

Which Treatment is More Effective in Myofascial Pain Syndrome? Local Anesthetic Injection or Kinesio Taping?

Miyofasiyal Ağrı Sendromunda Hangi Tedavi Daha Etkilidir? Lokal Anestezik Enjeksiyonu mu Kinesyolojik Bantlama mı?

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ABSTRACT Objective: To investigate effectiveness of local anesthetic injection and kinesio taping in patients with myofascial pain syndrome (MPS). **Material and Methods:** Fifty-five patients, who were diagnosed with MPS at our outpatient clinic were randomly assigned into two groups, local injection group (LIG) (n=28) received local anesthetic (1ml 2% prilocain) injection and kinesio taping group (KTG) (n=27) received kinesio taping. Two participants in the LIG and one participant in the KTG did not come for follow-up examinations. Fifty-two patients were analyzed. All patients were evaluated at baseline, 1st, 3rd, 6th weeks after treatment using Visual analogue scale (VAS), Nottingham Health Profile (NHP) and Beck depression inventory (BDI). **Results:** Both groups' VAS pain, VAS fatigue, VAS limitations in daily living activities (p<0.001, p=0.005; p<0.001, p=0.014; p=0.017, p=0.485; respectively LIG, KTG) were significantly decreased and value of algometric pressure (p<0.001, p<0.001; respectively LIG, KTG) were significantly increased. The decrease in all these values were higher in the group of local anesthetics (p=0.001, p=0.003, p=0.005; respectively). No changes were determined in the BDI and the NHP values after treatment (p>0.05, p>0.05; respectively). **Conclusion:** These findings suggest that kinesio taping is a good treatment alternative being a non-invasive and easy applicable procedure in MPS therapy, also the use of both treatments may be appropriate. Further studies are needed using kinesiotaping in the treatment of MPS.

Keywords: Athletic tape (kinesiotape); injections; myofascial pain syndromes

ÖZET Amaç: Miyofasiyal ağrı sendromu (MAS) olan hastalarda lokal anestezik enjeksiyonun ve kinesiotapingin etkinliğini araştırmak. **Gereç ve Yöntemler:** Polikliniğimizde MAS tanısı konmuş elli beş hasta randomize iki gruba ayrıldı. Lokal enjeksiyon grubu (LIG) (n=28) lokal anestezik (1 ml %2 prilocain) enjeksiyonu yapıldı. Kinesio bantlama grubuna (KTG) (n=27) kinesio bantlama uygulandı. LIG'de 2 hasta KTG' de 1 hasta takip incelemelere gelmedi. Elli iki hasta analiz edildi. Tüm hastalar tedavi öncesi ve tedavi sonrası 1., 3., 6. haftalarda Görsel analog skala (VAS), Nottingham Sağlık Profili (NHP) ve Beck depresyon envanteri (BDI) kullanılarak değerlendirildi. **Bulgular:** Her iki grubun VAS ile değerlendirilen ağrı skoru, yorgunluk skoru, günlük yaşam aktivitelerinde kısıtlamaları (p<0.001, p=0.005; p<0.001, p=0.014; p=0.017, p=0.485; sırasıyla LIG, KTG) anlamlı derecede azaldı. Her iki grubun algometrik basınç değeri anlamlı derecede arttı (p<0.001, p<0.001; sırasıyla LIG, KTG). Ancak bu değerlerde azalma lokal anestezik grubunda daha yüksekti (p=0.001, p=0.003, p=0.005; sırasıyla). Tedaviden sonra BDI ve NHP değerlerinde herhangi bir değişiklik saptanmadı (p>0.05, p>0.05; sırasıyla). **Sonuç:** Bu bulgular, kinesio bantlamanın MAS tedavisinde invaziv olmayan ve kolay uygulanabilir bir prosedür olması açısından iyi bir tedavi alternatifini olduğunu, ayrıca her iki tedavinin kullanımının uygun olabileceğini düşündürmektedir. MAS tedavisinde kinesiotaping uygulamalarını değerlendirecek daha fazla çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Atletik bant (kinezyobant); enjeksiyonlar; miyofasiyal ağrı sendromları

Myofascial Pain Syndrome (MPS), which is common but often overlooked in clinical practice, is a musculoskeletal inflammatory disorder associated

with pain and muscle stiffness, characterized by the presence of hyper-irritable palpable nodules in skeletal muscle fibers called miyofascial trigger point

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(TP). Trigger point is the cardinal feature of MPS.¹ Typically, pain is common, deep, irregular. Myofascial Pain Syndrome can be confused with other diseases.² The pain may reflect in a distant region and may be associated with autonomic phenomena such as paresthesia, dysesthesia, and/or sensory disturbances and/or sweating. Trigger point may be active or latent. While active TP causes spontaneous pain, latent TP can be converted into active ones due to psychological stress, weak posture, sudden injury, muscle overload and repetitive microtrauma.³

The most commonly accepted treatment of MPS is the treatment for the underlying etiology. If the underlying cause cannot be properly treated, the TP may be reactivated and MPS may resume. Treatment methods based on the principle of inactivation of the TP by injection techniques are thought to provide mechanical destruction in fibrotic tissues, to remove sensitizing agents and to increase vasodilation.^{1,4} Most commonly used injection techniques are dry needling, local anesthetic or saline injections methods. Pharmacological treatment includes nonsteroidal antiinflammatory drugs, myorelaxant drugs, sleep regulating drugs, antidepressants, neuroleptics, anti-convulsant drugs. Nonpharmacological treatment methods, include acupuncture, manual therapy, osteopathic techniques, massage, acupressure, ultrasonography, heat or ice, diathermy application, skin electrical nerve stimulation, ethyl chloride spray and stretch technique etc.⁵

Kinesio taping (KT) is a taping method which is applied without limiting the joint movements with band similar to the structural features and flexibility of human skin. As kinesio taping elevates the skin and subcutaneous interstitial area by removing skin, circulation and movement are increased. In this way, inflammation and pain are reduced, performance is increased, circulation and tissue healing are faster. One of the application areas of kinesio taping is MPS. It can be used in correction of tonus disorders in the muscles, treatment of trigger point and increasing of range of motion. Studies on this indication of KT is limited.⁶

It is known that trigger point injection is one of the most effective treatment methods in MPS. It has been proven to provide this effect by reducing pain and muscle spasm, increasing joint range of motion,

increasing local blood circulation and acting on fibrotic scar formation. Saline, steroid, botulinum toxin, dry needling and local anesthetic injection are among these injections and local anesthetic injection is one of the most widely used methods.^{1,4,7}

The principal goal of this study was to compare the effectiveness of local injection and kinesio taping in patients with MPS, evaluating pain, depression and activities of daily living in the short, medium and long term follow-up.

MATERIAL AND METHODS

SUBJECTS

The study was designed as a randomized controlled clinical trial. Sixty-five cases were assessed for eligibility. Eight cases were excluded from the study because they did not meet the inclusion criteria and two cases did not want to participate in the study. Fifty-five patients aged 18-60 years who applied to outpatient clinic with the complaints of back, neck and shoulder pain and diagnosed as MPS according to Travell and Simons diagnostic criteria for at least 3 months were included in the study. After all subjects were informed about the study and approved the informed consent form, the patients were randomized and 28 of them received local anesthetic injection (LIG) to trigger point and the other 27 were applied kinesio taping (KTG). Two participants in the LIG and 1 participant in the KTG did not come for follow-up examinations. Fifty-two patients were analyzed (Figure 1). Patients with allergic reaction against kinesio taping and local anesthesia, bleeding disorder, under anticoagulant therapy, cellulitis, open wound, healing wound, sensitive skin areas treated with radiotherapy, active infection, vascular occlusion were excluded. Also pregnant women, patients with a history of malignancy, patients who received physical therapy, ESWT (extracorporeal shock wave therapy) and kinesio taping for MPS in the last 3 months were excluded.

The study was approved by the ethics committee of the Medical Faculty of University on 05.06.2014 with the decision number of 2014/126, conducted according to the Declaration of Helsinki, and informed consent was obtained from all subjects.

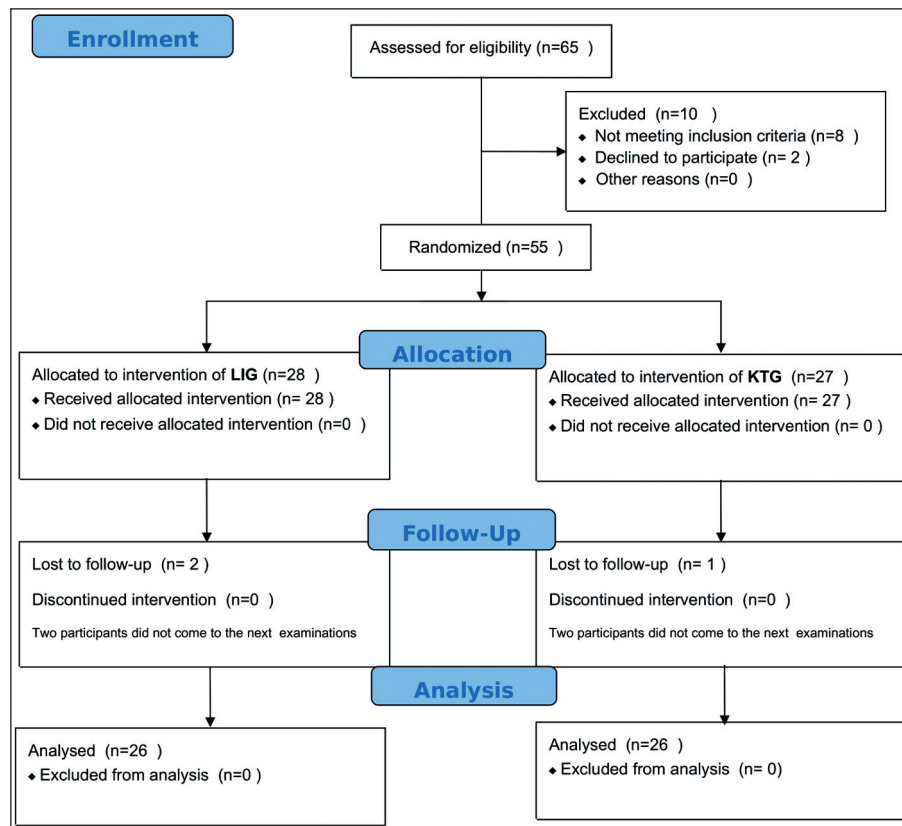


FIGURE 1: Flow of participants (allocation and randomization process).

All subjects were evaluated in terms of their age, sex, BMI (Body mass index), occupation, marital status, educational status, duration of disease, medications used in MPS treatment, before taking treatment.

In the algometric measurement, we used the algae device (STORZ MEDICAL Operating Manual Digital Force Measurement Unit Version 5.0) to evaluate the pain pressure threshold and pain tolerance. Perpendicular pressure was applied to the affected muscle by the metal piston. The applied pressure was increased by 1 kg per second. The patient's initial pain was measured in kg by reading the digital screen on the device.

All patients were evaluated before treatment and 1st, 3rd, 6th weeks after the the treatment. Visual Analog Scale (VAS) was used to assess pain levels, fatigue levels, limitation values in daily life activity. Nottingham Health Profile (NHP) was used to assess musculoskeletal problems . Beck Depression Inventory (BDI) was used to assess depression.⁸⁻¹⁰

PATIENT TREATMENTS

Trigger Point Injection

Prilocain injection of TP was performed by the modification of techniques recommended by Travell and Simons. The patients were asked to lie down in prone position. Injections were performed with 26 gauge - 0,45x13 mm needles. The stretched band, that was localized between the thumb and the index finger, was injected rapidly, having the tip of the needle perpendicular to the skin. The needle was inserted into the muscle until the exact TP was reached. After injecting 1 ml of 2% prolacain solution, the needle was moved backward and forward, and the same point was needled eight to ten times. Then the tip was withdrawn to the subcutaneous tissue, the injector was mildly inclined, and the sides and upper and lower parts of the first injection site were needled. The patient's bleeding control was performed and the patient was kept under supervision for 30 minutes in terms of side effects.^{11,12} All patients were given stretching exercises as home programme.

Kinesio Taping Therapy

The affected muscles of 27 patients were identified and the trigger points were palpated and marked with a pen. For each patient, kinesio bands (KINESIO TEX® TAPE) were ovally cut to the extent that they included the trigger point in the affected cavity and a "I" shape. The patient was seated in a relaxed and fixed, manner and the tape was glued parallel to the muscle fibers without hand contact and stretching. The patients were advised not to remove the tape for 1 week. Each patient was supervised for 30 min after taping and was advised to reapply to outpatient clinic in the event of any side effects. This treatment was applied to each patient once.^{13,14} All patients were given stretching exercises as home programme.

STATISTICS

The power of the study; effect size was given as 0.9 in the welding study. In accordance with this information, it is planned to work with a minimum of 52 individuals with 90% power and 5% type I error and a minimum of 26 individuals in each group.^{15,16}

Shapiro Wilk test was used to determine whether the variables were suitable for normal distribution. In cases where the distribution assumption is achieved, continuous variables are summarized as mean±standard deviation, and continuous variables are presented as median [min.-max] if the distribution assumption is not provided. Categorical variables are summarized in terms of numbers and percentages. Chi-square test was used in the analysis of cross tables. Since the distribution assumption was not met, Kruskal Wallis test was used for comparison of more than two independent groups. The Dunn test was applied from post hoc tests to find the source of the difference between the groups. In the comparison of two dependent groups, Wilcoxon test was used because of the distribution assumption. Spearman correlation coefficient was calculated for the relationship between two continuous measurements. Repeated measures of ANOVA test was used to investigate differences between repeated measurements and to investigate group interaction. Error bar plots with 95% confidence intervals were drawn for each parameters. Since the data in the subscales were in terms of ratio, arcsin transformation was performed. Descriptive sta-

tistics were calculated based on untransformed values. The analyzes were performed with Statistica v.13.3.1 program. $p < 0.05$ was accepted as statistical significance level.

RESULTS

SOCIODEMOGRAPHIC CHARACTERISTICS

The mean ages of the LIG and the KTG patients were 42.8 ± 12.3 and 41.7 ± 12.8 years, respectively. The groups were similar in terms of age, sex, BMI, marital status ($p > 0.05$, Table 1). When the educational status is evaluated; university and above education is the most common degree in LIG with 42.3% and KTG with 34.6%. Secondary school is the second common degree in LIG with 23.1% and primary school is the second common degree in KTG with 30.8%.

BASELINE CLINICAL CHARACTERISTICS

The mean duration of disease was 10 months in LIG and 24 months in KTG and significantly higher in KTG ($p = 0.017$). When the drug use for MPS was evaluated, 16 (25%) of the patients used NSAID drugs at least once. Seven of these 16 patients used additional myorelaxant drugs and 9 of these patients used topical anti-inflammatory drugs. Beck depression index was compared between the groups. There was no statistically significant difference between the groups and BDI ($p = 0.434$, Table 2). There was a significant difference between the groups in terms of pretreatment VAS pain value and it was found to be significantly higher in LIG ($p = 0.016$). There was no significant difference between the groups in terms of initial algometric pain threshold ($p = 0.371$), fatigue level assessed by VAS ($p = 0.307$) and limitation values in daily living activity assessed by VAS ($p = 0.200$, Table 2).

ANALYSIS OF CLINICAL PARAMETERS

The VAS scores at the follow-up intervals of 1st, 3rd, 6th weeks were compared with the baseline VAS scores for pain levels, fatigue levels, limitation values in daily living activity and algometric pain threshold. Both groups' VAS pain, VAS fatigue, VAS limitations in daily living activities significantly decreased, but the decrease in all these values

TABLE 1: Demographic and clinical characteristics of LIG and KTG groups.

	LIG Mean±SD	KTG Mean±SD	P
Age (years)	42.8±12.3	41.7±12.8	0.751
Gender (n/%)			
Male	10/38.5	5/19.2	0.126
Female	16/61.5	21/80.8	
BMI (kg/m ²)	28.5±5.3	27.3±5.5	0.434
Marital status (n/%)			
Married	21/80.8	20/76.9	0.734
Single	5/19.2	6/23.1	
Literacy level (n/%)			
Illiterate	3/11.5	0/0	0.06
Primary	3/11.5	8/30.8	
Middle	6/23.1	2/7.7	
High	3/11.5	7/26.9	
University and above	11/42.3	9/34.6	

BMI: Body Mass Index; LIG: Local Injection Group; KTG: Kinesio Taping Group.

were higher in LIG group. APT were significantly increased in LIG and KTG (Table 3, Figure 2, Figure 3). No changes were determined in the Beck Depression Index and the Nottingham Health Profile

values after treatment ($p>0.05$, $p>0.05$; respectively).

DISCUSSION

Myofascial pain is a common problem caused by muscles and related fascia and characterized by myofascial trigger points.¹⁷ MPS treatment includes many treatment modalities such as manual therapy, physical therapy, trigger point injections, oral medical therapies, kinesio taping. In the case of inappropriate treatment, pain in MAS becomes chronic pain, affects the daily life activity of the patient and causes predisposition to depression in the patient.^{6,18,19}

Although MPS is mostly observed in the population between 27-50 years of age, its incidence can be as high as 54% in women and 45% in men.²⁰ In our study, the mean age was 42.8 in the local anesthetic group and 41.7 in the kinesio group. The ratio of women was 61.5% in LIG and 80.8% in KTG.

Socioeconomic and educational status of the patients are also effective in the development and maintenance of the disease. In both groups, housewife as a profession and university and higher education level were found to be the highest.

TABLE 2: Baseline characteristics of subjects in the study group.

Characteristics	LIG	KTG	P
Duration (in months), Median	10	24	0.017
Depression level, n (%)			
No	16/61.5	11/42.3	0.211
Moderate	6/23.1	12/46.2	
Severe	4/15.4	3/11.5	
Baseline BDI score (mean±std.deviation)	28.5±5.3	27.3±5.5	0.434
Nottingham Health Profile, median (minimum-maximum)			
Pain	0.69 (0.00-1.00)	0.38 (0.00-1.00)	<0.001
Energy	0.67 (0.00-1.00)	0.67 (0.00-1.00)	0.661
Emotions	0.39 (0.00-1.00)	0.33 (0.00-1.00)	0.796
Sleep	0.3 (0.00-1.00)	0.20 (0.00-0.80)	0.814
Social Isolation	0.00 (0.00-1.00)	0.10 (0.00-0.80)	0.512
Physical Mobility	0.38 (0.00-1.00)	0.26 (0.00-0.63)	0.133
Algometric Pain Threshold Score, kg, median (minimum-maximum)	10 (5-15)	11 (6-19)	0.371
Fatigue assessed by VAS median (minimum-maximum)	8 (4-10)	7.5 (2-10)	0.307
Limitation values in daily living activity assessed by VAS median (minimum-maximum)	5 (2-8)	5 (0-10)	0.200

LIG: Local Injection Group; KTG: Kinesio Taping Group; BDI: Beck Depression Inventory; VAS: Visual Analog Scale.

TABLE 3: Efficacy of the intervention at various intervals in reduction of VAS scores in comparison to baseline scores in LIG and KTG.

	LIG	KTG	p ^a
	Mean±Std. Deviation	Mean±Std. Deviation	
VAS Pain Scores			
0 th week	7.12±1.66	5.96±1.68	0.016
1 st week	4.46±2.30 ^d	5.00±1.67 ^d	0.419
3 rd week	4.15±2.22 ^d	4.88±1.77 ^d	0.255
6 th week	4.19±2.14 ^d	5.08±1.65 ^d	0.117
p ^b	<0.001	0.005	p ^c 0.001
VAS Fatigue Levels			
0 th week	7.46±1.61	6.81±2.12	0.307
1 st week	4.65±2.23 ^d	6.00±1.96 ^d	0.031
3 rd week	4.35±2.17 ^d	5.92±1.92 ^d	0.010
6 th week	4.31±2.38 ^d	6.04±1.95 ^d	0.017
p ^b	<0.001	0.014	p ^c 0.003
VAS Limitation Values in Daily Living Activity Scores			
0 th week	5.65±2.04	4.62±2.97	0.200
1 st week	3.73±2.34 ^d	4.31±2.75	0.400
3 rd week	3.54±2.23 ^d	4.27±2.71	0.308
6 th week	3.62±2.53 ^d	4.35±2.77	0.319
p ^b	0.017	0.485	p ^c 0.005
Algometric Pain Threshold scores (Kg)			
0 th week	10.00±2.77	11.00±3.21	0.371
1 st week	14.04±4.25	12.00±3.45	0.073
3 rd week	14.92±4.01	12.23±3.18	0.010
6 th week	15.27±4.66	12.19±3.17	0.010
p ^b	<0.001	<0.001	p ^c <0.001

p^a: Comparison of two independent groups for each week; p^b: Comparison of dependent times for each groups; p^c: Interaction of group and time; ^d: Difference between first week and others; LIG: Local Injection Group; KTG : Kinesio Taping Group; VAS: Visual Analog Scale.

As the pain duration increases, the patient's susceptibility to depression increases and his/her social life is affected. There is insufficient data on which depression and pain begin first, or which triggers the other. Pain can affect the mental state, and mental disorder can change the perception of pain Bean et al. showed that physical function can be affected by depression.²² McKnight et al. found non-compliance and failure in social life in individuals with depression.²³ Although there was a difference in disease duration between our groups, there was no significant difference in terms of depressive symptoms. Ay et al. in their study comparing local injection and dry needling treatment in MPS, observed a significant decrease in scores in both groups in the evaluation of depression at the 4th and 12th weeks after treatment

with the BDI.²⁴ In our study, no significant change was observed in depressive symptoms in both groups at the 1st week, 3rd week and 6th week follow-up.

In general, it is known that women are more prone to depression than men in the pain population. Fishbain et al. reported that men and women had an equal depression rate in a study of 238 patients with MPS.²⁵ In our study, no relationship was found between depression and gender. There was no relationship between marital status and occupation and depression.

The most important complaint in MPS is pain and many scales are used for evaluation. The most commonly used scale is VAS.^{8, 25} VAS pain values of the LIG were significantly higher. There was no signifi-

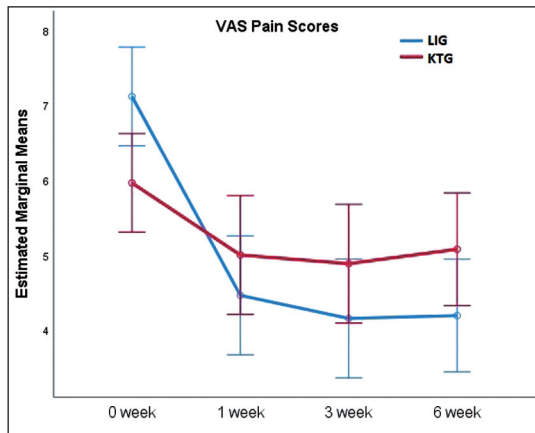


FIGURE 2: Relative efficacies of the two interventions in reduction of VAS scores in comparison to baseline scores in the LIG and KTG.

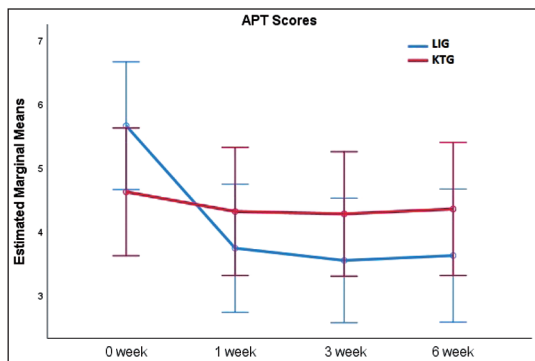


FIGURE 3: Relative efficacies of the two interventions in reduction of Algometric Pain Threshold scores in comparison to baseline scores in the LIG and KTG.

cant difference between the groups in terms of fatigue, daily life activity limitation and algometric pain threshold values evaluated by VAS. At the 1st, 3rd and 6th weeks after treatment, significant decrease was found in both groups but this decrease was higher in the LIG.

In the comparison of local anesthetic and dry needling treatment in MPS study, Ay et al. determined significant decrease in VAS pain values in both groups at 4 and 12 weeks follow-up and no difference between the groups.²⁴

In meta-analysis of 17 studies; Lim et al. found that kinesio taping had an effect on musculoskeletal pain but had no superiority over other methods.²⁶ In meta-analyzes studies, Csapo et al. report that the application of kinesio tapes may have some therapeutic benefits, but the usage of these tapes does not promote muscle strength gains in healthy adults.²⁷

In our study, exercise was recommended as home program after each treatment. After needling the TP, it is essential to correct the muscle imbalance to achieve a good therapeutic result.²¹ It is important to try to restore normal length and flexibility to the muscles.⁷ Stretching exercises form the basis of exercise treatment of myofascial pain. This treatment addresses the muscle tightness and shortening that are closely associated with pain in this disorder and permits gradual restoration of normal activity.²⁸ Sharma et al. showed that exercise program has positive results on physical and mental health in chronic pain and suggested that it should be included in the treatment program.²⁹

Subaşı et al. compared the efficacy of kinesio taping and subacromial injection in 70 patients with subacromial impingement syndrome. Betamethasone plus and prilocaine were used in the injection and both treatments were found to be effective in subacromial impingement syndrome.³⁰

Ay et al. compared the efficacy of kinesiotaping and sham kinesiotaping in 61 patients with cervical MPS, and showed that Kinesio taping improved pain, pressure pain threshold, and cervical range of motion. Therefore, they suggested that kinesio taping may be used as an alternative treatment in the treatment of patients with MPS.³¹

Ata et al. demonstrated that kinesiotaping may be useful in increasing the efficacy of trigger point lidocaine injection in MPS in 75 patients with local anesthesia, local anesthesia plus fake kinesiotherapy, and local anesthesia and kinesiotherapy.³²

Noguera-Iturbe et al. evaluated the immediate and short-term efficacy of the space correction KT technique in patients with latent or active TP in the upper trapezius muscle and did not show significant differences in pain pressure threshold, cervical lateral flexion and cervical rotation compared to the sham groups.³³

In our study, kinesiotaping was applied only once to ensure standardization. In daily clinical practice, as a noninvasive, painless and easily applicable method with fewer side effects, this technique can be repeated, the frequency of administration can be individualised, which may increase patients' response

to treatment. We thought that the more effective local anesthetic injection might be due to the relatively higher initial pain values and shorter symptom duration of this group. As a result; we suggest that kine-

sio taping is an effective treatment in our MPS patients but it is less effective than local anesthetic injection. We believe that further studies with larger patient groups will be necessary.

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