhance the cervical range of motion, and IASTM had some benefits in terms of mobility outcomes, which implies its utility as a component of a multimodal manual therapy approach [19]. Nevertheless, other systematic reviews point out that although IASTM has the potential to reduce patient-reported pain and enhance musculoskeletal disease functions with moderate or low certainty, the heterogeneity of the studies and differences in protocols are to be interpreted cautiously and require further high-quality research [20]. Collectively, these data imply that though IASTM is an encouraging study with prospective significant effects on the disability of the neck and associated outcomes, standardization of procedures and additional comparative studies are required to clarify the best practices and determine the comparative effectiveness.

This study has several limitations. The absence of long-term follow-up limits conclusions about the durability of treatment effects, and the quasi-experimental, non-randomized design restricts causal inference despite baseline comparability. Lack of participant and therapist blinding introduces potential performance bias, although outcome assessment was blinded. Additionally, the single-center setting in Karachi, modest sample size, and inherent therapist variability may limit generalizability; future multi-center RCTs with long-term follow-up are warranted.

CONCLUSIONS

In conclusion, the IASTM-based intervention produced a statistically and clinically meaningful reduction in Neck Disability Index scores compared with conventional physiotherapy in patients with upper trapezius myofascial trigger points. The magnitude of improvement exceeded the established minimal clinically important difference, whereas gains in the conventional physiotherapy group were smaller, indicating a less pronounced improvement in functional disability.

Authors' Contribution

Conceptualization: WA, SPC
Methodology: MSA
Formal analysis: NM
Writing and Drafting: WA, MA, NM, MSA
Review and Editing: WA, MA, NM, SPC, MSA

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

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