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Effectiveness of instrument assisted soft tissue mobilization in myofascial pain syndrome: preliminary results of a randomized controlled trial

Arzu Erden[1], Emre Şenocak[1], Ahmet Kalaycıoğlu[2], Adem Aktürk[3]
[1,]*Karadeniz Technical University, Faculty of Health Science, Department of Physiotherapy and Rehabilitation, Trabzon Turkey*
[2]*Biruni University, Faculty of Medicine, Division of Anatomy, İstanbul, Turkey*
[3]*Gelişim University, Faculty of Medicine, Division of Physical Therapy and Rehabilitation, İstanbul, Turkey*

Abstract. *Objectives***.** Myofascial pain syndrome is a common problem decreasing physical functioning, emotional status, and social participating. It also affects quality of life of individual suffering from myofascial pain syndrome. The aim of the study was to show the effectiveness and contribution of instrument assisted soft tissue mobilization in physical therapy in myofascial pain syndrome. *Materal and Methods***.** Randomized controlled study design. Twenty two patients (F/M:17/5) with myofascial pain syndrome were included. They were randomly divided into two groups (study and control). The experimental group applied IASTM with conventional physiotherapy program, the control group was followed by only a conventional physiotherapy program without any manual intervention. Visual pain scale, neck and shoulder joint range of motion, pain pressure threshold, Neck Pain and Disability Index, Beck Depression Inventory, Center of Disease Control Health-Related Quality of Life were used for data collection. *Results***.** The mean age participants was 36.86±10.28 years. In study group, there was a significant difference after intervention according to preintervention in all measurements. In control group there was a difference in just neck and shoulder range of motion($p<0.05$). In the study group, development was found meaningfully more than the control group in quality of life parameter, item 3 (number of days good at emotional health), depression score, disability score, pain severity, neck lateral flexion and pain pressure threshold($p<0.05$). *Conclusion***.** In myofascial pain syndrome, instrument assisted soft tissue mobilization could be an effective treatment technic in quality of life, emotional status, pain severity, functional status and range of motion.
Key words*: myofascial pain; soft tissue; mobilization; quality of life; disability.*

Introduction

Myofascial pain syndrome (MPS) is a musculoskeletal disease located in one or a few muscles and/or connective tissue and characterized with trigger points, accompanied by findings and symptoms as pain, muscle spasm, sensitivity, limitation of movement, weakness and rarely autonomic disfunction (1).

In etiology of MPS, while micro and macro traumas, excessive myotonia, physical tiredness, psychological stress, like genetic effects factors are propounding, the etiology hasn't already been engaged and exactly clarified only one factor (2). Patients who have MPS usually suffer from chronic pain, limitation of movement from muscle strain and/or general tiredness. The pain can be dull or unbearable, searing or obtuse, continuous or periodical. When it presses on a trigger point, pain usually begins spontaneously. The pain spread is related with the sensibility of trigger point. As the trigger point is sensitive so the pain spreads far away(3) As psychological problems, behavior disorders, being disorder, general state of health and trauma factors are accepted in trigger in MPS (4). Laboratory tests are normal. This type of patients are found ATP and the decrease of phosphocreatin, low of lactate and glycogen (5). Intended for this symptoms and trigger points, different treatment modalities are tried. Instrument Assisted Soft Tissue Mobilization (IASTM) is between the new methods that are being tried at the present time. IASTM is a myofascial relaxation technique with an applied device that is used by physiotherapist and chiropractors, mechanically activated by damaged tissue, increasing flexibility and to loosen healthy tissue around it. It restarts the inflammation process by taking in controlled measure micro trauma in impressed areas for degenerate connective tissue. The healing process ends with collagen storage and maturing by increasing proliferative invasion of fibroblasts, transfer of blood and food stuffs in the area (6). It is shown that human tendon fibroblast's cyclic mechanic stretch increases, producing of prostaglandin E2 and cyclooxygenase expression (7). According to

Yang et al. (8) repetitive, while it being suggested that hypothesis which small swelling is anti-inflammatory, large size distention is pro-flammatory. IASTM affects mechanic loading extracellular matrix (ECM). The most important cell is fibroblast in ECM. When it is stimulated, it increases ECM also included collagen, elastin, cytokines and maturing factors. According to Standley the injury forces the fibroblast and fascia in a negative direction, whereas manual muscle therapy forces the fibroblast fascia to heal(9).
Both injury and manual muscle therapy reason for healing of manual muscle therapy tissue increasing fibroblast number in the fascia, also increasing inflammatory mediator (9). Recent studies have shown that eccentric exercise improves increasing type 1 collagen synthesis in chronic Achilles tendons' (10). There is a direct correlation between collagen metabolism and improvement in human tendons. Fibroblast proliferation and activation are key events in the process of connective tissue healing and are responsible for gene expression. Thus, they produce cellular mediators in collagen healing and synthesis (11). Any intervention that may significantly increase fibroblastic proliferation in the acute or chronic stage of the injury is predicted to be associated with recovery.
The general aims of MPS treatment are pain relief, to provide adequate muscle strength, proper posture of the affected muscle joint and full range of motion (12). In the literature, it has been suggested that IASTM may be effective, but there are not enough studies. There are approximately ten randomized controlled trials in the literature examining the effects of IASTM. Only a few of these are related to the upper extremity and are limited to the results of pain, ROM and muscle strength. So it is an important need to present detailed effects of this technique in myofascial pain. In our study, the effect of IASTM on quality of life, emotional status and disability was analyzed with these parameters. It is targeted to present new data in the field of MPS treatment.
Hypothesis. H1: In MPS, IASTM is more effective technic than conventional physiotherapy on reducing pain; H2: In MPS, IASTM is more effective technic than conventional physiotherap on increasing quality of life and functional status; 3: In MPS, IASTM is more effective technic than conventional physiotherapy on increasing range of motion; H4: In MPS, IASTM is more effective technic than conventional physiotherapy emotional state.

Material and Method

*Trial Design***.** This study was a single-centred randomized controlled study. It was approved by Scientific Research Ethics Committee of XXX (4th December, 2017; Protocol no: 2017/162). After all participants (n=30) had completed medical examination and diagnosis progress by physical medicine and rehabilitation doctor, they were received. They were informed assessed, asked for permission to be willing to continue the study. For allocation they were divided into 2 groups (study=15 and control=15) by lottery method. Final number of the study completed were 11 in study group and 11 in control group.
*Participants***.** Eligibility criteria of the study were having MPS diagnosis, palpation of the upper/mid back region sought to identify palpable trigger points, having pain more than three months, able to communicate varbally, literate. Patients diagnosed with fibromyalgia syndrome according to American College of Rheumatology criteria, patients with cervical disc lesion, cervical radiculopathy and myelopathy, who had neck or shoulder surgery within 1 year before the study, those with severe psychological problems and pregnant women were excluded from the study. Twenty two eligible patients aged 18-50 years were admitted to the physical therapy and rehabilitation outpatient clinic in a private hospital and diagnosed as MPS by a physical therapy and rehabilitation doctor. The diagnosis of MPS was made according to American College of Rheumatology criteria.
Data collection was performed in a private physical therapy and rehabilitation center between December, 2017 – December, 2018. Participants in the study signed an informed consent document, accepting the principle of conformity to the Helsinki Declaration Principles.
Interventions. The patients were randomly divided into two groups (study and control). The experimental group applied IASTM with conventional physiotherapy program (tens, hot pack, ultrasound) and Mattes Active Isolated Stretching Exercise, the control group was followed by a conventional physiotherapy program (tens, hot pack, ultrasound) without any manual intervention.

Instrument Assisted Soft Tissue Mobilization. It is applied two days a week, total 3-5 minute during 4 weeks with a duration of 8 sessions. Within the scope of IASTM, six patented stainless steel instruments were used designed for application to the m. trapezius muscle. Brush technique was used (13). It is applied to local painful points for 30seconds-1minute, followed by 3-5 minutes on painful muscles. Afterwards, Mattes Active Isolated Stretching Exercise was performed. The exercise, which is developed by American kinesiologist Aaron Mattes about 35 years ago, extends each muscle group in different ways from different angles, stretching all muscle fibers equally. At the end of the stretching, breathe when returning to the starting position. The first repetition of each stretch should be gentle and the second must come to the point where it begins to feel resistance. Subsequent repetitions must go beyond this point to advance a few degrees each time (with the help of hands, if necessary with a rope or other help) so that a maximum stretch is achieved. If the patient feels discomfort during stretching, the stretching is stopped at that point (14). In our study, the exercises were performed in 2 sets of 12 repetitions.

VAS (visual analog scale) for pain severity, digital goniometer for range of motion (ROM), algorithm for determining pressure pain threshold, neck pain and disability score (NPDI), Beck Depression Scale for emotional status change, center of disease control health-related quality of life (CDC-HRQOL-4) for both groups questionnaire was applied.

Assessment Parameters

Trigger point detection. It was applied with an algometer that was performed with Pressure pain threshold measurement. "Pressure pain threshold" values determined by pressure algometry provide reliable results in determining the trigger points leading to MPS in the clinic and evaluating the effectiveness of various treatment methods.

The pressure algometer used in the study consists of a metal piston with a 1cm² round disc attached to a dial where the pressure is measured in kilograms (kg) and pounds (Lb). The dial is calibrated to 2.5 kg with 25 g divisions. The pressure exerted by continuously pressing the disc backwards advances the pointer in the dial clockwise by means of the metal piston. When the instrument is removed from the skin, the pointer; it remains constant over the last measured value and is ready for further measurements by pressing the reset (15).

After the patient was told what to do, he was given a sitting position and completely relaxed. Trigger points on the evaluated trapezius muscle were identified and marked. The metal rod of the pressure algometer was applied correctly to the marked location. When the compression pressure was gradually increased and the patient felt pain or restlessness, he was asked to say yes and the pressure was stopped. Trigger points were determined by observing the pain state as a result of a 2.5 kg digital palpation (this amount is equal to the bleaching of the pressed nail fold).All participants were evaluated by the same person.

Visual Analog Scale. The scale used for the assessment of pain is a 10 cm line drawn horizontally on a plain white paper with the words "I don't have any pain at one end" and "intolerable severe pain" at the other. The patients were asked to mark the pain between this line and the point they marked was measured with a ruler and the pain intensity was calculated over 10 cm (16).

Measurement of range of motion (ROM): Neck and shoulder range of motion (ROM) measurements were performed with a standard goniometer. Flexion, extension, lateral flexion and rotation angles were measured for the neck. Flexion, extension, abduction, internal and external rotation angles were measured for the shoulder.

Beck Depression Inventory (BDI). It was developed in 1967 by Beck. The scale composes somatic, affective and cognitive functions over 21 items.

These questions are ranked from the neutral state (0 points) to the heaviest (3 points). The patient will mark the option that suits him by reading. The highest point is 63. It is evaluated that 0-13 points: no depression symptoms, 14-24 points: moderate depression symptoms, 25 points: severe depression symptoms (17).

Neck Pain and Disability Index (NPDS). This is a functional evaluation developed by Wheeler et al. Turkish validity and reliability study was also conducted by Biçer et al. in 2004.

The questions are investigating the relationship between neck pain severity and pain on occupational life, recreational activities, social and functional status related to life and emotional factors. 10-cm visual analog scale is used for each question. This scale includes 6 vertical lines spaced evenly. Each range is marked with two points on the midline. Scoring of each problem ranges from 0 to 5 throughout the scale. High scores indicate severe disability in patients (18).

Center of Disease Control Health-Related Quality of Life (CDC-HRQOL-4). CDC HRQOL-4, which was developed in 1993, is a short and useful survey, used in clinics, valid and reliable quality of life questionnaire consisting of 4 items. It is used in rheumatologic diseases, asthma, stroke, diabetes, depression and diseases of the musculoskeletal system. Turkish adaptation is a valid and reliable questionnaire conducted by Cavlak (19).

Outcomes. At the beginning of the study, the measurements of the patients divided into groups were completed. A homogeneity test was made. There was no change in the distribution of participants because the results showed that the groups were homogeneous. Four people from the study group left the study because of health problems, 2 people from the control group had transportation problems and 2 person did not want to continue.

Sample size. When randomized controlled trials of IASTM in the literature were examined, the average number for each group was determined as 10-20. In our study the sample size was determined by power analysis in the G* Power 3.1.9.2 program. In order to compare the post-treatment results of study and control group, sample size was calculated as 21 for each group with 80% power and 0.80 effect size. As our study was a preliminary result, the groups were presented as 11 people.

Randomisation and Allocation. The patients who met the inclusion criteria for the study were divided into two groups as study and control groups. This distinction was made by drawing lots. The volunteers were asked to pull each of the balls of different colors determined so that they did not look inside and give them to the researcher, and the ball was opened by the researcher, and the group of the participants was determined. A homogeneity test was made. The experimental and control groups were homogeneous in terms of measurements ($p>0.05$).

Implementation. The results were analyzed as 8 weeks difference in both groups and comparison of change in both groups. Third blind researcher generated the random allocation sequence, enrolled participants, and assigned participants to interventions.

Measurements were made in pre-intervention (first) and after 8 weeks/post intervention (second). In order to minimize bias, a fourth blind researcher from outside the study team was held responsible for assessing the record of the data. The control group was kept unaware of the intervention in the other group.

Statistical analysis. Data were analyzed using SPSS 22.0 software (Statistical Package for Social Sciences Inc. Chicago, Ill., USA). The mean, standard deviation, and percentage distributions for the descriptive data were calculated. In the analysis of the differences between the independent variables, Man Whitney U test was used for non-normal distribution data. Wilcoxon test was used for repeated measurements. The significance level of all data was accepted as $p<0.05$.

Results

Initially 60 participants were received for he study. They were informed assessed, asked for permission to be willing to continue the study.

Fourteen of them had cervical disc lesion and fibromyalgia, ten of them decllined to participate, 8 of them were older than 50. Twenty eight were included according to the inclusion criteria. For allocation they were divided into 2 groups (study=14 and control=14) by lottery method. Final number of the study completed were 22 patient (5 females and 17 males): 11 in study group and 11 in control group.

Intervention, follow up and measurement analyses were completed between December 2017- December 2018. The preliminary results were presented in Table 1.

The mean age of the participants was 36.86(10.28) years, 41% were educated to primary level, 45% were high school level, 14% were university level. A total of 50 % right region of their body and 50% left region of their body (Table 1).

According to the rest of homogeneity of variances, the significant value of all items was >0.05 in the two groups (study and control) according to measurement data. It was shown that participants were homogeneous.

There were differences between the all pretreatment and post treatment measurements except from first item which they define their general health status (CDC1) in GROUP I (study group) ($p<0.05$) (Table 2). There were differences only ROM between pretreatment and post treatment measurements in GROUP II (control group) ($p<0.05$) (Table 3).

Table 1. Sociodemographic statictics

Features	**Group I(n=11)** (Mean±SD)	**Group II (n=11)** (Mean±SD)
Age (year)	32.45±9.91	41.27±9.00
Body Mass Index	24.45±4.39	27.48±4.79
	N (%)	**N (%)**
Male	5 (46)	0(0)
Female	6(54)	11(100)
Educational Status		
Literate	3(27)	0
Primary school	2(9)	6(46)
High school	3(27)	5(54)
University	3(27)	0
Effected side		
right	7(64)	4(36)
left	4(36)	7(64)

Table 2. Analysis of differences between pre- and post-treatment measurements

Parameters	Preintervention (n=11) (Mean±SD)	Post intervention(n=11) (Mean±SD)	p
*Group I			
CDC2	14.18± 10.28	6.09± 5.54	0.006
CDC3	13.18± 9.60	4.64± 3.10	0.005
CDC4	12.55± 7.55	4.73± 4.31	0.005
BECK	12.45± 6.62	7.82 ± 6.67	0.006
NPDI	57.36± 7.39	29.18± 17.83	0.000
VAS	6.13± 1.19	2.40± 1.70	0.000
Pain Treshold	4.40± 1.11	7.14± 0.88	0.009
*Group II			
CDC2	15.45± 7.23	13.18± 4.04	0.211
CDC3	15.45± 6.87	14.27± 5.08	0.573
CDC4	15± 7.41	13.27± 4.81	0.438
BECK	11.55± 2.16	11.82± 2.71	0.711
NPDI	43.18± 10.61	38.27± 7.17	0.265
VAS	5.97± 0.76	5.30± 1.32	0.173
Pain Treshold	3.91± 0.89	4.33± 1.33	0.436

**Wilcoxon Test; Group I: Study; Group II: Control; CDC2: Number of days in which physical health is not good in the last 30 days; CDC3: Number of days in which mental health is not good in the last 30 days; CDC4: Number of days without daily activity, because of poor mental and physical health; VAS: Visual analog scale; NPDI: Neck Pain Disability Index; BECK: Beck Depression Inventory

When the changing between before and after the 8-week period was evaluated, the quality of life dimensions of third item (CDC3) (number of days with poor mental health), Beck depression score, NPDI score, pain severity, pain pressure threshold and neck right lateral flexion ROM were significantly improved in the study group (Table 4).

Table 3. Analysis of the difference between pre- and post-treatment for ROM

ROM	**Pre intervention** (N=11) (Mean±SD)	**Post intervention** (N=11) (Mean±SD)	*p*
***Group I**			
ROM NECK			
Rotation (L)	50.09± 14.20	57.64± 4.08	<0.001
Rotation (R)	55.45± 11.06	59.09± 1.22	<0.001
Lateral flexion (L)	26.91± 11.23	41.45± 4.69	<0.001
Lateral flexion (R)	35.82± 12.47	43.91± 3.01	<0.001
Flexion	44.18± 2.13	44.36 ± 1.28	<0.001
Extansion	42.91± 3.83	43.55 ± 4.50	<0.001
ROM SHOULDER			
Flexion (L)	178.73± 2.97	180.55± 3.35	<0.001
Flexion (R)	176.55± 6.05	179.55± 4.39	<0.001
Extansion (L)	57.55± 8.02	60.18± 2.31	<0.001
Extansion (R)	58.82± 2.44	60.64± 2.87	<0.001
Externalrotation (L)	89.09± 2.70	90.09± 0.30	<0.001
Externalrotation (R)	86.82± 5.09	90.36 ± 1.69	<0.001
Internalrotation (L)	86.36± 5.10	89.45± 1.44	<0.001
Internalrotation (R)	85.00± 5.95	88.36± 3.64	<0.001
Abduction (L)	179.73± 0.90	180± 0.00	<0.001
Abduction (R)	176.18 ± 6.85	179.45± 2 94	<0.001
***Group II**			
ROM NECK			
Rotation (L)	54.64± 4.84	58.55± 2.80	<0.001
Rotation (R)	54.55± 4.52	55.36± 3.55	<0.001
Lateral flexion (L)	42.82± 3.84	43.45± 3.61	<0.001
Lateral flexion (R)	40.73± 3.84	41.09± 2.98	<0.001
Flexion	44.91± 1.64	45.09± 0.70	<0.001
Extansion	45.00± 0.00	45.00 ± 0.00	1.000
ROM SHOULDER			
Flexion (L)	177.27± 3.25	178.73 ±1.61	<0.001
Flexion (R)	176.91± 4.15	179.27±1.42	<0.001
Extansion (L)	58.91± 1.31	59.00±1.34	<0.001
Extansion (R)	59.55± 0.00	59.55± 0.00	1.000
Externalrotation (L)	89.18± 1.66	90.09± 0.70	<0.001
Externalrotation (R)	89.36± 10.20	89.91± 0.30	<0.001
Internalrotation (L)	89.36± 0.92	89.64± 0.67	<0.001
Internalrotation (R)	88.82± 1.60	89.18± 1.60	<0.001
Abduction (L)	179.08± (.71	177.91± 3.53	<0.001
Abduction (R)	178.64± 1.85	179.73± 0.64	<0.001

ROM: Range of motion, L: left, R: right

Table 4. Comparison of the changing (pre-post treatment improvement) between study and control group

	Pre-Post Treatment Improvement		
Parameters	Group I(n=11) Mean±SD	Group II(n=11) Mean±SD	p
CDC2	8.09± 7.661	2.27 ± 5.641	0.066
CDC3	8.55± 7.825	1.18± 6.735	0.013
CDC4	7.82± 7.264	1.73± 7.086	0.074
BECK	4.64± 4.365	0.27± 2.370	0.014
NPDI	28.18± 11.08	4.91± 13.780	0.001
VAS	3.72± 1.88	0.66± 1.357	0.003
Pain Treshold	2.74± 0.71	0.42± 0.950	0.001
ROM NECK			
Rotation (L)	7.55± 14.88	1.91 ± 5.50	0.133
Rotation (R)	3.64± 11.81	0.82± 2.82	0.217
Lateral flexion (L)	14.55± 10.43	0.64± 2.46	0.365
Lateral flexion (R)	8.09 ± 11.25	0.36± 3.26	0.000
Flexion	0.18± 1.160	0.18± 1.47	1.000
Extansion	0.64 ± 2.69	0.00± 0.00	0.748
ROM SHOULDER			
Flexion (L)	1.82± 4.30	1.45 ±2.01	1.000
Flexion (R)	3.00± 4.29	2.36 ± 3.44	0.748
Extansion (L)	2.64± 8.29	0.9± 2.25	0.562
Extansion (R)	1.82± 3.76	0.00 ± 1.00	0.478
Externalrotation (L)	1.00± 2.68	0.91± 1.44	0.699
Externalrotation (R)	3.55± 4.71	0.55± 1.29	0.101
Internalrotation (L)	3.09± 4.72	0.27± 1.19	0.193
Internalrotation (R)	3.36± 6.86	0.36± 1.80	0.151
Abduction (L)	0.27± 905	1.18± 2.27	0.193
Abduction (R)	3.27± 6.63	1.09± 1.81	0.949

* Mann Withney U; Group I: Study; Group II: Control; CDC2: Number of days in which physical health is not good in the last 30 days; CDC3: Number of days in which mental health is not good in the last 30 days; CDC4: Number of days without daily activity, because of poor mental and physical health; VAS: Visual analog scale; NPDI: Neck Pain Disability Index; BECK: Beck Depression Inventory

Discussion

In this study, the effects of IASTM on pain, quality of life, range of motion, functional status and emotional status in MPS patients were investigated. In the study group a positive improvement was observed in all parameters, however there was improvement only in ROM in the control group. The difference between pre and post 8 weeks treatment was found in the study group significantly higher than the control group in the quality of life dimensions of CDC3 (number of days with poor mental health), Beck depression score, NPDI score, pain severity, ROM and pain pressure threshold parameters. In the literature, there are some studies examining the effect of IASTM treatment on ranges of motion, pain severity and pain threshold in general. In circumstances where IASTM is applied to shoulder problems, also functionality is evaluated as in our study (20). Besides, a study was come across which investigated depression, functionality and quality of life in patients with MPS diagnosed by IASTM. The limited number of studies demonstrating the efficacy of conservative treatments in MPS treatment revealed the need to investigate the different efficacy of IASTM.

In this context, our study presents new data examining the effects of depression, neck functionality and quality of life in patients with MPS.
Current studies have shown that IASTM treatment reduces pain and increases the pain pressure threshold. In our study, pain pressure thresholds increased and pain severity decreased in patients who have a diagnosis with MPS applied in group of IASTM. The study was conducted by Fousekis et al. (21) who applied IASTM on the trigger point in the lumbar region, obtained the gains on pain and pain threshold were found better than other methods such as ischemic compression and cup therapy. In the study conducted by Gulick (22), it was recorded that the pain thresholds of the patients who applied IASTM increased significantly compared to the control group. They explained this decrease in pain threshold with to reduce in cell matrix adhesions. According to Lee et al., (23) There was a significant decrease in pain and increase in range of motion compared to the control group in patients with chronic low back pain who applied IASTM. In the study conducted by Lauche et al., (24) while a statistically significant result was obtained by decreasing the resting pain from 4.3 to 3.0 in the IASTM group, resting pain inthe control group decreased from 5.2 to 5.1, but no statistically difference was found. In the results of our study, resting pain of the study group decreased from 6.13 to 2.4 and a statistically significant decrease was obtained.In our control group, resting pain decreased from 5.97 to 5.30 and a statistically significant difference was found in accordance with Lauche et al. (24) In addition, Lauche obtained a significant increase in the pain threshold of the IASTM group in their study. A significant increase was noted supporting of this study in our results. As for the study was that Şenbursa et al. (25) compared manual therapy with conventional physiotherapy, while the resting pain of the control group was 0.02 before treatment, a significant difference was obtained regressing to 0.9 after treatment. In our study, resting pain decreased from 5.97 to 5.3 and it could notobtaina significant result statistically. The effect of IASTM on the control of musculoskeletal pain is supported by our study results. Microvascular and capillary hemorrhage have been increased creating micro-trauma in soft tissue with the IASTM technique and it is assumed that the body's inflammation process is restarted. In this way, it is assisted that increasing fibroblastic activity and accelerating the synthesis of collagen, to blood tissue activating the body's healing process and restorative systems(26). Following these physiological responses, adhesions decrease and muscle flexibility increases (27). Thus, a gain of motion can be provided.
There are studies that have proven that soft tissue mobilization increases the range of motion of joints such as knees, ankles and shoulders (20,25,28). In both groups, there was a significant difference in the patency of all neck and shoulder movements between 8 weeks before and after (Table 4) however, there was a greater increase in IASTM in terms of lateral flexion of the right of the neck and rotation range of the left neck (Table 6). In the literature; in the study of Laudner et al., (26) a significant increase was observed in shoulder internal rotation and horizantal adduction angles after IASTM application. In a study conducted by Coviella et al. it was observed that patients' shoulder flexion range of motion and patient satisfaction increased and pain decreased after IASTM application (29). In our study, the amount of change in shoulder range of motion was similar between the groups except for lateral flexion and rotation of the neck. This result demonstrates that IASTM applied to the m.trapezius muscle is effective in neck ROM values rather than shoulder range of motion,.
MPS is highly effective disease on the functional disability level of the individual, which can be seen in 85% of the general population (30). Because pain is one of the main factors affecting the physical activities and functionality of individuals (31). In our study, in terms of disability, a reduction was provided in the IASTM group in the post-treatment. In the control group, there was no difference compared to pretreatment.In the study performed by Braun et al., (32) it was provided to increase pain and functional status in the neck pain group applied IASTM. In addition, statistically significant increase was detected in general health perception, mental and physical health perception and social functions in the IASTM group. Also Emshi et al. emhasized a meningful reduction in neck disability in the IASTM group obtained by similar results to Braun et al (33). In this context, our results support the literature. Chronic pain, which is the most important symptom in MPS, is associated with depression and is one of the main causes of depression (34). Previous studies also support this situation (35,36). Depression and chronic pain have been associated with stress and disruption of stress-related hormones (37). Therefore, it is important to examine the depression parameter in patients with neck pain. in our study, we observed a decrease in depression score after treatment in the IASTM group. Otherwise, when pre- and post-treatment efficacies among the groups were compared, a

significant decrease in depression score was recorded in the study group compared to the control group.There is no study in the literature on the effect of IASTM on pain-related depression (38).
It is not found in a study in the literature on the effect of IASTM on pain-related depression. However, the relationship between pain and depression is clearly demonstrated. We think that this relationship causes decrease in pain and depression after treatment.
Evaluation of parameters such as pain, function and quality of life in MPS requires importance (39). Pain is the main symptom that should be treated as it triggers both anxiety and depression and reduces quality of life (40-42). Therefore, treatment of pain has a positive effect on other symptoms. In our study, pre- and post-treatment analyzes in the IASTM group showed significant positive changes in terms of general health status, the number of days that stress, depression and emotional problems affect mental health. In the control group, only in general health status a significant change was noted. At the end of 8 weeks of treatment, significant differences were found in favor of the IASTM group in terms of the number of days in which stress, depression and emotional problems affect mental health between the study and control groups (43). Trigger-related pain and loss of function are associated with quality of life. In the study of Naik et al. (44), it was emphasized that IASTM treatment improves the quality of life. In the literature, the number of studies demonstrating the impact of IASTM is quite limited. In our study, MPS patients were evaluated as a physical and mental whole and our results revealed the positive effects of IASTM on pain, quality of life, range of motion, functional state and emotions in MPS.
Our results showed that IASTM, which is a short-term, easily applicable, low-cost, comfortable method, was more effective technic than only conventional physiotherapy on quality of life, disability, pain and emotional status in MPS. The use of this technique in MPS as a modality of physiotherapy opens the window for the use in other cases of chronic pain. It may also be a preferable method in order to save time for the specialists and provide instant relief to the patients in a short time. There are also some limitations of the study. Firstly, IASTM are performed in combination with conventional physiotherapy program. Future studies applied IASTM without other technics may also influence the outcome. Secondly, long term effects weren't investigated. To show after three and six months effects would be useful to explain the technics long term efects. Finally these findings are preliminary results, so the final results could be changed.
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Corresponding Author:
Arzu Erden
Karadeniz Technical University,
Division of Physiotherapy and Rehabilitation, Trabzon, Turkey.
E-mail adress: *arzu_erden@hotmail.com*

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