

Short-term results of instrument-assisted soft tissue mobilization in female patients with myofascial pain syndrome: A randomized blinded sham-controlled study

Basak Cigdem-Karacay¹ , Tugba Sahbaz² , Dogus Gumusay¹ , Muhammed-Ihsan Kodak³ , Figen Tuncay¹ , Anil Ozudogru³ ,
Fatmanur-Aybala Kocak¹ 

¹Department of Physical Medicine and Rehabilitation, Kırşehir Ahi Evran University Faculty of Medicine, Kırşehir, Türkiye

²Department of Physical Medicine and Rehabilitation, Beykent University Faculty of Medicine, İstanbul, Türkiye

³School of Physiotherapy and Rehabilitation, Kırşehir Ahi Evran University, Kırşehir, Türkiye

ABSTRACT

Objectives: This study aims to investigate the effectiveness of the Graston method, an instrument-assisted soft tissue mobilization (IASTM) technique, on pain reduction, trigger point count (TPC), pain pressure threshold (PPT), disability, depression, and quality of life.

Patients and methods: This randomized, double-blind, sham-controlled study included 84 female patients who were divided into three groups: the Graston group (GG), the sham group (SG), and the control group (CG). In addition to exercise, IASTM was applied to GG with the Graston technique, while the IASTM device was applied to SG without any technique. The CG received exercise only. Patients were assessed before and after treatment using the Numerical Rating Scale (NRS), TPC, PPT, Neck Disability Index (NDI), Beck Depression Inventory (BDI), and the World Health Organization Health-Related Quality of Life-Brief Form (WHOQOL-BREF).

Results: Eight patients were lost to follow-up, and one patient failed to adhere to the exercise program. Hence, data from 75 female patients (mean age: 33.8±13.2 years) were analyzed. A statistically significant improvement was detected in NRS, TPC, PPT, and NDI in all groups. The difference in NDI and BDI scores in the GG was statistically significantly higher than in the SG. A statistically significant difference was detected in the GG compared to the CG in the changes in NRS, left-sided TPC, total TPC, NDI scores, BDI scores, and WHOQOL-BREF physical health subgroup scores.

Conclusion: Adding IASTM treatment to exercises for treating myofascial trigger points provided additional benefits on quality of life, depression, and disability. However, IASTM treatment applied with the Graston technique and sham treatment was similarly effective on pain and the TPC. The IASTM treatment did not affect PPT.

Keywords: Myofascial pain syndrome; myofascial trigger points; quality of life; superficial back muscles, upper trapezius muscle.

Myofascial trigger point (MTrP) is defined as a taut band within the muscle where it is located, which is highly sensitive to pain and results in referred pain. It is classified into two types: active and latent. Latent MTrP is often asymptomatic. If pressure is applied to latent MTrPs, they cause discomfort. Active MTrPs are usually painful spontaneously, or pain occurs when interventions such as stretching and pressure are applied.^[1,2]

Topical analgesics and oral benzodiazepines, cyclobenzaprine, tizanidine, and tricyclic

antidepressants are recommended for the pharmacological treatment of MTrP. Physical exercises are the cornerstone of conservative treatments for patients with MTrP. The efficacy of exercise programs in managing MTrP has been established.^[3,4] Interventional techniques comprise dry needling, as well as ultrasound-guided or blind local anesthetic injections.^[5-7] Manual treatment techniques are utilized to treat MTrP.^[8] Moderate evidence supports manual therapy methods in treating MTrP.^[9]

Corresponding author: Basak Cigdem-Karacay, MD. Kırşehir Ahi Evran Üniversitesi Tıp Fakültesi, Fiziksel Tıp ve Rehabilitasyon Anabilim Dalı, 40100 Kırşehir, Türkiye.

E-mail: basakcigdem@hotmail.com

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Instrument-assisted soft tissue mobilization (IASTM) is a type of manual treatment that involves the application of a stainless-steel device to the body. This method is less stressful on the practitioner's hand and allows for deeper force transmission than manual application alone. Instrument-assisted soft tissue mobilization has been reported to be superior to manual methods in these aspects.^[10] It can be applied with different techniques depending on the instrument and treatment approach. The Graston technique is also one of the IASTM techniques.^[11] The Graston technique comprises an examination, warm-up, instrument-guided mobilization, stretching, and strengthening exercise. If subacute inflammation is suspected, the cold application is additionally incorporated.^[11]

The effectiveness of IASTM has been investigated in multiple musculoskeletal disorders.^[12] The initial randomized controlled study that investigated the IASTM method's efficacy to treat MTrPs was conducted in 2014.^[13] There has been a recent increase in attention towards the IASTM method for musculoskeletal conditions. However, the current evidence does not support its effectiveness. Numerous studies have indicated that randomized controlled trials exhibit a high bias rate and low quality.^[14]

Studies in the literature exploring the IASTM technique in treating MTrP have typically compared the Graston technique to various massage methods.^[15,16] As far as we know, the literature has not yet included any studies utilizing the sham technique. Moreover, prior research has focused on pain, pain pressure threshold (PPT), and disability as primary outcome measures.^[13,15,16] Myofascial pain is acknowledged as having an adverse impact on an individual's quality of life (QoL) and emotional well-being.^[17] Following a holistic approach, this study aimed to assess the impact of interventions on both the QoL and levels of depression in participants. We endeavored to mitigate bias by conducting this study in a blinded manner. The main purpose of this study was to examine the effectiveness of the Graston method, an IASTM technique, on pain reduction, number of MTrPs, pain threshold, disability, depression, and QoL in the treatment of active MTrPs in the upper trapezius.

PATIENTS AND METHODS

This randomized, blinded, sham-controlled study was conducted at Kırşehir Training and Research Hospital, Department of Physical Medicine and

Rehabilitation between April 2022 and September 2023. The study involved 100 female participants with myofascial pain syndrome caused by MTrPs in the upper trapezius muscle fibers. Criteria for inclusion in the study were defined as being a woman between the ages of 18 to 45 years, having a diagnosis of myofascial pain syndrome due to MTrPs in the upper trapezius muscle, not being in menopause, painful limitation in cervical lateral flexion, and a pain score evaluated out of 4 points with the Numerical Rating Scale (NRS). For the diagnosis of MTrP, the presence of at least one trigger point and taut band, the familiar pain radiating with pressure on the trigger point, the presence of a twitch response to palpation, and the presence of referred pain were investigated during the physical examination.^[18] Patients with a history of upper extremity and spine-related surgery, history of head and neck surgery, neuromuscular diseases, rheumatic diseases, presence of malignancy, leg length difference, polio sequelae, scoliosis, kyphosis, cervical discopathy, cervical spondylosis, Beck Depression Inventory (BDI) score >30, psychiatric drug use, and body mass index ≥ 30 kg/m² were not included in the study (Figure 1). Patients who reported experiencing pain in their upper back region during their attendance at the outpatient clinic were assessed by a physiatrist. The study included participants diagnosed with active MTrP in their upper trapezius muscle based on diagnostic criteria and who met the inclusion criteria.^[18] Patients with only latent MTrP and those who met the exclusion as mentioned above criteria were excluded from the study. Written informed consent was obtained from all participants. The study protocol was approved by the Kırşehir Ahi Evran University Faculty of Medicine Clinical Research Ethics Committee (Date: 08.02.2022, No: 2022-03/21). The study was conducted in accordance with the principles of the Declaration of Helsinki. The trial is registered on Clinical.gov.tr (registration no: NCT05297656).

Of the patients diagnosed with myofascial pain syndrome due to an active MTrP in the upper trapezius muscle, 84 agreed to participate in the study. Participants were allocated randomly to three groups (Graston, sham, and control groups) using a list of random numbers generated by Microsoft Excel 2019 (Microsoft Corp., Redmond, WA, USA). The investigator who performed randomization was different from those administering the interventions and evaluating the outcomes. All interventions were administered by an experienced physiotherapist with

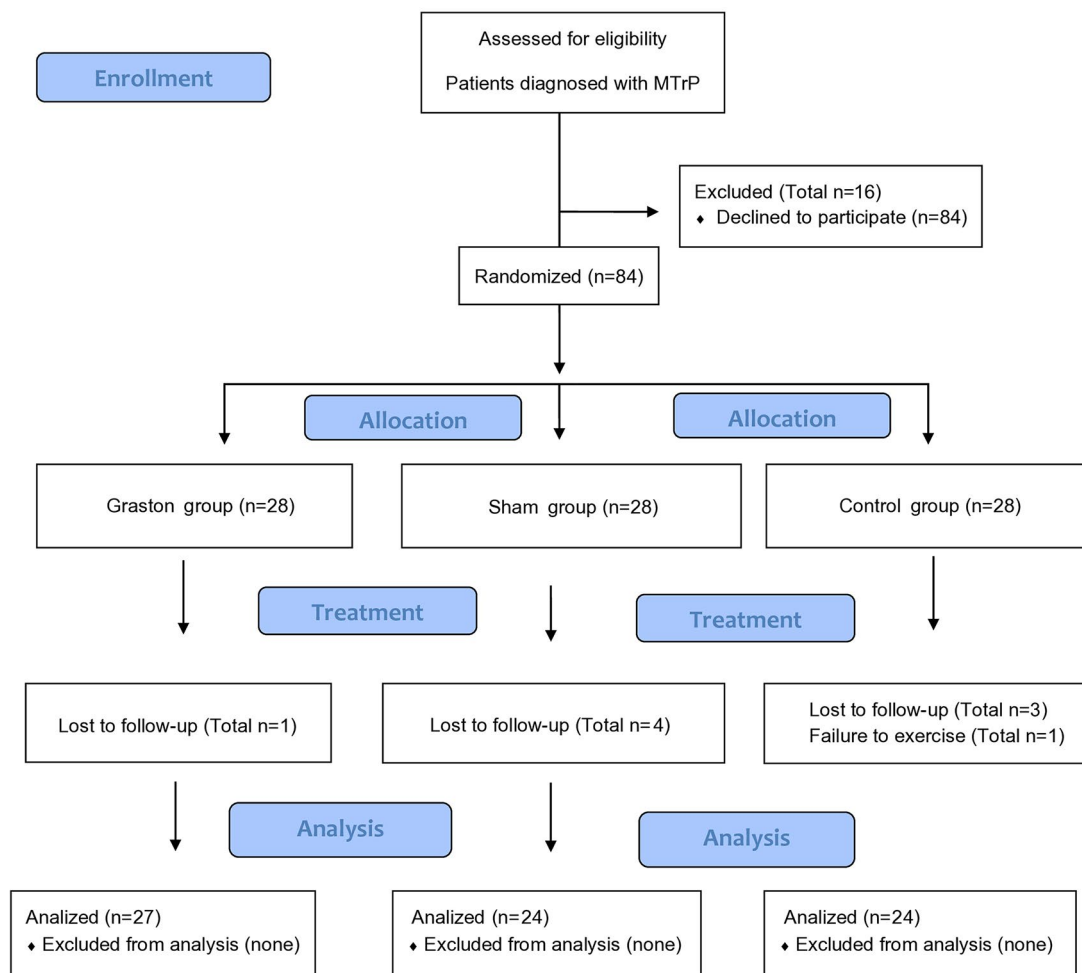


Figure 1. Flowchart of the study. The sweep technique applied to the Graston group using the GT3 instrument. MTrP: Myofascial trigger point.

an IASTM practitioner certificate, encompassing proficiency in the Graston technique. Outcome measures were taken by a physiatrist blinded to participants' groups at the beginning and end of the treatment (Figure 1).

The Graston group received the IASTM program at the hospital. The IASTM procedure was comprised of eight sessions over four weeks, with two sessions per week, and each session spanning 5 min. Participants in the Graston group also received home exercises. Participants in the sham group received sham IASTM treatment at the hospital. The sham IASTM application was administered twice a week for four weeks, resulting in eight sessions. Each session lasted 5 min. Unlike the real IASTM application, no deep tissue massage was performed with the device in the sham application. The GT3

and GT4 instruments were applied superficially to the skin for 5 min without using a specific technique. Participants in the sham group also received a home exercise program. Participants in the control group were solely administered a home exercise program.

IASTM application procedure

The participants in the Graston group received the Graston technique from an experienced physiotherapist who held an IASTM certificate. The technique was administered with the patient lying face down, and care was taken to avoid applying it to bony areas. A sufficient amount of petroleum jelly was administered on all application areas to prevent skin irritation and decrease friction. It was ensured that the patient did not experience any discomfort during the administration. The patient

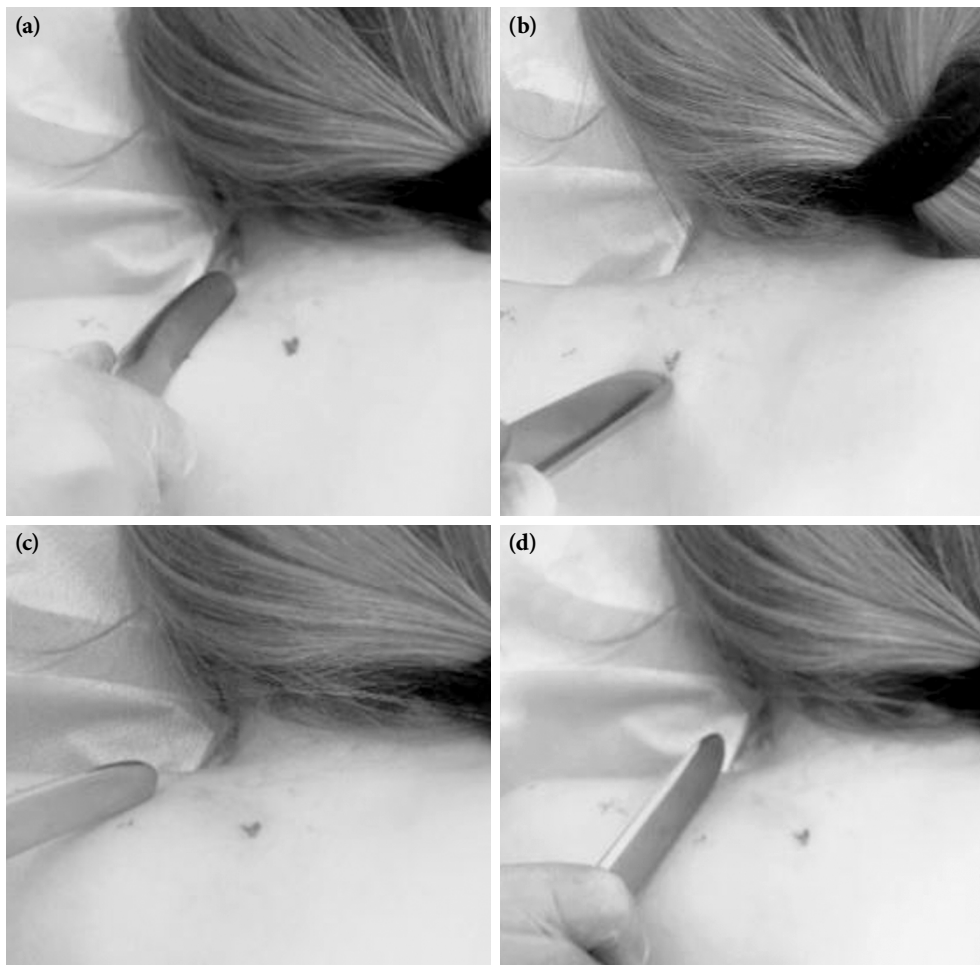


Figure 2. Application of brush and sweep techniques to Graston group and sham group. (a) The sweep technique applied to the Graston group. (b) The brush technique applied to the Graston group. (c) The sweep technique applied to the sham group. (d) The sweep technique applied to the Graston group.

was asked to report any discomfort to the practitioner. A specially designed instrument made of stainless steel was utilized throughout the procedure. Each patient was examined by a physiatrist before the session, and MTrPs were marked. The brush technique was applied to the marked MTrPs for 1 min using the instrument. Additionally, the upper trapezius muscle was applied using the sweep technique for 4 min using the instrument. For participants with bilateral MTrPs, 10 min of application were used, including 5 min on the right side and 5 min on the left side.

Sham procedure

The IASTM-certified physiotherapist applied sham treatment to patients in the sham group while in the prone position for 5 min. To ensure patients were unaware of their group allocation, a sufficient

amount of petroleum jelly was applied to those in the sham group, and they were asked to notify the practitioner of any discomfort. A physiatrist examined patients in the sham group before the session, and MTrPs were marked. A sham procedure was carried out instrument. Unlike the genuine Graston technique, the instrument was superficially moved over the upper trapezius muscle without any particular technique. It was ensured that no pressure was applied during the procedure.

Exercise procedure

The exercise program was identical for all three groups and involved bilateral trapezius muscle stretching, cervical joint range of motion, active assistive stretching, and pectoral stretching exercises. The first set of exercises was delivered and

demonstrated by the physiotherapist who performed the interventions, and a brochure with detailed explanations was provided to all patients.

Patients were instructed to perform the prescribed exercises at home daily for four weeks. Each session began with eight repetitions, and exercise adherence was monitored by means of an exercise diary and telephone follow-ups. Subsequently, the number of repetitions was adjusted by the exercise compliance of the patients. Patients who did not exercise for 12 days during four weeks, as indicated by their exercise diary, were excluded from this study due to poor exercise adherence.

Primary outcome measures

Outcome measures were taken before and following treatment by the same physiatrist. The physiatrist acted as a blind evaluator for the groups. All scales used in the outcome measure were completed face-to-face with the patient. In this study, patients were evaluated twice in total. The pretreatment evaluation was conducted after randomization, one day before the patients began the interventions. The posttreatment evaluation was carried out on the 30th day across all groups.

Participants' pain experience during rest was assessed using a 10-point NRS, with more excellent scores indicating more intense pain. A score of 0 represented the absence of pain.

All participants underwent examination by the same evaluator, who determined the number of active MTrPs in the upper trapezius muscle. Travel and Simons^[18] diagnostic criteria were utilized for the diagnosis of MTrP. Latent MTrPs, which were not associated with persistent or spontaneous pain and only caused pain when stimulated, were not considered.

Current research indicates that utilizing algometry to measure PPT presents a viable option for quantitatively assessing pain within the presence of MTrP.^[19] It is suggested that this method could prove to be a reliable alternative for pain assessment. In this study, the evaluator objectively measured the PPT of the participants using an algometer device (Baseline Dolorimeter 66 lb/30 kg; Fabrication Enterprises Inc., White Plains, NY, USA) and recorded the outcomes in pounds (lb).

The manual algometer was positioned on the patient's MTrP, identified through examination.

The participant was notified that the MTrP situated in the upper trapezius region would be subjected to pressure with the aid of the algometer device. The participant was requested to inform the evaluator when the pressure sensation shifted toward pain. The PPT measurement was repeated thrice, and the mean value was recorded. For participants with multiple detected MTrPs during the examination, measurements were taken separately for each MTrP. Then, the mean of the recorded values was calculated.

Secondary outcome measures

In this study, the Neck Disability Index (NDI) was utilized to evaluate functional limitation in the neck caused by MTrP. The NDI comprises 10 queries assessing the severity of neck pain, headache, pain experienced in the neck during different activities, and sleep disturbance. Each query holds a score ranging from 0 to 5 points, with higher scores indicating greater, more significant disability. To document a clinical change, a 10-point alteration between measures is required.^[20] This easily applicable scale underwent cultural adaptation and test-retest reliability assessment.^[21]

The BDI is comprised of 21 questions, each with a score ranging between 0 and 3 points, which correlate with the severity of depressive symptoms. Higher scores indicate greater severity of depressive symptoms. The assessment evaluates pessimism, past failures, guilt, punishment, self-respect, self-assessment, suicidal inclinations and feelings of worthlessness, sleep, appetite, and interest in sexual matters. This simple-to-use scale was subject to retesting, cultural adaptation, and cutoff score determination.^[22]

The World Health Organization Health-Related Quality of Life-Brief Form (WHOQOL-BREF) comprises 27 questions. It was developed from WHOQOL-100, which has a long-form and contains 100 questions. Each question is scored between 1 and 5 points. The WHOQOL-BREF evaluates five parameters: overall health, physical health, psychological well-being, social relationships, and environmental factors.^[23] Cultural adaptation, validation, and reliability testing of the scale were conducted.^[24]

Sample size calculation

Study power and sample size were calculated using G*Power version 3.0.10 software (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) to guarantee a sufficient sample size.

To achieve a factors test power of 0.80 [α (type 1 error)=0.05, β (type 2 error)=0.05, mean effect size=0.25, and three intervention groups with two replicates], the appropriate total sample size was 66.^[25] Considering the 10% drop rate in this study, a total of 72 patients were planned to be included.

Statistical analysis

Data were analyzed using IBM SPSS version 25.0 software (IBM Corp., Armonk, NY, USA). Descriptive outcomes for all numerical data were reported as mean $\pm$ standard deviation (SD), median, (min-max) values, along with frequency (%). The distribution of the data was evaluated using the Shapiro-Wilk test.

For between-group comparisons of demographic data and baseline measurements, the one-way analysis of variance was used for normally distributed data, while the Kruskal-Wallis test was applied for data that did not meet normality assumptions. To assess within-group differences between pretreatment and posttreatment measurements, the paired t-test was used for normally distributed data, while the Wilcoxon test was applied for nonnormally distributed data. For overall differences in outcomes across the three groups from pre- to posttreatment, the Kruskal-Wallis test was performed due to the data not meeting normality assumptions. Post hoc pairwise

comparisons with Bonferroni correction were used to identify statistically significant differences between groups. A significance level of $p < 0.05$ was considered appropriate for all analyses.

RESULTS

Eight patients were lost to follow-up, and one patient failed to adhere to the exercise program. Hence, data from a total of 75 female patients (mean age: 33.8 ± 13.2 years) were analyzed. Ten (13.3%) of the patients were primary school graduates, 24 (32.0%) were high school graduates, and 41 (54.7%) were university graduates. While 42 (56.0%) of the patients had no comorbidities, 33 (44.0%) had comorbidities. When the demographic data, pretreatment clinical data, and QoL evaluations of the patients were examined, no statistical difference was detected between the three groups (Table 1).

When clinical and QoL data before and after treatment were examined, a statistically significant improvement was detected in NRS, MTrP count, PPT, and NDI evaluation in all three groups compared to before treatment. While BDI values showed a statistically significant improvement compared to pretreatment in both the Graston and sham groups, a statistically significant improvement was also observed in the WHOQL-BREF physical health ($p = 0.004$) and psychological ($p = 0.005$) subdimensions in the Graston group (Table 2).

TABLE 1
Baseline parameters

	Control group (n=27)			Graston group (n=24)			Sham group (n=24)			<i>p</i>
	Mean $\pm$ SD	Median	Min-Max	Mean $\pm$ SD	Median	Min-Max	Mean $\pm$ SD	Median	Min-Max	
NRS	7.00 $\pm$ 1.21	7	5-9	6.65 $\pm$ 1.06	7	5-8	7.09 $\pm$ 1.04	7	5-9	0.368
Trigger point right	3.17 $\pm$ 0.89	3	2-5	2.85 $\pm$ 1.19	3	1-5	2.78 $\pm$ 1.097	3	1-4	0.447
Trigger point left	2.48 $\pm$ 1.27	2	0-5	2.35 $\pm$ 1.20	2	0-4	2.04 $\pm$ 1.26	2	0-5	0.407
Trigger point total	5.61 $\pm$ 1.90	6	2-9	5.19 $\pm$ 1.94	5	2-9	4.83 $\pm$ 1.59	5	2-8	0.386
Duration of pain (mo)	2.21 $\pm$ 1.20	2	1-5	2.30 $\pm$ 1.43	2	1-6	2.13 $\pm$ 0.91	2	1-4	0.878
PPT right	9.28 $\pm$ 2.68	8	6-15	8.12 $\pm$ 2.29	8	4-14	9.57 $\pm$ 3.597	10	4-18	0.226
PPT left	9.02 $\pm$ 2.60	8	5-15	8.82 $\pm$ 2.37	8	5-14	9.36 $\pm$ 3.69	10	4-16	0.951
NDI score	17.61 $\pm$ 4.38	17	11-37	17.62 $\pm$ 6.70	15.5	10-39	18.43 $\pm$ 8.97	16	10-48	0.788
BDI score	16.26 $\pm$ 7.71	15	6-35	15.42 $\pm$ 9.95	13.5	1-41	11.91 $\pm$ 6.68	11	1-23	0.190
QoL-General health	41.30 $\pm$ 19.38	50	0-75	46.15 $\pm$ 22.01	50	0-75	51.63 $\pm$ 15.22	50	0-75	0.271
QoL-Physical	50.47 $\pm$ 12.98	50	17.86-71.43	54.40 $\pm$ 17.36	55.35	10.71-92.86	56.52 $\pm$ 12.40	53.57	35.71-75	0.384
QoL-Psychological	52.72 $\pm$ 17.84	58.33	8.33-79.17	55.60 $\pm$ 17.79	54.16	20.83-87.50	54.35 $\pm$ 13.20	54.16	29.17-87.50	0.884
QoL-Social	60.51 $\pm$ 17.98	58.33	25-100	61.69 $\pm$ 16.91	66.6	25-100	64.49 $\pm$ 20.29	58.33	16.67-100	0.643
QoL-Environment	59.78 $\pm$ 16.08	65.62	28.13-84.38	62.86 $\pm$ 14.34	65.62	34.38-87.5	62.09 $\pm$ 15.86	62.5	37.5-100	0.840

SD: Standard deviation; NRS: Numerical rating scale; PPT: Pain pressure threshold; NDI: Neck disability index; BDI: Beck Depression Inventory; QoL: Quality of life.

TABLE 2
Comparison of outcome measures between groups before and after treatment

	Control group (n=27)			Graston group (n=24)			Sham group (n=24)		
	Pre-T	Post-T	p	Pre-T	Post-T	p	Pre-T	Post-T	p
NRS									
Mean±SD	7.00±1.21	5.78±1.35	<0.001	6.65±1.06	4.38±1.50	<0.001	7.09±1.04	4.96±1.69	<0.001
Median (min-max)	9 (5-7)	8 (2-6)		8 (5-7)	7 (1-4)		9 (5-7)	7 (1-5)	
Trigger point right									
Mean±SD	3.17±0.89	2.65±0.88	<0.001	2.85±1.19	2.00±1.06	<0.001	2.78±1.097	2.13±0.97	<0.001
Median (min-max)	5 (2-3)	4 (1-3)		5 (1-3)	4 (0-2)		4 (1-3)	4 (0-2)	
Trigger point left									
Mean±SD	2.48±1.27	2.30±1.22	0.157	2.35±1.20	1.62±0.94	<0.001	2.04±1.26	1.35±0.83	0.002
Median (min-max)	5 (0-2)	5 (0-2)		4 (0-2)	3 (0-2)		5 (0-2)	3 (0-1)	
Trigger point total									
Mean±SD	5.61±1.90	4.96±1.89	0.002	5.19±1.94	3.62±1.50	<0.001	4.83±1.59	3.48±1.38	<0.001
Median (min-max)	9 (2-6)	8 (2-5)		9 (2-5)	7 (1-3)		8 (2-5)	6 (1-4)	
PPT right									
Mean±SD	9.28±2.68	10.26±2.72	0.018	8.12±2.29	9.81±2.23	<0.001	9.57±3.597	11.22±4.42	<0.001
Median (min-max)	15 (6-8)	16 (6-10)		14 (4-8)	16 (6-10)		18 (4-10)	20 (4-12)	
PPT left									
Mean±SD	9.02±2.60	10.39±2.79	0.002	8.82±2.37	10.62±2.16	<0.001	9.36±3.69	10.30±3.52	0.022
Median (min-max)	15 (5-8)	16 (6-11)		14 (5-8)	14 (5-11)		16 (4-10)	16 (6-10)	
NDI score									
Mean±SD	17.61±4.38	15.00±4.30	<0.001	17.62±6.70	11.62±5.49	<0.001	18.43±8.97	15.22±8.57	<0.001
Median (min-max)	37 (11-17)	26 (8-14)		39 (10-15.5)	24 (3-10.5)		48 (10-16)	40 (3-13)	
BDI score									
Mean±SD	16.26±7.71	15.61±7.27	0.110	15.42±9.95	12.31±8.64	<0.001	11.91±6.68	10.65±6.36	0.031
Median (min-max)	35 (6-15)	34 (6-14)		41 (1-13.5)	33 (1-9.5)		23 (1-11)	23 (1-8)	
QoL-General health									
Mean±SD	41.30±19.38	43.48±18.02	0.157	46.15±22.01	53.37±18.22	0.075	51.63±15.22	55.43±11.81	0.053
Median (min-max)	75 (0-50)	12.5/50/75		75 (0-50)	87.5 (12.5-56.2)		75 (0-50)	87.5 (37.5-50)	
QoL-Physical									
Mean±SD	50.47±12.98	51.09±14.86	0.840	54.40±17.36	61.53±14.18	0.004	56.52±12.40	58.23±12.49	0.391
Median (min-max)	71.4 (17.8-50)	75 (17.7-50)		92.8 (10.7-55.3)	96.8 (35.7-60.7)		75 (35.7-53.5)	89.2 (35.7-57.1)	
QoL-Psychological									
Mean±SD	52.72±17.84	52.90±17.78	0.974	55.60±17.79	59.61±15.62	0.005	54.35±13.20	55.43±16.45	0.529
Median (min-max)	79.1 (8.3-58.3)	83.3 (8.3-58.3)		95.8 (20.8-54.1)	87.5 (29.1-62.5)		87.5 (29.1-54.1)	91.6 (25-54.1)	
QoL-Social									
Mean±SD	60.51±17.98	61.23±17.52	0.589	61.69±16.91	66.02±17.30	0.074	64.49±20.29	64.85±15.06	0.773
Median (min-max)	100 (25-58.3)	100 (25-58.3)		100 (25-66.6)	100 (25-66.6)		100 (16.6-58.3)	100 (16.6-58.3)	
QoL-Environment									
Mean±SD	59.78±16.08	60.59±17.16	0.263	62.86±14.34	65.38±15.40	0.114	62.09±15.86	62.90±13.59	0.587
Median (min-max)	84.3 (28.1-65.6)	84.3 (21.8-62.5)		87.5 (34.3-65.6)	93.7 (40.6-65.6)		100 (37.5-62.5)	100 (37.5-62.5)	

SD: Standard deviation; NRS: Numerical Rating Scale; PPT: Pain Pressure Threshold; NDI: Neck Disability Index; BDI: Beck Depression Inventory; QoL: Quality of life.

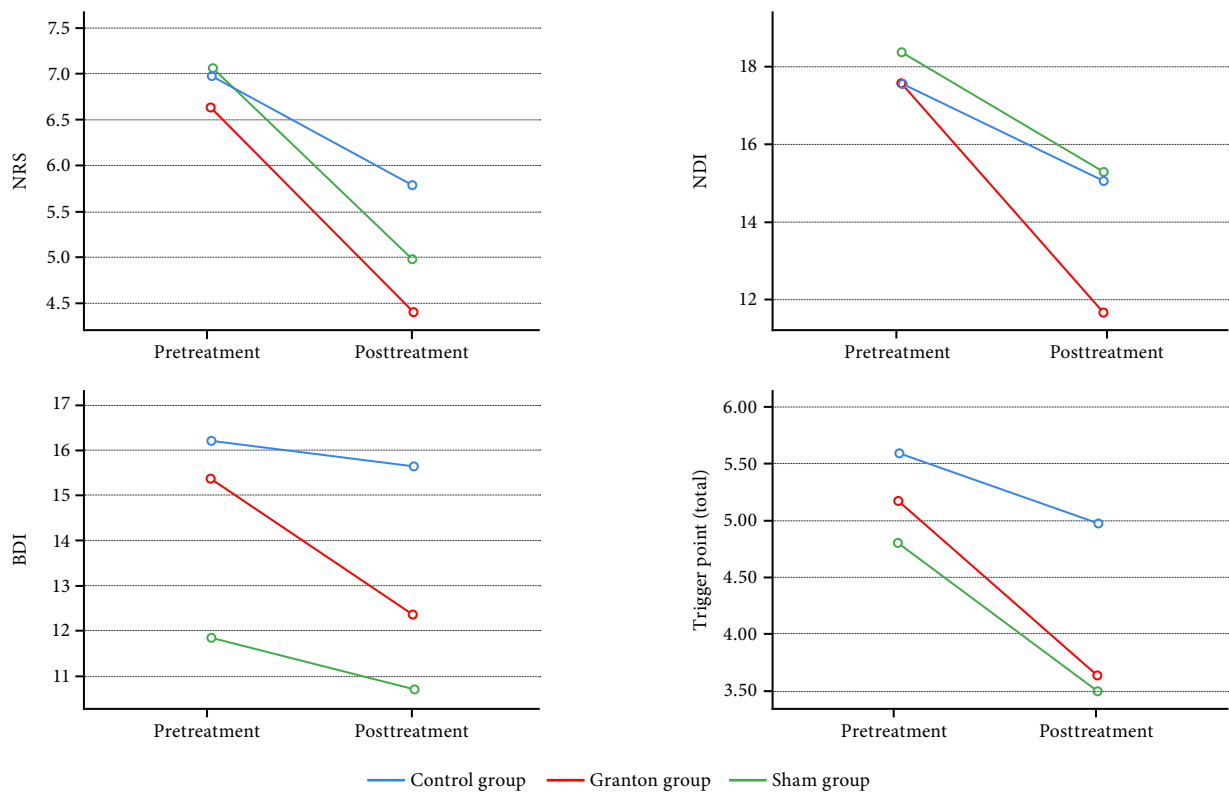


Figure 3. The differences in NRS, BDI, and NDI scores and total trigger point values before and after treatment.

NRS: Numerical rating scale; BDI: Beck Depression Inventory; NDI: Neck Disability Index.

The differences between the pre- and posttreatment evaluations of all three groups were calculated. When the changes were compared between the three groups, a statistically significant difference was detected in NRS, left-sided MTrP count, total MTrP count, NDI and BDI scores, and WHOQL-BREF physical health subdimension. In post hoc evaluations, a statistically significant difference was detected in the Graston group compared to the control group in the changes in the NRS score, left-sided MTrP count, total MTrP number, NDI and BDI scores, and WHOQL-BREF physical health subdimension. A statistically significant difference was detected in the sham group in NRS scores and the total MTrP count compared to the control group. In addition, the difference in NDI and BDI scores in the Graston group was statistically significantly higher than in the sham group (Table 3; Figure 3).

DISCUSSION

Based on the findings, exercise, IASTM therapy, and sham massage were effective in managing pain, PPT, number of MTrP, and disability.

Supplementing exercise with a sham massage or IASTM technique had a favorable impact on mood. Furthermore, the application of IASTM enhanced the QoL among patients with MTrP. Incorporating IASTM, applied with the Graston method, to the home exercise program proved effective in reducing pain and the number of MTrPs in participants. However, better results were achieved in NRS and MTrP numbers when sham massage was added to the exercises compared to exercises alone. Based on the conclusions reached, IASTM massage using a specific technique appeared to have greater efficacy in treating depression and disability and provided better QoL outcomes. However, fake massage, which involved a superficial and random application without resorting to deep methods, was equally effective as IASTM treatment in reducing pain and MTrP.

Based on existing research, the program was conducted twice a week. The evidence indicates that administering the IASTM reduces both pain intensity and disability in the treatment of MTrP in the upper trapezius muscles. This outcome has been consistently observed in clinical trials.^[26-28]

The findings of this study align with the existing literature.

The IASTM treatment is a specialized technique that requires expertise in its application by a qualified physiotherapist. However, there is no sham-controlled study in the literature to show that this effect is related to the technique applied. To the best of the authors' knowledge, this initial study was conducted to assess real efficacy.^[26] According to the results of this study, superficial sham massage performed without a technical application on MTrP was as effective as the IASTM method on pain and the numbers of MTrPs.

The effectiveness of the IASTM application is explained by gate control theory. Therefore, it has been reported that during IASTM application, A-beta fibers are stimulated, resulting in the inhibition of delta and C fibers responsible for pain.^[12] According to this theory, a superficial stimulus applied without any technique can also give rise to this effect. Our results suggest that the improvement in the sham group may have been attained through this mechanism.

The literature presents conflicting data on the impact of IASTM treatment on the PPT. One study reported no change in the PPT after IASTM treatment, attributing this to increased ischemia on the MTrP during the PPT evaluation.^[13] However, recent research has indicated that IASTM enhances the PPT in individuals with MTrP.^[26-28] Our findings indicate that exercise alone or combined with sham massage or the IASTM method enhances the PPT. However, incorporating the IASTM method into exercise therapy does not significantly affect the PPT.

Functional limitations and pain resulting from myofascial pain syndrome are known to impact mood and QoL. Clinical studies in the literature have explored treatment methods related to myofascial pain syndrome and their effects on mood and QoL.^[29-32]

However, to the our knowledge, no research has investigated the effect of the IASTM technique on the mood or QoL of individuals with myofascial pain syndrome. This study is the first to explore these outcome measures when assessing the effectiveness of IASTM. Myofascial trigger points are a significant cause of neck pain-related disability, and the development of disability has been reported to be related to pain

duration.^[29] The groups in this study had the same pain duration at baseline. According to the findings of this study, the application of IASTM treatment in addition to exercise is effective on disability, depression, and QoL. Instrument-assisted soft tissue mobilization may have increased pain-free joint range of motion and reduced pain, which in turn reduced disability due to neck pain, thus positively affecting mood and QoL. Although there is no study on IASTM, a recent study reported that deep tissue massage enhanced QoL and reduced disability.^[33]

The main limitation of this study was the short duration of its follow-up period, which only allowed for the evaluation of the initial effects of the therapies used. Studies with long follow-up periods are recommended. On the other hand, this study employed a sham control method and blinding to reduce bias. The methodology was well-designed, with latent MTrPs excluded from the study. Only female patients were recruited for the study, which prevented any influence of sex on pain and PPT. Restricting the patient population to those younger than 45 years of age eradicated any pain attributed to osteoarthritis caused by aging. Additionally, the study focused on pain and MTrPs and evaluated mood and QoL, making it a substantial contribution.

In conclusion, adding IASTM treatment to exercises for treating MTrP provided additional benefits on QoL, depression, and disability. However, IASTM treatment applied with the Graston technique and sham massage treatment were similarly effective on pain and the number of MTrPs. Treatment with IASTM did not affect PPT.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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