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A COMPARISON OF MANUAL THERAPY AND SPLINT THERAPY IN PATIENTS DIAGNOSED WITH MYOFASCIAL TEMPOROMANDIBULAR DYSFUNCTION WITH SLEEP BRUXISM

ORIGINAL ARTICLE

ABSTRACT

Purpose: The aim of this study was to investigate the effect of manual therapy on temporomandibular pain, range of motion, functionality level of the jaw, sleep quality, and patient satisfaction, and to compare the efficacy with splint therapy among female patients with myofascial temporomandibular dysfunction (M-TMD) accompanied by sleep bruxism (SB).

Methods: A total of 29 female patients, aged 18-50 years, diagnosed with M-TMD were separated into two groups using a simple random sampling method as the manual therapy group (MT; n:15) and the splint therapy group (ST; n:14). All the patients were informed about bruxism and its effects and were given home exercises. The patients in the ST group were instructed to use a static splint for one month. The MT group patients received a total of 8 sessions, 45 minutes twice a week of treatment, including joint and soft tissue mobilizations to the temporomandibular joint (TMJ) and cervical region. Pain severity, symptoms, TMJ range of motion, jaw functionality, sleep quality, and patient satisfaction were evaluated. The evaluations were repeated after 4 weeks and compared with baseline values.

Results: A statistically significant difference was determined in both groups in pain, TMJ range of motion, and sleep quality ($p<0.05$). In the comparison between the groups after treatment, the pain, TMJ range of motion values, and sleep quality were seen to be statistically significantly better in the MT group ($p<0.05$). The patient satisfaction measurements of mean general satisfaction, interpersonal attitude, mean healthcare services score, and general satisfaction total points were found to be statistically significant in the MT group ($p<0.05$).

Conclusion: The applications of both MT and ST were seen to be effective in patients with M-TMD with bruxism. In the comparisons between the groups, the MT method was seen to be more effective than ST. It can be thought that the application of stabilization splint therapy together with manual therapy would significantly increase the treatment efficacy in patients with M-TMD.

Key Words: Bruxism, Manual Therapy, Pain, Splint, Temporomandibular Dysfunction

UYKU BRUKSİZMİ OLAN MİYOFASYAL TEMPOROMANDİBULAR DİSFONKSİYON TANILI HASTALARDA MANUEL TEDAVİ İLE SPLİNT TEDAVİSİNİN KARŞILAŞTIRILMASI

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Çalışmada, uyku bruksizmin (UB) eşlik ettiği miyofasyal temporomandibular disfonksiyonu (M-TMD) olan kadın hastalarda, manuel tedavinin temporomandibular ağrı, eklem açıklığı, çenenin fonksiyonellik düzeyi, uyku kalitesi ve hasta memnuniyeti üzerine etkisini incelemek ve splint tedavisi ile etkinliğini karşılaştırmak amaçlandı.

Yöntem: M-TMD tanılı, 18-50 yaş arası 29 kadın hasta, basit rastgele örnekleme yöntemi ile Manuel Tedavi (MT; n:15) ve Splint Tedavi (ST; n:14) olarak iki gruba ayrıldı. Tüm hastalara bruksizm ve etkileri üzerine eğitim ve ev egzersizi verildi. ST grubundaki bireylerden stabilizasyon splintini bir ay süre ile kullanmaları istendi. MT grubuna, temporomandibular eklem (TME) ve servikal bölgeye eklem ve yumuşak doku mobilizasyonlarını içeren haftada 2 seans 45 dk süreyle, toplam 8 seans tedavi uygulandı. Ağrı şiddeti, semptomlar, TME açıklığı, çene fonksiyonellik düzeyi, uyku kalitesi ve hasta memnuniyeti değerlendirildi. Değerlendirmeler 4 hafta sonunda tekrarlandı ve tedavi öncesi bulgular ile karşılaştırıldı.

Sonuçlar: Her iki grupta kendi içinde ağrı, TME hareket açıklığı ve uyku kalitesinde istatistiksel olarak anlamlı fark bulundu ($p<0,05$). Grupların karşılaştırılmasında ağrı, TME hareket açıklığı değerleri ile uyku kalitesinde MT grubu lehine anlamlı sonuçlar alındı ($p<0,05$). Hasta memnuniyet ölçümlerinde; genel memnuniyet, kişilerarası tutum, sağlık hizmetleri skor ortalaması ile genel memnuniyet total puanı MT grubu bireylerinde anlamlı olarak daha yüksek bulundu ($p<0,05$).

Tartışma: MT ve ST uygulamaları bruksizmin eşlik ettiği M-TMD'si olan hastalarda etkili bulundu, ancak grupların karşılaştırılmasında MT yönteminin ST'ye göre daha etkili olduğu tespit edildi. M-TMD'u olan hastalarda splint tedavisi ile manuel tedavinin birlikte uygulanması tedavi etkinliğini önemli ölçüde arttırabilir.

Anahtar Kelimeler: Bruksizm, Manuel Terapi, Ağrı, Splint, Temporomandibular Disfonksiyon

INTRODUCTION

The most commonly encountered disorder of the temporomandibular joint (TMJ) is myofascial temporomandibular dysfunction (M-TMD), which is a syndrome characterized by findings such as headache, fatigue, stiffness, limited normal joint movement, muscle spasms, and pain with trigger points occurring in all soft tissue including muscles and fascia (1).

Previous epidemiological research has shown that M-TMD is extremely widespread in the general population and is seen more often in females at a mean 4-fold more than in males (2).

There is no specific etiological factor for TMD, but risk factors affecting the dynamic balance of the chewing system have been determined. These risk factors are separated as traumatic, anatomic, physiopathological, and psychosocial (2,3). Psychosocial reasons include stress factors seen together with bruxism. The clenching and grinding of teeth defined as bruxism can be in the form of sleep bruxism (SB) or daytime bruxism (DB) (3). In SB, which is seen more than DB, patients usually awake in the morning with pain in the chewing muscles, fatigue, and headache. As a result of clenching or grinding the teeth, a mechanical load is placed on the muscles and joints, and this can cause M-TMD. Evaluations of the prevalence of bruxism have reported rates varying from 8% to 31% (2,3). These differences in prevalence rates are accepted due to the use of different measurement methods in the diagnosis of bruxism (3).

Different treatment approaches for TMD and bruxism have been recommended in the literature. The current approach to TMJ problems favors the application of non-invasive treatments rather than invasive. Treatments included various approaches such as pharmacological agents, oral splints, cognitive-behavioral programs, physical therapy agents (laser, ultrasound, TENS, biofeedback), manual therapy (MT), osteopathy, relaxation, and meditation (4,5).

From a scan of literature related to this subject, it can be seen that an increasing number of studies have been conducted in recent years related to the efficacy of MT in TMD treatment (6-9). In the majority of studies, the treatment has been weighted towards TMJ and soft tissue mobilization methods. Only one study could be found, which included the TMJ, soft tissues, and cervical segments in M-TMD accompanied by bruxism and that compared splint therapy with MT approaches (9). However, the effect of these approaches on sleep quality, functionality level, and patient satisfaction has not been examined. Therefore, the aim of this study was to compare the efficacy of occlusal splint treatment and manual therapy in patients diagnosed with myofascial temporomandibular dysfunction associated with bruxism and present the evidence for the MT preference. The hypothesis of the study was that manual therapy in M-TMD accompanied by bruxism would be more effective than splint therapy in reducing pain and improving sleep quality.

METHODS

This study was conducted on female patients, aged 18-50 years, who were diagnosed with M-TMD accompanied by bruxism in the Dentistry Faculty of Kahramanmaraş Sütçü Imam University and Kahramanmaraş Türkoğlu Dr. Kemal Beyazıt State Hospital. The study was conducted between January 2019 and February 2020.

Approval for this randomized controlled trial was granted by the Human Research Ethics Committee of Hasan Kalyoncu University (decision no: 2019-67: 14.06.2019). All study procedures conform to the provisions of the World Medical Association Declaration of Helsinki. Written and oral consent was obtained from all participants.

The study included female patients, aged 18-50 years, who were diagnosed with myofascial TMD according to the diagnostic criteria for temporomandibular disorders (DC/TMD) and probable SB according to clinical evaluation and a questionnaire-based assessment (3), with pain severity of VAS ≥3, pain in the jaw, face, temporal region, or ear for at least 6 months, and pain determined in the chewing muscles with palpation.

Patients were excluded from the study if they had TMD other than myofascial according to the research DC/TMD (1), a history of surgery associated

with cervical and/or TMJ problems, a proven specific pathological condition such as cervical and/or TMJ malignancy, fracture, or systemic rheumatoid disease, a history of facial paralysis, a diagnosed psychiatric disease, regular drug use, if they were undergoing orthodontic treatment, had received physiotherapy within the last 3 months, or could not be co-operative.

Power analysis to calculate the sample size was applied using G-power 3.19 software. A moderate effect size (effect size=0.5) was set based on Cohen's d, the significance level was set to a=0.05, and power=0.8, resulting in a minimum of 15 subjects per group required. A total of 56 patients were evaluated, of which 20 were excluded; 7 did not wish to participate in the study, 2 did not meet the criteria, and 11 for other reasons. Thus, 36 patients met the inclusion criteria and were willing to participate in the study. The patients were randomly separated into two groups using the method of single- and double-digit numbers written on paper in a sealed envelope. Those who selected a double-digit number were assigned to the manual therapy (MT) group (n:18) and those with a single-digit number to the splint therapy (ST) group (n:18). After the further exclusion of 7 patients during the treatment period, the final evaluations were compared of 29 patients (15 MT and 14 ST) who completed the 4-week treatment process (Figure 1, Flow Diagram). The opening of the TMJ was measured with calipers in cm. Patient satisfaction was evaluated with the Patient Satisfaction Questionnaire (PSQ-18) (10).

Pain severity was measured with a Visual Analog Scale (VAS), marked from 0 to 10, where 0 indicates no pain and 10 indicates intolerable pain. The patients were instructed to mark the scale corresponding to the severity of pain felt (11).

The level of TMJ functionality was evaluated with the Jaw Functionality Limitation Scale-20 (JFLS-20). The JFLS is a scale with clinical validity and reliability, which evaluates the disability conditions in an individual with temporomandibular dysfunction. The total points range from 0-to 20, with higher points indicating a higher level of disability (12).

The sleep quality of patients was analyzed with the Pittsburgh Sleep Quality Index (PSQI). The PSQI includes 24 items related to both daytime and nocturnal sleep. The responses are scored from 0-3, as 7 sub-scores to give a global score of total points in the range of 0-21. A score of ≥5 indicates poor sleep quality (13).

Treatment Protocol

At the beginning of the treatment, patient education directed at parafunctional behaviors was given, and an exercise program was taught to both groups, with all the patients instructed to perform these exercises at home.

In the patient education, how to protect the jaw joints was explained in detail to the patients. Information was given about avoiding chewing hard foods, not chewing on one side, and paying attention to head posture during the day and when lying down at night. All the patients were also informed about sleep hygiene within the scope of patient education.

The home exercise program included diaphragmatic breathing exercises, mouth opening, and closing while the tongue is in contact with the superior-anterior palate, chin-tuck exercises, mouth opening, and mandibular lateral shift resistance exercises, chewing, and pectoral and neck muscle stretching exercises (8). The patients were instructed to perform the exercises as 3 sets of 10 repetitions per day. The patients were followed up in respect of the home exercise program and splint use with weekly telephone calls.

MT Group

In addition to the patient education and home exercises, the MT group received a manual therapy program applied as 2 sessions of 45 mins each week for 4 weeks (total 8 sessions) by a physiotherapist (SDÖ). Each patient received the therapy at the same time on the same days each week. Soft tissue and joint mobilizations were applied to the TMJ and surrounding structures and to cervical segments, trigger point treatment was applied to trigger points, and myofascial loosening was performed (14). Under caudal traction of the mediolateral and anterior gliding mobilizations, post-isometric relaxation (PIR), suboccipital loosening, and fascia mandibularis myofascial release were applied (4-8). Patients were instructed to perform the

Table 1. Demographic Data of Patients

		MT Group (n=15) X ±SD	ST Group (n=14) X ±SD	z	p
Age (years)		29±9.57	27.79±7.60	-0.197	0.844
Education level (year)		13.33±2.55	11.86±3.06	-1.370	0.171
		N (%)	**N (%)**		
	No education	0 (0%)	0 (0%)		
	Primary school	1 (6.6%)	4 (28.5%)		
	High school	5 (33.3%)	4 (28.5%)		
	Further Education	0 (0%)	0 (0%)		
	University	8 (53.3%)	6 (40%)		
Marital status	**Married**	6 (40%)	8 (57.14%)		
	Single	9 (60%)	6 (42.85%)		
	Divorced	0 (0%)	0 (0%)		
GIS problems	**Present**	9 (60%)	11 (78.57%)		
	Absent	6 (40%)	3 (21.42%)		
Allergy	**Present**	9 (60%)	7 (50%)		
	Absent	6 (40%)	7 (50%)		
Systemic Problems (DM, HT)	**Present**	1 (6.66%)	1 (7.14%)		
	Absent	14(93.33%)	13 (92.85%)		

p*<0.05; X: Mean, SD: Standard deviation, p: Mann-Whitney U test, GIS: Gastrointestinal System, DM: Diabetus Mellitus, HT: Hypertension, MT: Manual Therapy, ST: Splint Therapy

exercises learned in the home exercise program in 3 sets of 10 repetitions every day.

Splint Group

The patients in the ST group were given a static occlusal splint, and adjustments were made as necessary (15,16). All the patients in this group were instructed to use the splint when sleeping for a period of one month. Follow-up of the application was checked in weekly telephone calls.

Statistical Analysis

Differences in general characteristics (age, height, weight, education) between the two groups were analyzed using Fisher's exact test. The Mann-Whitney U test was applied to analyze the differences from baseline to post-treatment mean scores between the two groups. Within the groups, the baseline mean values were compared with the mean values after the treatment using the Wilcoxon test. All statistical analysis was performed using SPSS ver. 21.0 software (SPSS Inc., Chicago, IL, USA). Statistical significance was defined as a p-value <0.05.

RESULTS

The demographic and clinical characteristics of the patients in the MT and ST groups are shown in Table 1. The evaluation was made of 29 patients with a mean age of 28.41±8.58 years (range, 18-47 years).

Symptoms decreased in both groups after treatment, with a greater improvement observed in the MT group. Before treatment, the pain severity values of both groups were similar (p>0.05). After treatment, the VAS values of both the MT and the ST group were determined to decrease significantly (p<0.05), with a significant decrease in the MT group than in the ST group (p<0.05) (Table 2).

In comparing the pre-and post-treatment TMJ ROM values, an increase was seen in all the measurements in both groups (p<0.05). Before treatment, the ROM measurements in both groups were similar (p>0.05). After treatment, a difference was seen between the groups, and the increase in the MT group was determined to be more significant (p<0.05). In the comparisons between the groups of the pre-and post-treatment JFLS and PSQI val-

Table 2. Comparison of the Pain Values pre and post Treatment and Between the Groups

VAS (0-10 cm)	Groups	Pre-treatment X ± SD	Post-treatment X ± SD	p^a	p^b
Jaw pain on waking in the morning	**MT**	4.87 ±1.60	1.40 ±1.18	0.001*	0.000*
	ST	5.43 ±1.60	3.79 ±1.12	0.001*	
Jaw pain when eating	**MT**	5.07 ±1.44	1.33 ±0.90	0.001*	0.000*
	ST	4.64 ±1.01	3.50 ±0.76	0.003*	
Jaw pain after eating	**MT**	4.71 ±0.99	1.00 ±1.07	0.001*	0.000*
	ST	4.00 ±1.11	3.50 ±1.09	0.038*	
Jaw pain at night	**MT**	4.27 ±1.71	0.80 ±0.94	0.001*	0.000*
	ST	3.71 ±1.82	3.07 ±1.44	0.007*	
Headache on waking in the morning	**MT**	5.64 ±1.22	1.60 ±1.24	0.001*	0.000*
	ST	5.14 ±1.29	4.64 ±1.22	0.020*	

p*<0.05, X: Mean, SD: Standard Deviation, MT: Manual Therapy, ST: Splint Therapy, p^a: Within-group differences; p^b: Inter-group differences

ues, there was seen to be a significant decrease in the scores of both scales (p<0.05). After treatment, the decrease in the scores of both scales was determined to be significant in the MT group (p<0.05) (Table 3).

At the end of the treatment period, the level of satisfaction of the patients with the treatment applied was evaluated with the patient satisfaction questionnaire. There was determined to be a significant difference between the groups in respect of the mean general satisfaction, interpersonal attitude, healthcare services, and general satisfaction total points (p<0.05), and the difference was due to the higher scores of the MT group patients compared to the ST group (Table 4).

Table 3. Comparison of the Range of Motion, Jaw Functionality and Sleep Quality Values pre and post-Treatment and Between the Groups

	Group	Pre-treatment X ± SD	Post-treatment X ± SD	p^a	p^b
TMJ ROM Maximal mouth opening (cm)	**MT**	3.47±0.33	4.85±0.39	0.001*	0.000*
	ST	3.64±0.54	3.89±0.48	0.001*	
Right lateralisation (cm)	**MT**	1.03±0.39	1.55±0.40	0.001*	0.006*
	ST	1.11±0.33	1.01±0.31	0.002*	
Left lateralisation (cm)	**MT**	0.96±0.35	1.40±0.40	0.001*	0.009*
	ST	0.98±0.35	0.98±0.35	0.001*	
Protrusion (cm)	**MT**	0.47±0.23	0.83±0.29	0.001*	0.023*
	ST	0.49±0.27	0.59±0.27	0.020*	
JFLS	**MT**	49.47±20.60	20.00±14.20	0.001*	0.001*
	ST	65.57±27.64	55.50±27.96	0.001*	0.001*
PSQI	**MT**	7.93±2.25	5.20±1.57	0.001*	0.001*
	ST	7.07±1.94	6.43±1.83	0.014*	0.040*

p*<0.05, X: Mean, SD: Standard Deviation, MT: Manual Therapy, ST: Splint Therapy, TMJ: Temporomandibular Joint, JFLS: Jaw Functional Limitation Scale, PSKI: Pittsburgh Sleep Quality Index, p^a: Within-group differences; p^b: Inter-group differences

Table 4. Comparison Between the Groups of the Patient Satisfaction Questionnaire Results

PATIENT SATİSFACTION QUESTIONNAIRE	MT Group (n=15) (X±SD)	ST Group (n=14) (X±SD)	z	p
General satisfaction	4.63±0.23	3.61±0.49	-4.550	0.000*
Technical quality	4.50±0.50	4.30±0.52	-1.292	0.196
Interpersonal attitude	4.90±0.28	4.64±0.36	-2.288	0.022*
Communication	4.63±0.35	4.43±0.33	-1.578	0.115
Financial dimensions	4.35±0.72	4.32±0.72	-0.138	0.890
Healthcare services	4.47±0.35	3.89±0.68	-2.550	0.011*
Accessibility and comfort	3.83±0.51	3.82±0.70	-0.404	0.686
General total	80.07±4.82	74.07±6.56	-2.536	0.011*

p*<0.05, X: Mean, SD: Standard Deviation, p: Mann Whitney U test, MT: Manual Therapy, ST: Splint Therapy

DISCUSSION

In this study of female patients diagnosed with M-TMD accompanied by bruxism, the effect was evaluated of the administration of a comprehensive MT program including jaw joint and cervical region joint and soft tissue mobilizations together with patient education and a home exercise program, on parameters such as pain, TMJ ROM, jaw function, sleep quality, and patient satisfaction. The improvements in both groups after treatment compared to pre-treatment were found to be significant. In the comparisons between the groups, the difference was seen to be statistically significant in favor of the MT group. The hypothesis of this study was that manual therapy in myofascial TMD accompanied by bruxism would be effective on pain and sleep quality. When the pre-and post-treatment values were compared, this hypothesis was confirmed.

Although the prevalence of bruxism in the general population varies, the frequency and severity of its accompanying TMD are seen more in females than males. There is a greater tendency for females to seek treatment compared to males (17-19). In our study, the highest incidence of bruxism is seen between the ages of 20-50 years, after which this parafunctional habit gradually decreases (3). All the patients who presented at the clinic and met the study inclusion criteria were female. Patients were selected in the age range of 18-50 years, and the mean age of the 29 study subjects was 28.41 years. In this context, the current study is in parallel with the literature in respect of age and gender.

The most evident clinical symptom in TMD patients is pain in the TMJ region or the chewing muscles, or both, followed by joint limitation when opening the mouth (1). Moreover, cervical region structures are often associated with TMD because of direct or indirect anatomical, biomechanical, and neurophysiological links, and they affect each other (20-23). Previous studies have agreed on the subject that symptoms arising from cervical segments can be directed to the stomatognathic region through the trigeminocervical core pathway (20,21).

Occlusal splints are generally often preferred by dentists for the treatment of patients with bruxism and TMD (24-26). With increased parafunctional activity with oral splints, it is aimed to achieve muscle relaxation, and break teeth clenching habits while protecting the teeth and jaws, to normalize periodontal ligament proprioception using a splint to spread the forces applied to the individual teeth, especially when clenching and grinding can lead to damage, and reposition jaws and condyles within a central relationship. However, in the results of current literature, the debate continues between dentists on the subject of the efficacy of oral splints, the effect mechanism, and whether or not they are appropriate in the treatment of painful TMD. There has not been shown to be any beneficial effect in short-term or long-term follow-up (24,25).

Kraus et al. (23) examined the characteristics of

511 patients referred to physiotherapy for the determination of diagnostic sub-clusters of TMD and to assist in the clinical decision-making in the management of TMD. The study emphasized that oral splinting is the primary conservative method presented by dentists for cases with pain originating from the chewing muscles and the TMJ. The study concluded that it would be more appropriate for dentists to consult a physiotherapist when there is no clear indication for oral splint therapy in patients with suspected cervical spine disorder and to postpone the use of splinting until a response is obtained from physical therapy (23). In our study, patients in the ST group showed resistance to regular use of splints. Despite telephone calls every week and emphasizing the need to use the splint regularly, some patients did not wish to use the splint and terminated the treatment.

In a recent systematic review, insufficient evidence was found to confirm the use of occlusal splints in the treatment of bruxism (16). That systematic examination showed that the data were insufficient to confirm the efficacy of occlusal splints in the treatment of bruxism compared with an untreated group, the use of other intra-oral devices, TENS, cognitive-behavioral treatment, or pharmacological treatments.

There are very few studies in the literature that have compared exercise therapy and splint therapy. In a study by Michelotti et al., the short-term effects were evaluated patient education versus occlusal splint in the treatment of myofascial pain of the TMJ, and it was reported that the use of the splint together with patient education was more effective in reducing pain than the splint without education (27). In another study, the effects of splinting and conservative physiotherapy on pain and joint ROM were examined in TMD cases, with a splint used by the control group and muscle stretching exercises applied twice a week for 6 weeks to the study group. From the results of the study, it was reported that conservative physiotherapy could be a better initial treatment than splinting for reducing pain and increasing joint ROM in myogenic TMD cases (28).

Only one study could be found in the literature that has compared splint therapy with MT. Espi-Lopez et al. separated 16 patients with TMD into two groups, applying MT and ST to one group and ST only to the other. At the end of 4 weeks, the clinical improvement and decrease in pain were found to be significantly greater in the study group with combined therapies (9). This was similar to the current study, but in this case, the MT and ST were compared in isolation, and pain evaluated at 5 different times showed a decrease after treatment in both groups. The decrease in the pain severity values was seen to be significant in the MT group than in the ST group. When considering what would be a clinically meaningful reduction in pain, Farrar et al. (29) determined that a 30% decrease in pain would make a clinically relevant difference in patients with chronic pain. At all the 5 time points in the current study, a clinically significant difference was determined in the VAS values of the MT group.

Dias et al. evaluated the degenerative changes in the TMJ of patients with sleep bruxism, and to investigate the relationship between these and sleep quality, and the PSQI was applied. There was reported to be a significant drop in the sleep quality of the patients (30). In the current study, the sleep quality was evaluated with the PSQI, and consistent with the literature, a large proportion of the patients were seen to have sleep problems. A decrease in the PSQI scores was determined after treatment in both groups, and when the groups were compared, the decrease was significantly greater in the MT group.

After completion of the treatment in the current study, patient satisfaction was measured with the PSQ-18. The results demonstrated that the mean general satisfaction, interpersonal attitude, healthcare services, and general satisfaction total points were significantly higher in the MT group. The reason for this could have been that the physiotherapist spent more time face-to-face with the patients in the MT group, and because the nature of manual treatment requires touching the patient, the patient can comfortably express their problems throughout the session and feels valued by the allocation of time, which increases the level of satisfaction and is thought to have a psychological effect on the reduction of pain. According to the statements of the patients in the ST group, the score was seen to be affected by factors such as

the use of the splint was not practical, there was a fear of swallowing it during the night, and the healthcare personnel only spent a short time with them.

There were some limitations to this study. The planned number of patients could not be reached in the splint group as some patients did not want to use the splint for reasons such as fear of swallowing it, jaw fatigue, and difficulty sleeping at night, and therefore requested to leave the study before completion of the treatment period. The lack of a blind evaluator is another limitation. Other limitations were that regular use of the splint was based only on patient statements, only short-term results were examined as both treatments were only applied for 4 weeks, and therefore the long-term effects could not be evaluated. There is a need for the further blind, long-term studies, and comparisons.

CONCLUSION

In conclusion, both treatments applied in this study to patients with M-TMD accompanied by bruxism were seen to be effective. In the comparisons between the groups, manual therapy was determined to be significantly motre effective than splint therapy in decreasing the severity of pain, increasing TMJ ROM and jaw functionality, and improving sleep quality. The patient satisfaction values of the MT group were also determined to be higher. Splints may help to prevent dental damage in patients with M-TMD accompanied by bruxism. Therefore, it can be considered that the application of splints at the same time as manual therapy and exercises could increase the treatment efficacy, and this combination can be recommended.

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Informed Consent: A written informed consent form was obtained from all participants.

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