DOI: http://doi.org/10.54617/adoklinikbilimler.1507819

Original Research Article

Analyzing the Relationship Between Primary Complaint, Diagnosis, and Treatment in Patients With Temporomandibular Joint Disorders

Temporomandibular Eklem Bozukluğu Olan Hastalarda Birincil Şikayet, Tanı ve Tedavi Arasındaki İlişkinin İncelenmesi

Merve Çakır[1], Gül Merve Yalçın Ülker[1]

ABSTRACT

Aim: This study aimed to assess complaints of the patients with temporomandibular joint disorder (TMD) and diagnoses according to Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) criteria and evaluate the effectiveness of the treatment.

Material and Method: The clinical examinations of the patients with complaints of TMD were performed according to the internationally accepted Turkish version of the DC/TMD guideline. Patients' complaints, symptoms, visual analog scale (VAS) scores and diagnosis were recorded. Patients were classified into three groups: Group A, patients with pain-related TMD; Group B, patients with intra-articular TMD; and Group A-B, patients with both pain-related TMDs and intra-articular TMD. Patients received various treatments according to their examination and diagnosis. In the follow-up sessions after treatment, patients' remaining complaints and VAS scores were recorded. Descriptive statistics were performed to analyze relationship of the primary complaint, diagnose and the treatment effectiveness.

Results: The study included 127 patients (105 women and 22 men, mean age 34.5±11.2). 55 patients were in Group A, 14 patients in Group B, and 56 patients in Group A-B. Two patients were classified as 'undefined'. A statistically significant result ($p = 0.001$) was found when comparing complaints in diagnostic groups. Pain complaints were more frequent in group A, while complaints of TMJ sounds were less common in group A compared to other groups. In the relationship between treatment and diagnostic group, a statistically significant difference was found ($p<0.001$); pharmacotherapy was applied more frequently in groups A and A-B than in group B. It was determined that occlusal splint treatment differed between groups A and B. There was no significant difference between the median values of the difference in VAS scores according to the number of treatments applied. A decrease in VAS scores was observed as a result of the treatments applied.

Conclusion: For the most appropriate treatment of TMD, the complaints of the patients must first be clearly understood.

Keywords: Temporomandibular joint disorders; TMD diagnosis, TMD treatment

ÖZET

Amaç: Bu çalışmanın amacı; temporomandibular eklem düzensizliği (TMD) olan hastaların şikayetlerini ve Temporomandibular Düzensizliklerin Tanısal Kriterleri (TMD/TK) klavuzuna göre tanı alan hastaların tanılarını değerlendirmek ve tedavilerin etkinliğini değerlendirmektir.

Gereç ve Yöntem: TMD şikayeti olan hastaların klinik muayeneleri TMD/TK kılavuzunun uluslararası kabul görmüş Türkçe versiyonuna göre yapılmıştır. Hastaların şikayetleri, semptomları, VAS skorları ve tanıları kaydedilmiş ve hastalar üç gruba ayrılmıştır: Grup A, ağrıya bağlı TMD hastaları; Grup B, eklem içi TMD'li hastalar ve Grup A-B, hem ağrıyla ilişkili TMD'leri hem de eklem içi TMD'si olan hastalar. Hastalara muayene ve tanılarına göre çeşitli tedaviler uygulanmıştır. Tedavi sonrası takip seanslarında hastaların kalan şikayetleri ve VAS skorları kaydedilmiş, birincil şikayet, tanı ve tedavi etkinliği arasındaki ilişkiyi analiz etmek için tanımlayıcı istatistiksel değerlendirmeler yapılmıştır.

Bulgular: Çalışmaya 127 hasta (105 kadın ve 22 erkek, ortalama yaş 34.5±11.2) dahil edilmiştir. Grup A'da 55 hasta, Grup B'de 14 hasta ve Grup A-B'de 56 hasta bulunurken, iki hasta 'tanımsız' olarak sınıflandırılmıştır. Şikayetlerin tanı grupları ile karşılaştırılmasında istatistiksel olarak anlamlı bir sonuç ($p=0.001$) bulunmuştur. Grup A'da ağrı şikayeti daha sık görülürken, temporomandibular eklemde ses şikayeti grup A'da diğer gruplara göre daha az görülmüştür. Tedavi ve tanı grubu arasındaki ilişkide istatistiksel olarak anlamlı fark bulunmuştur ($p<0.001$); farmakoterapi A ve A-B gruplarında B grubuna göre daha sık uygulanmışken, okluzal splint tedavisinin A ve B grupları arasında farklılık gösterdiği belirlenmiştir. Tedavi sayısına göre VAS skorları arasındaki farkın medyan değerleri arasında anlamlı fark bulunmazken, uygulanan tedaviler sonucunda VAS skorlarında azalma gözlenmiştir.

Sonuç: TMD'nin en uygun tedavisi için öncelikle hastaların şikayetlerinin net olarak anlaşılması gerekmektedir.

Anahtar Kelimeler: Temporomandibular eklem düzensizliği; TMD diagnozu; TMD tedavisi

Makale gönderiliş tarihi: 01.07.2024; Yayına kabul tarihi: 16.11.2024

İletişim: Dr. Merve Çakır
İstanbul Okan Üniversitesi Diş Hekimliği Fakültesi Hastanesi, Tuzla-Istanbul-Türkiye
E-mail: dtmervecakir@gmail.com
[1] Istanbul Okan University Faculty of Dentistry Department of Oral and Maxillofacial Surgery, Istanbul, Türkiye

INTRODUCTION

Temporomandibular disorders (TMD) include a range of clinical conditions that affect the temporomandibular joint (TMJ), masticatory muscles, and related tissues, presenting primarily as localized pain and restricted jaw movement. This type of disorder is a distinct subgroup of musculoskeletal and rheumatic disorders and is the main cause of non-odontogenic orofacial pain.[1] TMD affects 8–15% of the adult population and is more common in women than men.[2] Some studies have suggested that men and women are equally affected, but women are more likely to seek treatment.[3] The risk of TMD increases with age, with the highest prevalence between approximately 35 and 45 years old.[2] TMD is also a societal issue that can be exacerbated by a faster-paced lifestyle, constant stress, and improper masticatory function.[4]

Symptoms of TMDs include chronic orofacial pain, muscular tenderness in the jaw area, pain during jaw motions, restricted jaw movements, and joint sounds like clicking or crepitation.[5] Additional symptoms such as neck pain, ear-related disorders (such as tinnitus and hearing problems), and headaches can often be related to TMD. Studies of TMD indicate an increased risk of psychological disorders such as depression, anxiety, social phobia, poor self-confidence, and difficulty concentrating.[6]

Many facets of the etiology, diagnosis, and optimal treatment of TMDs are still unclear. There is a need for a more comprehensive investigation of the epidemiology of TMD using standardized classification systems. In 2014, the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) was developed. The guide's main feature is the use of biaxial tests, which provide diagnoses based on both physical and psychosocial/behavioral factors.[7] The modern diagnosis of TMD should be established using the DC/TMD examination protocol, as appropriate treatment is only feasible with the correct diagnosis.[4]

It is advised to record the information using the patient's language and provide a comprehensive description.[8] The patient's principal complaint is of particular clinical importance in TMD, and is typically pain; prevalence varies from 13 to 59% according to previous studies. The significance of the primary concern in initiating and guiding subsequent diagnostic and therapeutic interventions is demonstrated by Dimitroulis *et al*.,[9] who stated that "the clinician's responsibility is to establish a diagnosis based on the information provided by the patient and develop a treatment strategy that effectively addresses the patient's primary presenting symptoms."

There are many treatment options for TMD because of the wide variety of conditions that are associated with it. These include pharmacotherapy, manual therapy, physical therapy, occlusal splints, arthrocentesis, intra-articular injections, and surgical interventions.[1,5] Pain reduction, functional improvement, and increasing quality of life are the primary objectives of TMD treatment.[10] At first instance, conservative and reversible treatment options are advised; these can provide relief in over 90% of cases.[5,11]

Various pharmacological agents are used for TMD pain management. These include analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, opioids, corticosteroids, and anticonvulsants.[11] Occlusal splint therapy is used to reduce pain and the strain on the TMJ, relax the muscles, support regenerative processes in the joint, and increase the extent of mouth opening.[1,4] Manual therapy can also be used to restore range of motion and to reduce pain and local ischemia.[5]

When conservative treatment modalities are not sufficient, minimally invasive choices such as arthrocentesis and intra-articular injections can be used. Arthrocentesis removes inflammatory mediators and degradation products. Corticosteroids and sodium hyaluronate can be used for intra-articular injections.[1,4]

Estimations of the need for TMD treatment in the general population vary, leading to differences in the prevalence of TMD across studies.[12] In this study, our aim was to assess the complaints and diagnoses of patients diagnosed according to DC/TMD criteria and to evaluate the effectiveness of the treatment methods applied.

MATERIALS AND METHOD

This retrospective study included patients who were referred to the Oral and Maxillofacial Surgery Clinic of İstanbul Okan University Faculty of Dentistry Hospital between 2018 and 2020 with a diagnosis of TMD and received one or more treatment modalities.

The research was approved by the İstanbul Okan University Ethics Committee with decision number 170-7.

The inclusion criterias for the study were: patients over the age of 18 with complaints of TMD symptoms including pain, joint noise, or restricted movement, and who received treatment for TMD in the relevant clinic. Exclusion criteria were: patients with signs or symptoms of systemic diseases that could potentially be related to TMD (like polyarthritis, rheumatoid arthritis, fibromyalgia), those who were examined but did not continue their treatment, and those who were under 18.

The clinical examination and anamnestic data collection were performed by trained investigators experienced in TMD management and followed the internationally accepted Turkish version of the DC/TMD guideline.[13] A form was filled out for each patient; the anamnestic section of this form included the main and secondary complaints, the patients' subjective assessment of their pain levels, and their dental and medical history. The form also included information about pain characteristics, symptoms experienced since the pain started (such as earache, decreased mouth opening, and weakness in the masticatory muscles), headache and its characteristics, the presence of joint noises, history of locking or trauma in the orofacial region, conscious oral habits (such as clenching, nail biting, gum chewing, and putting the phone between the ears and shoulder), sleep and diet patterns, and any previous treatments. Pain intensity was determined by a visual analog scale (VAS) from 1 to 10. Clinical assessments involved evaluating pain location, palpation pain, jaw mobility, movement-related pain, and TMJ sounds. Panoramic radiographs were performed for all patients. Cone-beam computed tomography (CBCT) was prescribed if there was any doubt about TMJ pathology or degenerative joint disease. Magnetic resonance images (MRI) were requested if there was persistent pain, prolonged restriction in mouth opening, or suspicion of degenerative TMD. In the follow-up sessions after treatment, patients' remaining complaints and VAS scores were recorded.

Patients were classified into three groups: Group A, patients with pain-related TMD; Group B, patients with intra-articular TMD; and Group A-B, patients with both pain-related TMDs and intra-articular TMD. Patients complaining of acute pain were initially administered medication and then re-examined to avoid intense discomfort masking accurate diagnosis.

Patients received various treatments according to their examination and diagnosis, including pharmacotherapy, occlusal splint, arthrocentesis, botox, or low-level laser therapies according to their examination and diagnosis. Treatments were given either alone or in different combinations.

Statistical analysis

Data were analyzed in IBM SPSS V23 (SPSS, Chicago, IL, USA). The normality of the data was examined using the Kolmogorov Smirnov and Shapiro Wilk tests and the Kruskal-Wallis H test was used to compare medians of skewed data. Bonferroni correction was used to compare quantitative data across multiple responses. Pearson's Chi-Squared test was used to compare categorical data according to groups, and multiple comparisons of proportions were examined with the Bonferroni corrected Z test. Results are presented as mean ± standard deviation and median (minimum–maximum), and the significance level is taken as $p<0.05$. Due to the presence of undefined values in the classification parameter, it was not included in the analysis.

RESULTS

The study included 127 patients (105 women and 22 men) who received treatment at the relevant clinic and attended follow-up sessions, out of 218 individuals who applied and were examined with complaints of TMD in 2018–2020. The mean age of the patients was 34.5± 11.2.

The complaints of 127 patients, their classification according to DC/TMD, and the treatments applied are presented in detail in Table 1.

Following examination based on the DC/TMD guideline, 55 patients were diagnosed with pain-related TMD (Group A), 14 patients with intra-articular TMD (Group B), and 56 patients with both pain-related TMD and intra-articular TMD (Group A-B). Two patients were classified as 'undefined' because they could not be diagnosed according to the guideline criteria.

Table 1. Descriptive statistics

	Frequency	Percentage
Gender		
Male	22	17.3
Female	105	82.7
Classification		
A	55	43.3
A-B	56	44.1
B	14	11
Undefined	2	1.6
Number of treatments		
1	87	68.5
2	30	23.6
3 and more	10	7.9
Treatment combinations		
Arthrocentesis	3	2.4
Arthrocentesis + Botox	1	0.8
Arthrocentesis + Laser	1	0.8
Botox	4	3.1
Pharmacotherapy	50	39.4
Pharmacotherapy + Arthrocentesis	2	1.6
Pharmacotherapy + Arthrocentesis + Botox	1	0.8
Pharmacotherapy + Botox	2	1.6
Pharmacotherapy + Occlusal splint	12	9.4
Pharmacotherapy + Occlusal splint + Arthrocentesis	7	5.5
Pharmacotherapy + Occlusal splint + Arthrocentesis + Laser	1	0.8
Occlusal splint	30	23.6
Occlusal splint + Arthrocentesis	8	6.3
Occlusal splint + Arthrocentesis + Laser	1	0.8
Occlusal splint + Botox	4	3.1
Magnetic resonance imaging		
Yes	14	11
No	113	89
Complaints ~		
Pain	98	77.8
Arthralgia	14	11.1
Joint noises	50	39.7
Sensation of sticking in the joint	1	0.8
Restriction in the mouth opening	19	15.1
Jaw lock	6	4.8
Bruxism	6	4.8
Sliding sensation in the jaw	2	1.6
Subluxation	2	1.6
Earache	8	6.3
Tinnitus	2	1.6
Treatments~		
Pharmacotherapy	75	59.1
Occlusal splint	63	49.6
Arthrocentesis	25	19.7
Laser	3	2.4
Botox	12	9.4
	Mean±S.Deviation	Median (Min-Max)
Age	34.5 ± 11.15	32 (18 - 75)
VAS before treatment	6.32 ± 2.84	7 (0 - 10)
VAS after treatment	2.89 ± 2.37	3 (0 - 10)

~ multiple response

A statistically significant result (p = 0.001) was found when comparing complaints in diagnostic groups. Pain complaints were more frequent in group A than in group B, while complaints of TMJ sounds were less common in group A compared to other groups (Table 2).

The relationship between treatment and diagnostic group was investigated and a statistically significant difference was found (p<0.001); pharmacotherapy was applied more frequently in groups A and A-B than in group B. It was determined that occlusal splint treatment differed between groups A and B (Table 2).

To evaluate the effectiveness of treatment options, VAS values at the beginning and end of treatment were examined; however, since the distribution of treatment combinations was not appropriate, a statistical comparison could not be made. There was no significant difference between the median values of the difference in VAS scores according to the number of treatments applied (single treatment or combination of treatments; p = 0.252). There was no statistically significant difference between the mean values for the difference in VAS scores according to treatments (p>0.05); however, a decrease in VAS scores was observed as a result of the treatments applied.

Table 2. Comparison of categorical parameters by classification

	Classification n (%)			
	A	**A-B**	**B**	**p***
Complaints ~				
Pain	45 (83.3)[a]	44 (78.6)[ab]	7 (50)[b]	
Arthralgia	2 (3.7)	12 (21.4)	0 (0)	
Joint noises	13 (24.1)[a]	27 (48.2)[b]	10 (71.4)[b]	
Sensation of sticking in the joint	0 (0)	1 (1.8)	0 (0)	
Restriction in the mouth opening	5 (9.3)	9 (16.1)	4 (28.6)	
Jaw lock	2 (3.7)	3 (5.4)	1 (7.1)	0.001
Bruxism	4 (7.4)	0 (0)	1 (7.1)	
Sliding sensation in the jaw	1 (1.9)	1 (1.8)	0 (0)	
Subluxation	0 (0)	2 (3.6)	0 (0)	
Earache	5 (9.3)	3 (5.4)	0 (0)	
Tinnitus	1 (1.9)	0 (0)	1 (7.1)	
Treatments~				
Pharmacotherapy	36 (65.5)[a]	36 (64.3)[a]	3 (21.4)[b]	
Occlusal splint	20 (36.4)[a]	29 (51.8)[ab]	12 (85.7)[b]	
Arthrocentesis	0 (0)	19 (33.9)	6 (42.9)	<0.001
Laser	0 (0)	3 (5.4)	0 (0)	
Botox	8 (14.5)	3 (5.4)	0 (0)	

~ multiple responses; * Pearson Chi-Squared test; [a-b]: There is no difference between groups with the same letter.

DISCUSSION

TMD is a challenging issue to handle. This term refers to a group of conditions affecting the structure and/or function of the masticatory system. Patients suspected of having TMD typically present to the clinician with a large number of signs and symptoms, including pain and various issues affecting structures in the head, neck, upper quadrant, central nervous system, and musculoskeletal system. This leads to confusion and an unclear definition of what comprises TMD.[14] According to Greene & Marbach[15] and Carlsson[16], standardizing TMD studies is challenging due to the frequent comparison of studies with different experimental designs. For example, studies that utilize questionnaires are often compared to those that rely on clinical examinations. This has complicated diagnosis, treatment, and patient care.[17] Effective treatment of TMDs requires a comprehensive diagnostic procedure that considers

both the symptoms and the underlying cause of the disorder.[12] This study aimed to match the complaints, diagnoses, and efficacy of administered treatment methods. The primary aim was to improve the patient's quality of life by relieving pain. Depending on the complaints, symptoms, and clinical findings, treatments such as medication, physical therapy, occlusal splint application, and arthrocentesis were preferred together or alone.

In a study profiling symptomatic TMD patients, pain was the most common complaint.[14] In this study, pain, TMJ noises, and restricted mouth opening were the most commonly recorded complaints, consistent with studies by Yekkelam *et al*.,[12] Bagis *et al*.,[17] Progiante *et al*.,[18] and Zhang *et al*.[19] Some previous studies have specified location and type of pain; according to these reports, pain was also the most common TMD symptom, though its location varied.[14,17]

As expected, in this sample, pain was the most common complaint of the patients with pain-related TMDs. For patients who were diagnosed with intra-articular TMD, the chief complaint was TMJ sounds with or without pain. The data presented indicate pain as the main complaint. Random sampling studies[20,21] have shown that the most frequent complaint of people with TMD was joint noise, while others[14,22] that focus on people with TMD, have reported pain as the most common complaint. These results are consistent with the findings of this study, which investigated patients with TMD.

In the literature, it has been stated that several factors predispose TMD.[2] Gender and age are two of the main factors.[2,3] TMD is reportedly more common in females than males due to hormonal, emotional, postural, and functional factors.[3,17] TMD is observed over a large age range and is most common in adolescents and middle-aged individuals. The reason may be the increased levels of stress during these life periods.[2,17] In this study, approximately 80% of the patients were female, and most were middle-aged, consistent with previous studies.

The signs and symptoms of patients are the most important factor in diagnosing TMD. Pain is the main complaint in most patients with TMD, but acute inflammatory pain can make it difficult to accurately diagnose the patient.[4] Persistent pain is one of the symptoms of intra-articular TMDs[4], so in this study to differentiate acute inflammatory pain and persistent pain, non-steroidal anti-inflammatory drugs were prescribed for two weeks and then patients were re-examined for an exact diagnosis. Most patients included in the study had pain-related TMD, followed by patients with pain-related and intra-articular TMD together. In some studies[14,23], disc displacement with reduction was the most common DC/TMD diagnosis; in others[24,25], consistent with our results, pain-related TMD was the most common.

The primary objective of TMD treatment is to reduce pain, improve functionality, and improve quality of life for patients. According to the literature, reversible treatment options should be prioritized before minimally invasive treatments and non-reversible treatments are considered.[10] The treatment options in this study were determined following this guidance.

In this study, patients who had pain were first treated with pharmacotherapy including NSAIDs and muscle relaxants (if necessary) for two weeks. The effectiveness of NSAID use alone is reported in the literature, citing positive effects on inflammation and pain management; at least two weeks of treatment is required to be effective.[11]

According to the literature, manual therapy is another useful treatment method for TMD.[5,26] Manual therapy has been applied to restore a normal range of motion, minimize local ischemia, improve proprioception, dissolve fibrous adhesions, increase synovial fluid production, and reduce pain.[5] Van Grootel *et al*.,[26] state that manual therapy may be preferable as a first treatment choice in the management of pain-related symptoms. In the present study, manual therapy and exercises were recommended at the initial visit for patients who had muscle spasms, pain, and restriction in TMJ movement.

Occlusal splints are used to restore neuromuscular balance, reduce excessive loading of the joint, provide centric occlusion, eliminate posterior interference, reposition the condyles, and relax the muscles.[5,27] Occlusal splints can be used in the treatment of all TMDs, with the most important factor being the use of the correct splint. Studies have shown that occlusal splint therapy is a useful treatment method but requires long-term usage.[4,28] In our study, occlusal splint was the preferred treatment option for patients

with bruxism and/or intra-articular TMD, with patients advised to use the splint for at least six months.

When conservative treatment options are not sufficient, arthrocentesis is the first choice of non-reversible treatment method for TMDs. Arthrocentesis removes degradation products and inflammatory mediators, and patients see the effects rapidly.[4,10,29] According to Nitzan[30], the main reason for joint problems is increased friction at bone surfaces, resulting from a decrease in synovial fluid. By performing arthrocentesis, the adaptive power of the joint is restored, restoring the lubrication mechanism and eliminating the main problem. With arthrocentesis, medications including hyaluronic acid, corticosteroids, analgesics, and platelet-rich plasma can be injected into joint space. It has been determined that arthrocentesis combined with occlusal splint therapy is more effective than splint-only therapy.[4,29] In this study, patients whose intra-articular degeneration was confirmed by MRI, arthrocentesis was performed immediately or after the use of an occlusal splint, depending on symptoms. For patients who underwent immediate arthrocentesis, an occlusal splint was used afterward.

It has been previously demonstrated that VAS is an effective tool for measuring pain in adults[11], here, the effectiveness of treatment was evaluated using VAS scores. However, as the distribution of treatment combinations was not appropriate, a statistical comparison could not be made. In all treatment modalities, VAS scores showed improvement at the end of the treatment, consistent with reports in the literature.[1,4,5]

The main limitations of this study were a variety of post-operative periods between patients; the small number of patients with different diagnoses; and the lack of appropriate comparison for assessing treatment combinations.

CONCLUSION

TMD is a difficult condition for both patients and clinicians, due to its complex, multifaceted nature. For the treatment of TMD, the complaints of the patients must first be clearly understood. This should be followed by detailed clinical and radiologic examination to ensure the selection of the most appropriate treatment technique.

ACKNOWLEDGEMENT

The authors report there are no competing interests to declare.

REFERENCES

1. Sousa BM, López-Valverde N, López-Valverde A, Caramelo F, Fraile JF, Payo JH, *et al*. Different Treatments in Patients with Temporomandibular Joint Disorders: A Comparative Randomized Study. Medicina 2020;56:113.

2. Valesan LF, Da-Cas CD, Réus JC, Denardin ACS, Garanhani RR, Bonotto D, *et al*. Prevalence of temporomandibular joint disorders: a systematic review and meta-analysis. Clin Oral Investig 2021;25:441-53.

3. Warren MP, Fried JL. Temporomandibular disorders and hormones in women. Cells Tissues Organs 2001;169:187-92.

4. Tatli U, Benlidayi ME, Ekren O, Salimov F. Comparison of the effectiveness of three different treatment methods for temporomandibular joint disc displacement without reduction. Int J Oral Maxillofac Surg 2017;46:603-9.

5. Melo RA, de Resende C, Rego CRF, Bispo ASL, Barbosa GAS, de Almeida EO. Conservative therapies to treat pain and anxiety associated with temporomandibular disorders: a randomized clinical trial. Int Dent J 2020;70:245-53.

6. Okeson JP. Management of temporomandibular disorders. 8th. edition Louis, Missouri: Elsevier Mosby; 2020.

7. Schiffman E, Ohrbach R, Truelove E, Look J, Anderson G, Goulet JP, *et al*. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications: recommendations of the International RDC/TMD Consortium Network* and Orofacial Pain Special Interest Groupdagger. J Oral Facial Pain Headache 2014;28:6-27.

8. Turp JC, Kowalski CJ, Stohler CS. Temporomandibular disorders--pain outside the head and face is rarely acknowledged in the chief complaint. J Prosthet Dent 1997;78:592-5.

9. Dimitroulis G, Dolwick MF, Gremillion HA. Temporomandibular disorders. 1. Clinical evaluation. Aust Dent J 1995;40:301-5.

10. Rodrigues ALP, Cardoso HJ, Angelo DF. Patient experience and satisfaction with different temporomandibular joint treatments: A retrospective study. J Craniomaxillofac Surg 2023;51:44-51.

11. Kulkarni S, Thambar S, Arora H. Evaluating the effectiveness of nonsteroidal anti-inflammatory drug(s) for relief of pain associated with temporomandibular joint disorders: A systematic review. Clin Exp Dent Res 2020;6:134-46.

12. Yekkalam N, Wanman A. Factors associated with clinical decision-making in relation to treatment need for temporomandibular disorders. Acta Odontol Scand 2016;74:134-41.

13. Ohrbach R ePS, Polat NT, Çetinoğlu A. Diagnostic Criteria for Temporomandibular Disorders:Assessment Instruments. Version 15May2016 Temporomandibuler Düzensizlikler için Tanı

Kriterleri: Değerlendirme Araçları: Turkish Version. Vol 2022. www.rdctmdinternational.org2016.

14. Pimenta e Silva Machado L, de Macedo Nery MB, de Gois Nery C, Leles CR. Profiling the clinical presentation of diagnostic characteristics of a sample of symptomatic TMD patients. BMC Oral Health 2012;12:26.

15. Greene CS, Marbach JJ. Epidemiologic studies of mandibular dysfunction: a critical review. J Prosthet Dent 1982;48:184-90.

16. Carlsson GE. Epidemiological studies of signs and symptoms of temporomandibular joint-pain-dysfunction. A literature review. Aust Prosthodont Soc Bull 1984;14:7-12.

17. Bagis B, Ayaz EA, Turgut S, Durkan R, Ozcan M. Gender difference in prevalence of signs and symptoms of temporomandibular joint disorders: a retrospective study on 243 consecutive patients. Int J Med Sci 2012;9:539-44.

18. Progiante PS, Pattussi MP, Lawrence HP, Goya S, Grossi PK, Grossi ML. Prevalence of Temporomandibular Disorders in an Adult Brazilian Community Population Using the Research Diagnostic Criteria (Axes I and II) for Temporomandibular Disorders (The Maringa Study). Int J Prosthodont 2015;28:600-09.

19. Zhang Q, Yuan S, Deng K, Li X, Liang Y, Wu A, *et al*. Correlation of patients' demographics and clinical symptoms with temporomandibular disorders. Cranio 2023;41:432-9.

20. Bonjardim LR, Gaviao MB, Pereira LJ, Castelo PM, Garcia RC. Signs and symptoms of temporomandibular disorders in adolescents. Braz Oral Res 2005;19:93-8.

21. Rauhala K, Oikarinen KS, Jarvelin MR, Raustia AM. Facial pain and temporomandibular disorders: an epidemiological study of the Northern Finland 1966 Birth Cohort. Cranio 2000;18:40-6.

22. Bonacci CE, Syrop SB, Gold N, Israel H. Temporomandibular/facial pain. An epidemiological report. N Y State Dent J 1992;58:30-3.

23. Vainionpaa R, Kinnunen T, Pesonen P, Laitala ML, Anttonen V, Sipila K. Prevalence of temporomandibular disorders (TMD) among Finnish prisoners: cross-sectional clinical study. Acta Odontol Scand 2019;77:264-8.

24. Alrashdan MS, Nuseir A, Al-Omiri MK. Prevalence and correlations of temporomandibular disorders in Northern Jordan using diagnostic criteria axis I. J Investig Clin Dent 2019;10:e12390.

25. Wieckiewicz M, Grychowska N, Nahajowski M, Hnitecka S, Kempiak K, Charemska K, *et al*. Prevalence and Overlaps of Headaches and Pain-Related Temporomandibular Disorders Among the Polish Urban Population. J Oral Facial Pain Headache 2020;34:31-9.

26. van Grootel RJ, Buchner R, Wismeijer D, van der Glas HW. Towards an optimal therapy strategy for myogenous TMD, physiotherapy compared with occlusal splint therapy in an RCT with therapy-and-patient-specific treatment durations. BMC Musculoskelet Disord 2017;18:76.

27. Incorvati C, Romeo A, Fabrizi A, Defila L, Vanti C, Gatto MRA, *et al*. Effectiveness of physical therapy in addition to occlusal splint in myogenic temporomandibular disorders: protocol of a randomised controlled trial. BMJ Open 2020;10:e038438.

28. Fricton J. Current evidence providing clarity in management of temporomandibular disorders: summary of a systematic review of randomized clinical trials for intra-oral appliances and occlusal therapies. J Evid Based Dent Pract 2006;6:48-52.

29. Machon V, Hirjak D, Lukas J. Therapy of the osteoarthritis of the temporomandibular joint. J Craniomaxillofac Surg 2011;39:127-30.

30. Nitzan DW. Arthrocentesis--incentives for using this minimally invasive approach for temporomandibular disorders. Oral Maxillofac Surg Clin North Am 2006;18:311-28.