



Original Article



Effectiveness of Instrument-Assisted Soft Tissue Mobilization on Cervical Pain in Upper Trapezius Trigger Points: A Quasi-Experimental Study

Waqas Ahmed¹, Ayesha Tasadduq¹, Syeda Riffat Sherazi¹, Fasiha Sohail², Muhammad Asif³ and Nasir Mehmood⁴¹Department of Rehabilitation Sciences, Dr. Ziauddin Hospital, Karachi, Pakistan²Department of Medicine, Ziauddin University, Karachi, Pakistan³Department of Rehabilitation and Health Sciences, Nazeer Hussain University, Karachi, Pakistan⁴Department of Physical Therapy, The Islamia University of Bahawalpur, Bahawalpur, Pakistan

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Waqas Ahmed

Department of Rehabilitation Science, Dr. Ziauddin Hospital, Karachi, Pakistan
drwaqaz@gmail.comReceived Date: 22nd December, 2025Revised Date: 10th February, 2026Acceptance Date: 20th February, 2026Published Date: 28th February, 2026

ABSTRACT

Upper trapezius myofascial trigger points (MTrPs) are a common cause of chronic neck pain. Instrument-Assisted Soft Tissue Mobilization (IASTM) has emerged as a soft-tissue technique designed to modulate myofascial restrictions and pain, but evidence comparing IASTM with conventional physiotherapy for upper trapezius MTrPs remains limited. **Objectives:** To compare the effects of IASTM versus conventional physiotherapy on pain intensity and trigger points in patients with chronic neck pain with active upper trapezius MTrPs. **Methods:** This experimental comparative study recruited 50 participants with chronic cervical pain and clinically confirmed active upper trapezius MTrPs from different physiotherapy clinics in Karachi and allocated them to Group A (IASTM; n = 25) or Group B (conventional physiotherapy; n=25). Group A received a Graston-type IASTM protocol while Group B received hot packs, manual stretching, cervical range-of-motion exercises, postural correction, and manual soft-tissue mobilization. Outcomes were assessed pre- and post-intervention after four weeks using the Numeric Pain Rating Scale and trigger-point palpation. Data were analyzed using descriptive statistics, chi-square tests, and repeated measures ANOVA, taking p<0.050 as the level of significance. **Results:** Both groups showed significant improvement; however, Group A demonstrated greater reductions in pain and disability. NPRS decreased from 8.68 ± 0.85 to 3.56 ± 0.87 in Group A and from 8.28 ± 0.84 to 5.56 ± 0.82 in Group B (p=0.001). **Conclusions:** This study demonstrated that IASTM produces significantly greater improvements in pain and trigger points than conventional physiotherapy in patients with chronic neck pain due to upper trapezius myofascial trigger points.

INTRODUCTION

One of the commonest causes of neck pain, limited mobility, and functional disability in clinical practice is upper trapezius trigger points. The existence of myofascial trigger points (MTrP) has been described as discrete, hyperirritable nodules found in taut bands of skeletal muscle fibers, which are painful to compression and may or may not result in characterized referred pain, motor dysfunction, and autonomic reactivity [1, 2]. Recent reviews highlight that MTrPs are related to abnormal motor end-plate activity, peripheral and central sensitization, and

dysfunction of the muscle, which provide the causes of chronic neck pain and disability [1]. Neck pain is now known to be one of the major public-health problems in the world. The Global Burden of Disease (GBD) Study analysis results indicate neck pain as one of the leading causes of years lived with disability (YLDs) globally, with its significant and increasing burden in most areas [3]. Recent GBD 2021 data also validate the fact that neck pain is a major contributor to disability-adjusted life years in both the high- and middle-income nations [4]. Epidemiological results in



Pakistan reveal the fact that the prevalence of neck pain is high, especially among working-age groups who are exposed to bad ergonomics and long sitting. Software engineers in Karachi have cross-sectional studies that indicate making lifetime neck-pain experience in over 60% of the subjects [5]. Long working hours and poor workstation design have been given as factors that contribute to neck and shoulder-related complaints among the workers in the bank and other offices [6]. In more recent times, neck pain was reported to have a period prevalence of 35% in a multicenter study of Pakistani professional drivers, which was correlated strongly with prolonged forward head posture and lack of awareness about effective ergonomics [7]. Taken together, these results indicate a common occurrence of neck pain in high-risk occupational populations of the Pakistani population, ranging from approximately one-third to more than two-thirds, with the upper trapezius often playing a significant role in symptomatic manifestation. Clinicians apply a broad range of physiotherapy methods in order to treat the upper trapezius MTrPs. Traditional modalities normally involve superficial heat (hot packs), stretching and range-of-motion (ROM) movement, postural re-education, and manual soft-tissue movement. All MTrP-directed approaches, including ischemic compression, strain counterstrain, myofascial release, therapeutic ultrasound, Transcutaneous Electrical Nerve Stimulation (TENS), and dry needling, have been shown to have short-term benefits in pain and functional improvements with variable levels of success, and long-term outcomes have been inconsistent, and the quality of the research is in most cases, moderate [8]. Over the past few years, Instrument-Assisted Soft Tissue Mobilization (IASTM) and its branded versions, like Graston Technique, have been gaining more and more attention as an up-and-coming form of myofascial intervention. IASTM involves scanning soft tissue with instruments that are contoured and made of stainless steel or other materials with the aim of mechanically loading fascia and muscle, breaking adhesions, and activating mechanosensitive nociceptors. The systematic reviews and meta-analyses indicate that IASTM may minimize patient-reported pain (moderate-certainty evidence) and produce small-to-moderate effects on function in a variety of musculoskeletal conditions [9]. Randomized controlled trials have revealed that IASTM, in addition to exercise therapy, has better pain and muscular endurance in chronic neck pain relative to exercise alone [10, 11]. Although the clinical application of IASTM is continuously increasing, as yet, there are not enough studies that could make firm conclusions about its effectiveness over traditional physiotherapy in upper trapezius MTrPs in

particular. Recent systematic reviews indicate methodological constraints, lack of sufficient follow-up, and extreme heterogeneity of protocols and outcome measures, and more rigorous randomized trials in well-defined groups of myofascial pain are needed. Since the burden of cervical MPS is high in Pakistan, given the high frequency of the involvement of the upper trapezius in occupational and postural neck pains, and the paucity of high-level data on newer interventions like IASTM, there is great rationale in undertaking well-structured comparative research. The research will assess the efficiency of IASTM compared to conventional physiotherapy in the administration of upper trapezius trigger points to create context-specific evidence that may inform clinical decision-making during Pakistani physiotherapy practice.

METHODS

This was an experimental comparative trial that was conducted in an attempt to determine the effect of Instrument-Assisted Soft Tissue Mobilization (IASTM) versus Conventional Physiotherapy on cervical pain patients with active upper trapeze myofascial trigger points (MTrPs). The research took place in several chosen public and private physiotherapy centers in Karachi, Pakistan, between 21st February 2025 and 16th July 2025, which is a common outpatient environment in the city, and the patients would address the problems of neck pain and myofascial pain disorders. The intervention period was four weeks after the institutional review board had given ethical approval and synopsis. Institutional Ethical Review Committee of the Al-Hamd Institute of Physiotherapy and Health Sciences granted the study ethical approval, and its reference number is AIPHS/IERC/0125/06. The study conduct was also adhered to and was consistent with the Declaration of Helsinki Guidelines. The a priori calculation of the sample size involved the G + Power 3.1 software. According to an estimated high effect size ($d = 0.80$) [12], power $(1 - 0.80) = 0.80$ and 0.05 as the alpha, the sample size required was 50 participants (25 in each group). The selected effect size indicates the size of change that has been found in earlier studies, where IASTM or other manual treatments result in clinically significant pain and disability improvements in neck and shoulder conditions [13]. The duration of treatment, 2-6 weeks, has been used in neck pain and MTrP trials, and makes it enough time to note short-term changes in pain, disability, and range of motion (ROM) [14]. Participant selection was done using a convenience non-probability sampling. Participants were identified and assigned to those groups randomly: either Group A (IASTM) or Group B (Conventional Physiotherapy) randomly under the random allocation procedure with sealed opaque envelopes that were developed by a

statistician not involved in the application of interventions and data collection. Those who met the criteria of being adults (male/female) and having 3 months of cervical/upper trapezius/pain and active upper trapezius MTrPs, which are palpable taut bands, hypersensitive nodules, reproduction of familiar pain in palpation, and a typical referred pain pattern [15]. The exclusion criteria were that the participants were not able to provide informed consent and had a bleeding history, head injury with significant cervical trauma or fracture, local skin disease/infection, neuropathic sensory symptoms, cervical surgery within the last 2-3 years, or diagnosed cervical radiculopathy or myelopathy. Group A was provided with instrument-assisted soft tissue mobilization (IASTM), applying standardized stainless-steel tools that are similar to the Graston Technique. The session was structured: (1) a short warm-up with damp heat and/or manual preparation; (2) an approximate of 60-s of scanning strokes over upper trapezius to detect restrictions; (3) specific IASTM strokes over defined MTrPs/taut bands; (4) passive and/or active stretch of upper trapezius; (5) eccentric activity of the affected musculature; and (6) brief cryotherapy to curb the soreness post-treatment. This is an integrated strategy that is consistent with the generally prescribed IASTM protocols that incorporate instrument strokes with stretching and eccentric loading to create soft-tissue remodeling, enhance pain/pressure sensitivity, and augment ROM. Systematic reviews and controlled trials evidence confirm pain and functional improvements in neck pain and MTrP populations, including upper trapezius involvement [12], with regional reports that indicate clinical uptake is on the rise [16]. Group B was provided with conventional conservative physiotherapy of upper trapezius MTraps, as it would be done in Pakistan and other countries. The program itself involved the use of superficial heat (hot packs) to decrease muscle tone and enhance tissue extensibility, manual stretching of the upper trapezius, active and passive cervical ROM exercises, postural correction and ergonomic counseling, and manual soft-tissue mobilization administered by the hands of the therapist. These elements are consistent with evidence-based conservative care of mechanical neck pain and myofascial pain syndrome, where education, heat, stretching, ROM, and mobilizing of the soft tissues are the main part of the first-line treatment [17]. Measurement

bias was minimized with all outcome measures being measured pre and post intervention by a qualified physiotherapist who had no involvement in the execution of the interventions. The intensity of pain was assessed with the help of an 11-point Numeric Pain Rating Scale (NPRS) with 0 indicating no pain and 10 indicating the worst imaginable pain. The NPRS is highly applicable in musculoskeletal studies and depicted high reliability, responsiveness, and interpretability in populations of neck and spine pain, with only small clinically significant differences generally reported with the scale ranging from 1-2 points. Identified and counted upper trapezius MTrPs were determined by manual palpation: the palpation of a palpable band, hypersensitive nodule within the band, reproduction of known pain of the patient, referred pain, or local twitch response on sustained compression. The clinical examination plan is aligned with the international consensus work and recent diagnostic algorithms of MTrPs [18].

The analysis of data was done by IBM SPSS Statistics Version 25.0. The descriptive statistics (mean \pm standard deviation, frequencies, and percentages) were calculated on all variables. Crosstabulation was used to investigate categorical variables, including sex, categories of severity, and presence/absence of trigger points. Repeated measures analysis of variance (ANOVA) with a significant value $p < 0.050$ was used to make between-group comparisons of continuous outcomes (NPRS and number of trigger points). The ANOVA-based methods are frequently used in IASTM and neck-pain RCTs when the changes of pre- and post-intervention in two or more groups should be compared [14]. All the analyses were done using complete datasets, and no missing values, as recommended in standard reporting of randomized trials.

RESULTS

Fifty participants (25 each) were used in the study. The data on NPRS normality was established. A repeated measures ANOVA demonstrated that there was a statistically significant difference between groups at post-treatment ($F(1, 48) = 69.93, p = 0.001$) with a very large effect size (Cohen $d = 2.37$; 95% CI: 1.65 to 3.09; partial $\eta^2 = 0.71$), and it would be considered very large. These results indicate a significant clinical improvement of IASTM compared with traditional therapy (Table 1).

Table 1: Normality analysis of NPRS Scores at Pre and Post Intervention Levels

Time	Group	Mean \pm SD	SE	95% CI	Minimum	Maximum	df	F	p-value	Cohen's d (95%CI)	Partial η^2 (95% CI)
Pre	Group A	8.68 \pm 0.852	0.170	8.33-9.03	7	10	48	2.784	0.102	0.47(-0.09 to 1.03)	0.05 (0.00 to 0.18)
	Group B	8.28 \pm 0.843	0.169	7.93-8.63	7	10					
Post	Group A	3.56 \pm 0.870	0.174	3.20-3.92	2	5	48	69.930	0.001	2.37(1.65 to 3.09)	0.59 (0.41 to 0.71)
	Group B	5.56 \pm 0.821	0.164	5.22-5.90	4	7					

At baseline, the groups were similar regarding the degree of pain and the disability of the neck. Group A had a mean pre-treatment NPRS of 8.68 ± 0.85 whereas Group B had 8.28 ± 0.84 ($p=0.102$). The post-treatment mean score in Intervention Group (A) decreased significantly to 3.56 ± 0.870 compared to Control Group (B) with a mean of 5.56 ± 0.821 (p -value= 0.001), equivalent to the point reduction of approximately 2.7. The comparison of post-treatment pain between groups demonstrated that the difference between IASTM and the other group is statistically significant ($p=0.001$)(Table 2).

Table 2: NPRS Scores at Pre and Post Treatment Levels

Time		Mean ± SD	SE	95% CI for M	Minimum	Maximum	df	F	p-value
Pre	Group A	8.68 ± 0.852	0.170	8.33-9.03	7	10	48	2.784	0.102
	Group B	8.28 ± 0.843	0.169	7.93-8.63	7	10			
Post	Group A	3.56 ± 0.870	0.174	3.20-3.92	2	5	48	69.930	<0.001
	Group B	5.56 ± 0.821	0.164	5.22-5.90	4	7			

Crosstab analysis of pain severity categories revealed that, before treatment, the majority of both groups showed severe pain, with 21/25 (84%) in Group A and 22/25 (88%) in Group B reporting severe pain, and the rest moderate pain. A significant change in the lower pain categories was observed in the two groups after four weeks of intervention, which was more significant in the IASTM group. Group A: 11 participants (44%)- mild, 14 (56%)- moderate, with none left in the severe category. Group B showed 4 (16) respondents (4) to mild pain and 21(84%) respondents to moderate pain at follow-up, and no severe pain. Active upper trapezius trigger points were also equally distributed across the groups at baseline, with most of the patients in either arm reporting three or four trigger points. The results of the post-treatment data indicated a decrease in the number of trigger points in the two groups. In Group A, 7 (28%) participants had no observable trigger points, 9 (36) participants had one trigger point, and 9 (36%) participants had two trigger points. In Group B, 3(12 percent) participants had no trigger points, 11 (44 percent) had one trigger point, and 11 (44 percent) had two trigger points. Therefore, a larger percentage of complete trigger-point deactivation (0 trigger points) was present in the IASTM group, which supports the suggested mechanism according to which IASTM leads to a decrease in the degree of myofascial stiffness and breaking taut bands and adhesions in the upper trapezius (Table 3).

Table 3: Pain Severity Category Distribution and Number of Trigger Points (Pre and Post)

Category	Sub-category	Frequency (%), Group A	Frequency (%), Group B	Total	χ ² value	p-value
Pain Severity (Pre)	Moderate	4 (16%)	3 (12%)	7 (14%)	5.565	0.030
	Severe	21 (84%)	22 (88%)	43 (86%)		
Pain Severity (Post)	Mild	11 (44%)	4 (16%)	15 (30%)	17.500	0.001
	Moderate	14 (56%)	21 (84%)	35 (70%)		
Trigger Points (Pre)	2	3 (12%)	1 (4%)	4 (8%)	17.500	0.001
	3	12 (48%)	11 (44%)	23 (46%)		
	4	10 (40)	13 (52%)	23 (46%)		

Trigger Points (Post)	0	7 (28%)	3 (12%)	10 (20%)	
	1	9 (36%)	11 (44%)	20 (40%)	
	2	9 (36%)	11 (44%)	20 (40%)	

Both groups had a clinically significant change in pain intensity when the results were interpreted against predetermined minimal clinically important change (MCIC) thresholds of chronic musculoskeletal pain to interpret the results of 11-point NRS (usually 11530 percentage) pain. Nevertheless, the scale of success in Group A (a reduction of about 59 percent at baseline) is evidently greater than smaller estimates of minimal detectable changes and more significant than the changes that were achieved when conventional physiotherapy was used alone.

DISCUSSION

The effects of Instrument-Assisted Soft Tissue Mobilization (IASTM) in comparison to conventional physiotherapy in patients with persistent neck pain and active upper trapezius myofascial trigger points were investigated in this comparative trial. The presented study findings are in line with and add to the emerging body of research on the use of IASTM to manage musculoskeletal pain. The previous systematic reviews proved the large effect sizes in pain and patient-reported function in injured populations undergoing IASTM treatment, which supports the clinical significance of the outcomes of the current study. Some have made similar conclusions and concluded that IASTM is equally effective and, in many cases, better than other types of manual therapy in the short-term treatment of pain and functional outcome [18]. A different study also established that both IASTM and trigger-point release were identical in terms of improving pain and ROM in mechanical neck pain, with the IASTM exhibiting positive trends in pain reduction and function [19]. The study was also reflective of a study by Islam et al. which was a Pakistani randomized controlled trial that reported that IASTM, along with conventional physiotherapy, yielded significantly more reductions of myofascial trigger points and symptoms of the cervix and lumbar areas compared with the conventional treatment alone among sedentary adults [20]. Collectively, these findings indicate that IASTM has incremental value when used in addition to

conventional physiotherapy, notably trigger-point caused neck and back pain. The difference in the IASTM group is not only statistically significant but also is also important clinically. The minimal clinically important change (MCIC) of patients with neck pain was estimated by Ahmed et al. to be about 1.52 points with reference to an 11-point pain NRS [21]. In this regard, both groups of our study were above the MCIC levels of pain, which validates that traditional physiotherapy is still a valid method of treating upper trapezius MTrPs. Nonetheless, the IASTM group showed a reduction in NPRS of about five points, which is much larger than MCIC and the slightest detectable change estimates, which is an enormous functional gain, and probably very perceptible. These differences are in reasonable contrast with effect sizes in systematic reviews of IASTM, in which pooled pain reductions tend to be of the small-to-moderate order in comparison with control interventions. The better results in the IASTM group could be attributed to a number of postulated processes. The present literature and evidence on neck pain and the up-to-date BMJ state-of-the-art review by Cohen and Hooten highlight the multimodal method of education, exercise therapy, and manual techniques, depending on the mechanisms of pain pathogenesis [22]. This research paper has a number of strengths. It employed a quasi-comparative design and had a reasonable sample size, which, based on a priori calculation of power, minimized the possibility of type II error. Second, the two groups were exposed to plausible and clinically relevant interventions, which enabled a realistic comparison of IASTM and standard physiotherapy as opposed to comparing them with minimal care.

It must be noted that there are a few limitations. The period of follow-up was four weeks only, and therefore, it is not known whether the benefit observed was long-term. Long-term outcomes as observed in studies on IASTM have been found to be very limited, systematic reviews have indicated, and future studies must incorporate medium and long-term follow-up to determine the persistence of the effects. The research took place within one city and clinical setting, and it might not apply to other populations, including older adults, people with important comorbidities, or other occupational requirements. In addition, the sample size was calculated adequately, although this sample size might be a limitation to generalization. Future research ought to: consider long-term follow-up to measure maintenance of benefits; consider alternate dosing schedules and co-administration with certain exercise programs; consider objective mechanistic outcomes (e.g., PPT, imaging, or biomechanical measures); and consider cost-effectiveness and patient preferences to inform clinical guidelines and policy.

CONCLUSIONS

This paper illustrates that IASTM has a much higher outcome in terms of pain and trigger points effects compared to standard physiotherapy in patients with chronic neck pain caused by upper trapezius trigger points.

Authors' Contribution

Conceptualization: WA

Methodology: WA, SRS, MA

Formal analysis: NM

Writing and Drafting: WA, AT, SRS, FS, NM

Review and Editing: WA, AT, SRS, FS, MA, NM

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

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

- [1] Dua A and Chang KV. Myofascial Pain Syndrome. [Updated 2025 Apr 13]. Stat Pearls [Internet]. Stat Pearls Publishing, Treasure Island (FL). Available from: <https://www.ncbi.nlm.nih.gov/books/NBK499882.2025>.
- [2] Mehmood N, Suriyakala Perumal Chandran WS, Bhutto MA, Patafi MA, Alam MS, Asif M et al. Impact of Dry Needling with Myofascial Release: A Synergistic Approach for Pain, Mobility, and Dynamic Balance in Cervical Myofascial Pain Syndrome: A Randomized Controlled Trial. TPM-Testing, Psychometrics, Methodology in Applied Psychology. 2025 Oct; 32(S7 (2025): Posted 10 October): 2148-55.
- [3] Safiri S, Kolahi AA, Hoy D, Buchbinder R, Mansournia MA, Bettampadi D et al. Global, Regional, And National Burden of Neck Pain in the General Population, 1990-2017: Systematic Analysis of the Global Burden of Disease Study 2017. British Medical Journal. 2020 Mar; 368. doi: 10.1136/bmj.m791.
- [4] Yang Y, Yi H, Jiang T. Global, Regional, and National Burden of Disease in Neck Pain: Statistical Analysis of Incidence, Prevalence, and DALYS, with Projections to 2036. European Spine Journal. 2025 Oct: 1-5.
- [5] Hasanat MR, Ali SS, Rasheed A, Khan M. Frequency and Associated Risk Factors for Neck Pain among Software Engineers in Karachi, Pakistan. The Journal of the Pakistan Medical Association. 2017 Jul; 67(7): 1009-12.

- [6] Shabbir M, Rashid S, Umar B, Ahmad A, Ehsan S. Frequency of Neck and Shoulder Pain and Use of Adjustable Computer Workstation Among Bankers. *Pakistan Journal of Medical Sciences*. 2016 Mar; 32(2): 423.
- [7] Tariq T, Kashif M, Ayaz J, Ijaz MM, Javed A, Adeel Arshad M et al. Work-Related Neck Pain and Its Association with Postural and Ergonomic Factors among Pakistani Professional Drivers. *Work*. 2025 Jan; 80(1): 471-83. doi: 10.3233/WOR-230344.
- [8] Urits I, Charipova K, Gress K, Schaaf AL, Gupta S, Kiernan HC et al. Treatment and Management of Myofascial Pain Syndrome. *Best Practice & Research Clinical Anesthesiology*. 2020 Sep; 34(3): 427-48. doi: 10.1016/j.bpa.2020.08.003.
- [9] Tang S, Sheng L, Wei X, Liang M, Xia J, Chen J. The Effectiveness of Instrument-Assisted Soft Tissue Mobilization on Pain and Function in Patients with Musculoskeletal Disorders: A Systematic Review and Meta-Analysis. *BioMed Central Musculoskeletal Disorders*. 2025 Mar; 26(1): 257. doi: 10.1186/s12891-025-08492-4.
- [10] Bostan A and Kaya P. Effect of Instrument-Assisted Soft Tissue Mobilization Combined with Exercise Therapy on Pain and Muscle Endurance in Patients with Chronic Neck Pain: A Randomized Controlled Study. *Journal of Manual and Manipulative Therapy*. 2024 Mar; 32(2): 131-40. doi: 10.1080/10669817.2023.2213989.
- [11] Candeniz Ş, Citaker S, Maraş G, Yavuzer HE, Yildirim H, Günendi Z. Comparison of the Effectiveness of Instrument-Assisted Soft Tissue Mobilization and Extracorporeal Shock Wave Therapy in Myofascial Pain Syndrome. *Turkish Journal of Medical Sciences*. 2023; 53(6): 1825-39. doi: 10.55730/1300-0144.5753.
- [12] Shewail F, Abdelmajeed S, Farouk M, Abdelmegeed M. Instrument-Assisted Soft Tissue Mobilization Versus Myofascial Release Therapy in Treatment of Chronic Neck Pain: A Randomized Clinical Trial. *BioMed Central Musculoskeletal Disorders*. 2023 Jun; 24(1): 457. doi: 10.1186/s12891-023-06540-5.
- [13] El-Hafez HM, Hamdy HA, Takla MK, Ahmed SE, Genedy AF, Abd EL-Azeim AS. Instrument-Assisted Soft Tissue Mobilisation Versus Stripping Massage for Upper Trapezius Myofascial Trigger Points. *Journal of Taibah University Medical Sciences*. 2020 Apr; 15(2): 87-93. doi: 10.1016/j.jtumed.2020.01.006.
- [14] Lam C, Francio VT, Gustafson K, Carroll M, York A, Chadwick AL. Myofascial Pain—A Major Player in Musculoskeletal Pain. *Best Practice and Research Clinical Rheumatology*. 2024 Mar; 38(1): 101944. doi: 10.1016/j.berh.2024.101944,
- [15] Fernández-de-Las-Peñas C, Dommerholt J. International Consensus on Diagnostic Criteria and Clinical Considerations of Myofascial Trigger Points: A Delphi Study. *Pain Medicine*. 2018 Jan 1; 19(1): 142-50. doi: 10.1093/pm/pnx207.
- [16] Mohabbat Ali, Basit Ansari, Nazish Rafique, and Asim Mahmood. Effects of Instrument-Assisted Soft Tissue Mobilization (IASTM) on Trigger Points of the Cervical and Lumbar Region among Sedentary Individuals. *Journal of Population Therapeutics and Clinical Pharmacology*. 2024; 31(8): 385-94.
- [17] Nugent SM, Lovejoy TI, Shull S, Dobscha SK, Morasco BJ. Associations of Pain Numeric Rating Scale Scores Collected During Usual Care with Research Administered Patient-Reported Pain Outcomes. *Pain Medicine*. 2021 Oct; 22(10): 2235-41. doi: 10.1093/pm/pnab110.
- [18] Cheatham SW, Baker R, Kreiswirth E. Instrument Assisted Soft-Tissue Mobilization: A Commentary on Clinical Practice Guidelines for Rehabilitation Professionals. *International Journal of Sports Physical Therapy*. 2019 Jul; 14(4): 670. doi: 10.26603/ijsp20190670.
- [19] Emshi ZA, Okhovatian F, Kojidi MM, Baghban AA, Azimi H. Comparison of the effects of Instrument Assisted Soft Tissue Mobilization and Dry Needling on Active Myofascial Trigger Points of Upper Trapezius Muscle. *Medical Journal of the Islamic Republic of Iran*. 2021 May; 35: 59.
- [20] Islam MA, Ahmed F, Hossain KA, Kabir MF, Jahan S, Rahaman E et al. Efficacy of Instrument-Assisted Soft Tissue Mobilization Technique for Patients with Chronic Low Back Pain: A Randomized Clinical Trial. *Bulletin of Faculty of Physical Therapy*. 2025 Jul; 30(1): 44. doi: 10.1186/s43161-025-00303-0.
- [21] Ahmed N, Mehmood N, Nizami GN. Pre and Post Analysis of Stress Reduction Following Pilates Exercise Among Undergraduate Students of Physical Therapy. *In Medical Forum Monthly*. 2021; 32(10).
- [22] Cohen SP and Hooten WM. Advances in the Diagnosis and Management of Neck Pain. *British Medical Journal*. 2017 Aug 14; 358. doi: 10.1136/bmj.j3221.