ORIGINAL RESEARCH

The Effect of Graston Technique on Pain, Proprioception, Flexibility, and Disability in Patients with Chronic Non-specific Low Back Pain

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ABSTRACT

Background • Chronic non-specific low back pain (CNLBP) causes significant dysfunction in patients. The Graston Technique (GT) is a new intervention in pain management but there is a lack of evidence in the literature regarding its effectiveness in low back pain.

Study Objective • This study aims to investigate the effect of GT added to exercise on pain, proprioception, disability, flexibility, and quality of life in individuals with CNLBP.

Methods • This was a randomized controlled trial with a total of 30 CNLBP patients.

Setting • Karabük University Training and Research Hospital, Turkey.

Participants • Thirty patients (mean age = 38.46 ± 9.03 years) with CNLBP for at least 12 weeks were included in the study. The patients were randomly divided into two groups intervention and control.

Intervention • Graston was applied three times a week for four weeks in addition to the exercise program in the intervention group, while only the exercise program was applied to the control group.

Outcome measures • Pain intensity, pressure pain threshold, proprioception, flexibility, disability, and quality of life were evaluated at the beginning and end of the study.

Results • Significant improvements in pain, disability, and quality of life were found in both the control and intervention groups ($P < .05$). There was an increase in flexibility and a decrease in proprioception deviation angles of 15° and 30° in the GT group ($P < .05$). The improvement in pain and disability in the intervention group was significant compared to the control group ($P < .05$). However, there was no significant difference between the groups regarding pressure pain threshold, flexibility, proprioception, and quality of life ($P > .05$).

Conclusion • GT added to exercise in patients with CNLBP better reduces pain and disability, improves proprioceptive sense, and increases mobility and quality of life. GT may be used as a supportive treatment during the rehabilitation of CNLBP patients. (*Altern Ther Health Med.* 2024;30(4):24-30).

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INTRODUCTION

Non-specific low back pain (NLBP) is defined as low back pain that cannot be attributed to a recognizable, known specific pathology (infection, tumor, osteoporosis, fracture, radicular syndrome, etc.).[1] It is a problem that 80% of healthy individuals encounter at least once in any period of their lives and has a very high prevalence in the whole population.[2] With the prolongation of the process that starts as acute pain, the pain becomes chronic. Chronic pain restricts physical function and negatively affects the quality of life, causing loss of workforce and increased health care expenses.[2,3]

Within the skeletal system, the most load-bearing region of the spine is the lumbar region. Therefore, it is the region most affected by mechanical stresses, functional loads, and occupational and sports traumas.[4] Instability in the lumbar region leads to insufficient motor control system and causes low back pain.[5] Impaired lumbar proprioception can also cause low back pain.[6] As lumbar proprioception is impaired, it becomes more challenging to maintain the neutral position of the spine, and neuromuscular control is interrupted.[5] This situation causes low back pain to increase and become chronic. As a result, the ability to detect changes in body position is affected, thereby impairing proprioception, and creating a vicious circle.[5,6]

According to the current literature, various methods are used in treating low back pain based on the time and symptoms. Exercise therapy has an important contribution to the treatment of chronic lower back pain and can prevent the recurrence of pain.[7] Recent studies show that manual therapy is a viable treatment option for reducing chronic low back pain. Instrument Assisted Soft Tissue Mobilization (IASTM) is a popular treatment modality that can be used for myofascial restriction. IASTM is used to reduce pain in the pathology region, increase range of motion (ROM), restore function, and offer a mobilizing effect.[9-11] Graston technique (GT) is a widely used IASTM technique for this purpose.[12]

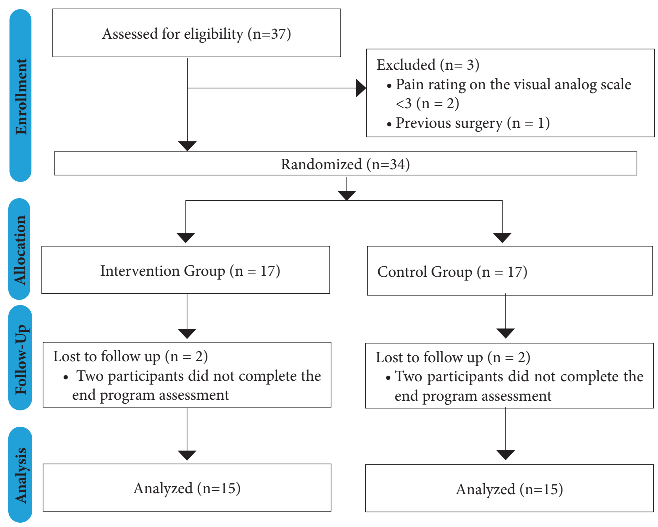
Studies show that the Graston technique can effectively reduce pain and improve soft tissue mobilization.[12,13] It also improves the quality of daily life by reducing the disability caused by pain.[12,14] Studies in the literature focused on the effect of Graston on pain and reported that it could be used in practice.[12,15] An additional systematic review suggests that Graston is an effective therapeutic intervention to reduce pain and improve function in less than three months.[16] A study by Lee et al.[13] showed that the Graston technique applied for four weeks in individuals with chronic low back pain was effective in reducing pain and improving joint range of motion.[13] However, a meta-analysis study does not support the effectiveness of IASTM on function, pain, and range of motion in the treatment of spine disorders, thus contrasting the findings of other researchers. Therefore, the evidence is not clear.[17] Since pain is a significant problem affecting patients' quality of life, it is important to investigate it. However, the lack of studies examining the long-term effectiveness of Graston on pain severity in individuals with chronic non-specific low back pain (CNLBP) draws attention. In addition, there is no study examining the effectiveness of Graston on proprioception, which plays a vital role in the healing mechanism. Based on the existing evidence on the efficacy of the Graston technique, we hypothesize that the Graston technique added to exercise will have a positive effect on pain, flexibility, proprioception, disability, and quality of life in individuals with CNLBP. Therefore, this study aimed to investigate the effect of the Graston technique added to exercise on pain, flexibility, proprioception, disability, and quality of life in individuals with CNLBP.

METHODS

Participants

Thirty volunteer patients who visited the Neurosurgery outpatient clinic and were diagnosed with CNLBP were included in this study. Inclusion criteria for this study were: between the ages of 18-65 years; being diagnosed with CNLBP by a neurosurgeon (pain that persists for at least 12 weeks and no known pathoanatomical cause in between gluteal folds and 12th ribs); pain rating of >3 on the visual analog scale (VAS); volunteering to participate in the study; and those who signed informed consent. Exclusion criteria for this study were: signs of neurological deficit, history of spondylosis or spondylolisthesis, psychological disorder, mental disorder, cancer, and severe depression; primary or metastatic spinal malignancy; diagnosis of advanced osteoporosis; surgery or acute infection of the lumbar region; regular use of analgesics.

Figure 1. Flow Diagram of Participants



The sample size was calculated using G*Power analysis software Version 3.0.10 (G*Power, Franz Faul, Universitat Kiel, Germany). Based on a previous study (effect size = 1.62), it was determined that the sample size should be at least 8 people for a significant change in pain intensity (pain pressure threshold) for 95% power ($\alpha = 0.05$).[18] Due to data loss that may occur during the study process, a total of 30 individuals, 15 for each group, were included in the study.

The study was approved by the ethics committee of the University (No: 2021/598) and conducted following the Declaration of Helsinki. All subjects gave written informed consent to participate in this study after being informed about the content, purpose, and associated benefits and risks of this study.

Study design

A randomized controlled trial was conducted to examine the efficacy of IASTM on CNLBP. The individuals included in the study were divided into two groups by simple randomization using a number random table and the closed envelope technique: intervention and control. All parameters outlined in outcome measures section were evaluatedin both groups at baseline and immediately after the four-week study period. The consolidated standards of reporting trials (CONSORT) diagram of patient flow throughout the study is shown in Figure 1.

The same exercise program was applied to the patients in both groups, three days a week, for four weeks. The exercise program included exercises for stretching the lower back muscles, strengthening the back and abdominal muscles, and postural correction (Table 1).[19] The exercise program was given and supervised by a physiotherapist, and the program was adapted according to the patient's tolerance. Strengthening and postural correction exercises were prescribed for three sets, ten repetitions, three times a day, each repetition for 5-7

Table 1. Exercise Program

Exercise Types	Frequency	Duration
Stretching Exercises	3 sets x 10 repetitions	15 to 30 sec
Knee to chest		
Double knee to chest		
Straight leg raise		
Cat and camel		
Quadratus Lumborum Stretch		
Strengthening exercises	3 sets x 10 repetitions	5-7 sec
Curl ups		
Diagonal curl ups		
Back extension		
Postural correction	3 sets x 10 repetitions	5-7 sec
Pelvic tilt		
Bird dog		

seconds. The repetitions were checked weekly and gradually increased until they reached 15 seconds according to tolerance. The stretching exercise was prescribed three times a day, three sets and ten repetitions, each lasting for 15 to 30 seconds. The number of repetitions was checked weekly and gradually increased according to tolerance.[12,19]

To treat the affected area of the patients in the intervention group, a Graston instrument was applied to the superficial and deep fascia on the erector spines, gluteus maximus, gluteus medius, and hamstrings by the physiotherapist. At first, patients were asked to kneel directly on the bed and lie forward. In this position, the superficial and deep fascia of the erector spinae was applied. Then, Graston was applied to the gluteus maximus and gluteus medius in the hip and knee flexion position, with the patient in the side-lying position. It was applied in the prone position for the hamstring muscles. The largest Graston instrument (GT1), used to treat soft tissue restrictions over large surface areas, was chosen for the treatment.[20] Lubricating cream was used to facilitate the gliding of the Graston instrument over the tissues. The Graston technique was applied for 20 seconds at a 45° angle in a direction parallel to the muscle fibers for each treated muscle. Immediately afterward, an additional 20 seconds of application was made at a 45° angle perpendicular to the muscle fibers, and the total treatment time was approximately 40 seconds for each muscle. Patients were informed that they may have painful, bruised, or small red spots called petechiae in the treated area. If there was severe pain after the treatment, ice was applied for 15-20 minutes.[12,13] Graston was applied 3 times a week for a total of 4 weeks.

Outcome measures

After the demographic and clinical characteristics of the patients were recorded, the following evaluations were made at the beginning of the study and after four weeks:

Pain intensity: Low back pain severity was measured using VAS. The VAS is a 10-point scale, where 0 represents no pain and 10 represents unbearable pain. The patients' pain intensity at rest was determined from the VAS score obtained between 0 and 10 points.[21]

Pressure pain threshold: Pressure pain threshold (PPT) was measured using an algometer (Baseline®, US). Algometer is a device that measures sensitivity to pain caused by pressure or force applied to any part of the body. The subjects were required to lie prone on the examination table with both forearms over the sides. The algometer was placed vertically 2 cm lateral to the 3rd lumbar vertebra, and then the pressure was applied to the area at a rate of 1 kg/s. The point at which the patient felt an unpleasant sensation or pain was accepted as the pressure pain threshold. Three short consecutive PPT measurements with 10 seconds between them were performed at each of the selected regions for the right and left sides. It was then recorded by averaging the values obtained for the right and left sides.[22,23]

Flexibility: Sit and Reach Flexibility Test was used to evaluate trunk and hamstring muscle flexibility. Patients rested their feet on the sit-and-reach table with their knees extended. Then, they were asked to lie forward with their hands together without lifting their knees. The test was repeated 3 times and the maximum distance the patient reached was recorded.[24]

Proprioception: The sense of position, known as the sense of repositioning of the trunk, was evaluated with a digital inclinometer (Baseline®, USA). Patients were asked to stand comfortably with their heels shoulder-width apart and their hands hanging freely at their sides. The inclinometer was placed parallel to the spinous processes of the T12-L5 vertebrae, with the patients standing upright. The digital inclinometer was reset before evaluation. The patient was asked to lean forward. The evaluator reminded the patient when the inclinometer showed an angle of 15° and 30°. Then, for trial and learning, they were asked to bend forward three times at 15° and 30° with their eyes closed and stop there for 3 seconds. The same procedure was applied after the trial, and the patients repeated the test 3 times. Deviation angles were recorded for 15° and 30° trunk flexion.[25]

Disability: The Oswestry Disability Index (ODI) was used to evaluate the level of functional disability caused by chronic low back pain.[24] The scale has ten subgroups. Subgroups of the scale: severity of pain, lifting, carrying, walking, sitting, standing, sleep, sexual life, traveling, and social life. Each subgroup has six options, and the first statement is scored as "0" and the sixth statement as "5". As the total score increases, the level of disability also increases.[26]

Quality of life: The Short Form-36 (SF-36) was used to measure changes in quality of life (QoL) levels due to chronic low back pain. This scale consists of 36 items and includes physical function, physical role, bodily pain, general health, emotional role, social function, mental health, and vitality sub-parameters. The score of the Short Form 36 range from 0 (worst) to 100 (best).[27,28]

Statistical analysis

Statistical analysis was performed using SPSS version 23 (SPSS Inc., Chicago, IL). Numerical data were expressed as mean and standard deviation; categorical data were expressed as numbers and percentages. It was determined whether the variables were normally distributed using visual (histograms) and analytical methods (Shapiro Wilk). Independent t test and Chi-Squared Pearson Test were used to compare demographic variables between groups. Normally distributed variables were compared using the Independent t test, and non-normally distributed variables were compared using the

Table 2. Sociodemographic Characteristics of Participants

	Intervention (n = 15)	Control (n = 15)	*P* value
Age, years, X ± SD	37.13 ± 8.87	39.8 ± 9.30	.429[a]
Gender, n (%)			.705[b]
Male	10 (66.7)	9 (60.0)	
Female	5 (33.3)	6 (40.0)	
Weight, kg, X ± SD	74.26 ± 12.90	80.0 ± 16.72	.302[a]
Height, cm, X ± SD	166.06 ± 10.05	169.8 ± 10.79	.335[a]
BMI, kg/m^2, X ± SD	26.95 ± 4.29	27.61 ± 4.20	.673[a]
Civil status, n (%)			.195[b]
Married	10 (66.7)	13 (86.7)	
Unmarried	5 (33.3)	2 (13.3)	
Educational status, n (%)			.007[b]
Primary school	5 (33.3)	1 (6.7)	
High school	4 (26.7)	0 (0.0)	
University degree	6 (40.0)	14 (93.3)	
Occupational status, n (%)			.019[b]
Housewife	7 (46.7)	0 (0.0)	
Student	1 (6.6)	0 (0.0)	
Working	7 (46.7)	14 (80.0)	
Unemployed	0 (0.0)	0 (0.0)	
Retired	0 (0.0)	1 (20.0)	
Smoking			.896[b]
Never smoked	7 (46.7)	6 (40.0)	
Currently smoking	5 (33.3)	5 (33.3)	
Has smoked before	3 (20.0)	4 (26.7)	

[a]Independent *t* test,
[b]Chi-Squared–Pearson test

Abbreviations: X, Mean; SD, Standard Deviation; BMI, Body Mass Index;

Table 3. Changes in VAS, Pain Pressure Threshold, Flexibility, and Proprioception

Variables	Groups	Before	After	Effect size	Group difference *P* value	Between groups *P* value
VAS	Intervention	6.94 ± 1.84	3.41 ± 1.99	1.842	0.001[c]	.002[a]
	Control	5.52 ± 1.83	4.38 ± 2.13	0.574	0.003[c]	
	P value	0.043[b]	0.210[b]			
Pressure pain threshold	Intervention	6.03 ± 1.68	7.73 ± 1.85	0.962	0.001[c]	.074[a]
	Control	8.81 ± 3.08	9.93 ±3.50	0.339	0.025[c]	
	P value	0.004[a]	0.233[a]			
Flexibility	Intervention	-5.53 ± 11.91	-1.93 ± 10.28	0.323	0.001[d]	.174[b]
	Control	0.86 ± 8.62	2.70 ± 7.26	0.230	0.077[d]	
	P value	0.056[a]	0.126[a]			
Proprioception						
15°	Intervention	4.54 ± 3.59	2.20 ± 1.85	0.819	0.003[c]	.567[a]
	Control	5.24 ± 3.40	3.36 ± 2.44	0.635	0.099[c]	
	P value	0.588[b]	0.174[a]			
30°	Intervention	5.66 ± 4.37	2.69 ± 1.92	0.879	0.011[d]	.073[b]
	Control	4.38 ± 2.85	3.76 ± 2.64	0.225	0.416[d]	
	P value	0.567[a]	0.217[a]			

[a]Mann Whitney U test
[b]Independent *t* test
[c]Wilcoxon test
[d]Paired *t* test

Abbreviation: VAS, Visual Analog Scale.

Mann–Whitney U test. Changes occurring after treatment were determined using the Paired Sample *t* test for normally distributed data and the Wilcoxon test for non-normally distributed data. Effect sizes were calculated using Cohen's d and categorized as trivial (≤0.20), small (0.21–0.49), moderate (0.50–0.79), or large (≥0.80).[29] Data were evaluated over a 95% confidence interval and considered statistically significant at *P* < .05.

RESULTS

This study was reported using the CONSORT guidelines. Thirty-seven patients with CNLBP were screened. Three patients did not meet the inclusion criteria. A total of 34 participants were randomly assigned to one of the two groups. Two participants from both groups did not complete the programs and did not participate in the final assessments. Finally, the data of 30 participants were analyzed.

The demographic characteristics of the participants according to the groups are shown in Table 2. The mean age of all participants was 38.46 ± 9.03 years. There was no statistically significant difference between the two groups regarding age, gender, body mass index, smoking, and marital status (*P* > .05, Table 2).

A significant decrease in pain severity was observed after the intervention program in both groups (*P* < .05), and a significant difference in pain severity was found between the two groups (*P* < .05). In VAS, while the effect size was large for the intervention group (d = 1.84), it was medium for the control group (d = 0.57). Pressure pain threshold increased significantly in both groups compared to baseline (*P* < .05) after the treatment but there was no significant difference between the groups (*P* > .05). The effect size in post-intervention and pre-intervention comparisons for each group is given in Table 3.

The participants' flexibility increased significantly only in the intervention group at the end of the treatment, and the effect size was small (*P* < .05 d = 0.32). At the end of the treatment, proprioception angular errors at 15 and 30 degrees of trunk flexion decreased significantly only in the intervention group (*P* < .05). In addition, the effect size was large for 15° and 30° of proprioception (d = 0.819 and d = 0.879, respectively). Changes in VAS, pressure pain thresholds, flexibility, and proprioception outcome measures, and effect size are shown in Table 3.

A significant decrease was observed in ODI scores according to both in-group and between-group analyses (*P* < .05). In ODI, the effect size was large (d = 0.99) and moderate (d = 0.53) for the intervention and control groups, respectively. The improvement in ODI scores was higher in favor of the intervention group (*P* < .05). After the intervention program, there were significant improvements from baseline in all QoL levels in the intervention group, except for the 'social function' subgroup of SF-36 (*P* < .05). In the control group, there were significant improvements from baseline only in the 'physical role' and 'body pain' subgroups (*P* < .05). The difference between the two groups was significant in the physical function, general health, and emotional role subgroups (*P* < .05). The effect size for the SF-36 sub-parameters was between 0.42 and 0.93 in the intervention group, while these were between 0.07 and 0.47 in the control group. Changes in ODI and SF-36 outcome measures and effect size are shown in Table 4. There were no adverse effects associated with the interventions.

DISCUSSION

This study showed that the Graston Technique (GT) added to the exercise program significantly reduced pain and increased the pressure pain threshold. Although GT added to the exercise improved proprioception, it was not superior to exercise. In addition, the GT improved physical function and general health, reducing the level of disability.

Table 4. Changes in Disability and Quality of Life

Variables	Groups	Before	After	Effect size	Group difference *P* value	Between Groups *P* value
ODI	Intervention	45.20 ± 21.52	24.80 ±19.50	0.993	.000[d]	.002[b]
	Control	28.26 ± 13.60	20.53 ± 15.48	0.530	.021[d]	
	P value	0.029[a]	0.624[a]			
SF-PF	Intervention	55.33 ± 21.99	75.33 ± 20.65	0.937	.002[c]	.005[a]
	Control	78.33 ± 17.07	80.66 ± 17.71	0.133	.559[c]	
	P value	0.003[b]	0.454[b]			
SF-RP	Intervention	40.00 ± 39.86	65.00 ± 38.72	0.636	.016[c]	.567[a]
	Control	63.33 ± 38.80	80.00 ± 31.62	0.471	.031[c]	
	P value	0.126[a]	0.345[a]			
SF-BP	Intervention	37.33 ± 22.48	56.00 ± 24.97	0.785	.002[c]	.089[a]
	Control	60.00 ± 21.85	70.00 ± 20.48	0.472	.031[c]	
	P value	0.009[b]	0.104[b]			
SF-GH	Intervention	47.66 ± 20.86	60.66 ± 26.24	0.548	.007[d]	.047[b]
	Control	59.33 ± 21.45	61.00 ± 20.37	0.079	.648[d]	
	P value	0.142[b]	0.902[b]			
SF-VT	Intervention	36.83 ± 22.31	56.50 ± 23.31	0.862	.018[d]	.126[b]
	Control	53.16 ± 28.99	58.16 ± 24.33	0.186	.394[d]	
	P value	0.095[b]	0.850[b]			
SF-SF	Intervention	56.66 ± 25.38	67.50 ± 25.35	0.427	.066[d]	.099[b]
	Control	79.16 ± 19.28	75.83 ± 21.37	0.163	.604[d]	
	P value	0.015[a]	0.436[a]			
SF-RE	Intervention	20.00 ± 35.18	75.55 ± 38.76	1.500	.040[c]	.013[a]
	Control	68.88 ± 44.48	75.55 ± 36.65	0.163	.257[c]	
	P value	0.013[a]	0.870[a]			
SF-MH	Intervention	54.13 ± 24.61	68.00 ± 20.81	0.608	.038[d]	.243[b]
	Control	61.20 ± 25.85	65.73 ± 20.51	0.194	.375[d]	
	P value	0.450[b]	0.766[b]			

[a]Mann Whitney U test
[b]Independent *t* test
[c]Wilcoxon signed rank
[d]Paired *t* test

Abbreviations: ODI, Oswestry Disability Index; SF, Short Form 36; PF, Physical Functioning; RP, Role Physical; BP, Bodily Pain; GH, General Health; VT, Vitality; SF, Social Functioning; RE, Role Emotional; MH, Mental Health.

In our study, pain was reduced by 30% more in the intervention group compared to the control group, and the effect size was large. A 30% change compared with the pre-test is considered a clinically meaningful improvement for individuals with low back pain.[30] Pressure pain threshold improved in both groups and although this effect was greater in the intervention group, no significant difference was found between the groups. The decrease in pain intensity may have been caused by Graston's increased flexibility in the muscles. The GT applied to the erector spinae, gluteus maximus/medius, and hamstring muscles are thought to increase muscle flexibility. Any shortening of the muscles surrounding the lumbar region and the deep fascia limits hip flexion, causes lumbar hyperextension and increases pain by affecting the biomechanics in the region.[31,32] It is assumed that the GT relieves pain by stimulating mechanoreceptors in soft tissues, reduces the activity of neurons and provides an additional analgesic response to skin deformations.[32] For this reason, it is thought that it is important to treat the muscle and fascia in chronic lower back pain. Similar to the results of our study, it was reported that chronic low back pain decreased and lumbar flexion, extension, right/left trunk flexion, and hip flexion ROM increased after four weeks of intervention of the GT.[13] In another study investigating the effect of the GT, it was reported that the technique applied in addition to the routine treatment of patients with NLBP, increased hamstring flexibility and thus decreased pain intensity.[15] In addition to the stimulation of mechanoreceptors with the Graston technique, increased tissue temperature increases the pressure pain threshold.[18] In our study, these effects of Graston improved the pressure pain threshold by 15% more in the intervention group than in the control group and provided a large effect size. Although Graston has a good penetration depth,[16] its effect on the deep group muscles in the lumbar region, which consists of a deep tissue layer, may be limited. Since more deep tissue was evaluated with pressure at the pressure pain threshold, the lack of difference between the groups may be because the effect of Graston was a little more superficial.

It has been reported that the angle of deviation increases with the deterioration of proprioception in patients with chronic low back pain.[33] Therefore, it is stated that proprioceptive sense should be considered during the treatment process to stimulate recovery by providing motor control.[5] However, the long-term effect of soft tissue mobilization on proprioceptive sensation in patients with chronic low back pain is unclear. This study showed that Graston added to exercise improved 15° and 30° of proprioception in patients with CNLBP by 51% and 52%, respectively, and the effect size was large. However, no difference was observed between the groups. Problems in afferent signals from muscle spindles and central regulation in patients with low back pain may lead to impaired proprioception.[34] The significant increase in proprioception may have been due to functional recovery in muscle memory due to soft tissue mobilization with the GT. In addition, the flexibility obtained in the muscles may have increased the sense of joint position by providing biomechanical improvement. It is suggested that pressure applied to the tissue increases position sensitivity by activating mechanoreceptors.[35,36] Therefore, it is rationalized that GT can be used in developing proprioceptive sense, which plays an important role in the effectiveness of rehabilitation.

Decreased flexibility limits the joint range of motion, causes abnormal load on the musculoskeletal system, and leaves the body vulnerable to injury.[37] The GT, applied in correct and appropriate doses, may reduce pain and increase muscle flexibility and ROM within a few weeks after treatment.[38] In a study, the knee range of motion of a patient who developed a complication of knee arthrofibrosis after patellar tendon rupture surgery was limited, and muscle activation was impaired. It has been observed that the GT, which was applied to the patient in addition to joint mobilization, flexion ROM exercise, strengthening, and home exercise program for a total of 5 times for four weeks, increased the range of motion and improved physical function.[39] In patients with plantar heel pain, it has been reported that a home stretching exercise program including triceps surae muscles and calcaneal tubercle and applying the GT for up to 8 sessions reduce pain and provide a significant improvement in lower extremity function.[40] Similar to previous studies, in our study, it was observed that flexibility increased due to soft tissue mobilization with the application of GT in patients with CNLBP. However, no difference was found between the groups. The GT creates a controlled local inflammation by increasing fibroblast production. With the onset of the inflammatory response, the load on the muscle-tendon complex with exercise may play a role in muscle elasticity and strength.[36] These results support the physiological effects of the GT in tissue. The increase in blood flow, decrease in tissue viscosity, myofascial relaxation, increase in deep tissue flexibility, and interruption of transmission in pain receptors may have improved function.[16] Therefore, the use of GT is recommended to improve restricted mobility in patients with chronic low back pain.

Pain causes fear in patients during activities of daily living, leading to the development of avoidance behavior and an increase in disability. Disability is a significant problem affecting physical performance and work efficiency in patients with chronic low back pain.[41] This study showed that both exercise and GT added to exercise reduced disability by 27% and 45%, respectively. In addition, it was observed that GT was more effective in reducing disability compared to exercise alone, while the effect size was large and medium, respectively. The change in disability level is above the minimal clinically significant difference for ODI after Graston intervention in individuals with low back pain.[30] Similar to our study, Abdel-Aal et al.[12] reported that four weeks, three sessions of exercise per week, and GT added to exercise reduced pain and disability in both groups in patients with cervicogenic headaches. In addition, it has been reported that the GT is more effective in reducing disability, headache frequency, and duration.[11] Crothers et al. showed that ten sessions of chiropractic and Graston intervention in individuals with thoracic spine pain reduced pain and disability within three months after treatment; however, this effect was not statistically significant.[14] Literature has reported that clinically important developments will be achieved when the GT is combined with exercises.[42] In our study, it is thought that the combination with exercise was also effective in observing significant improvements in the intervention group.

It is stated that soft tissue mobilization improves the quality of life in patients with chronic pain, but there is insufficient evidence on this subject.[43] In the present study, it was observed that Graston improved patients' quality of life with CNLBP but it was not superior to exercise. Also, the GT improved more effectively sub-parameters of quality of life such as physical health, general health, and mental and emotional role. However, for the quality of life sub-parameters, the effect size was large and medium in the GT group, whereas it was small or trivial in the control group. Since combining GT with exercise improves pain and disability parameters, the improvement observed in the intervention group in quality of life sub-parameters may be due to this. Similar to our study, Ozsoy et al.[44] showed that soft tissue mobilization added core stabilization exercises reduce pain and disability and improve the quality of life in patients with NLBP. However, no difference was observed between the groups in terms of the improvement in quality of life.[44]

This study has several limitations. Although the individuals participating in our study were randomly included in the groups, the severity of pain and disability at the beginning seemed higher in the intervention group. This may have led to a more significant improvement in pain and disability after the Graston treatment. Finally, reassessment three and six months after the GT would help explain the long-term effects of the technique.

CONCLUSION

GT added to exercise reduces pain and disability, increases mobility and proprioception, and plays an important role in improving quality of life compared to exercise alone. Considering these results, it is suggested that GT can be added to rehabilitation programs to improve pain control, mobility, and quality of life in patients with CNLBP.

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The authors declare that they have no competing interests.

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