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Original Article

Knowledge and Attitude Toward Temporomandibular Disorders: A Survey in İstanbul

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Main Points

- General dental practitioners in Istanbul consider occlusal splint therapy to be the most important treatment method in the rehabilitation of TMD patients.
- Contrary to the point of view in other countries, only one GDP (0.9%) referred the TMD patients to orthodontists.
- There is a consistency between the clinical approaches of GDPs in Istanbul to TMD patients and the consensus papers.

ABSTRACT

Objective: The aim of this study was to identify the strategies used for the diagnosis and treatment of patients with temporomandibular disorders (TMDs) by general dental practitioners (GDPs) in the city of Istanbul.

Methods: A total of 154 GDPs were assessed by a single examiner in this questionnaire-based study. Descriptive statistics were calculated for all variables, and the results were analyzed at a 95% CI and statistical power of 80% with the significance level set at $P < .05$.

Results: The most frequently employed strategies for obtaining a diagnosis were patients' medical history (33.1%), physical examination (37.7%), and a combination of diagnostic methods (29.2%). The most commonly referred specialties were prosthodontics (62.2%) and maxillofacial surgery (36.9%). All GDPs treated their TMD patients with occlusal splints, and the majority of the occlusal splints were hard occlusal splints (62.8%). Half of the GDPs considered the etiology of TMD to involve stress, whereas 49.4% believed that TMD is of a multifactorial etiology.

Conclusion: The GDPs clarified that TMD patients were mostly treated with occlusal splints and this datum is consistent with the suggestions of previous consensus papers.

Keywords: Temporomandibular joint disorders, dentist practice patterns, health-care surveys

INTRODUCTION

The American Association for Dental Research (AADR) approved a statement about temporomandibular disorders (TMDs) in 2010 and explained that "TMDs encompass a group of musculoskeletal and neuromuscular conditions that involve the temporomandibular joints (TMJs), the masticatory muscles, and all associated tissues."[1] General dental practitioners (GDPs) are responsible for the diagnosis and management of TMD and associated structures.[2,3] To achieve better treatment results, GDPs should consider and understand the diagnostic strategies, treatment plans, and possible outcomes of TMDs. Numerous scientific papers have been published on evidence-based diagnosis and treatment strategies, and consensus papers have been published on TMD.[1,4-7]

Two consensus statements have been published by the European Academy of Craniomandibular Disorders and the AADR that provide guidelines and recommendations on the examination, diagnosis, and management of patients with TMD for GDPs.[1,4] Both statements recommend that the primary management of TMD should be

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based on conservative therapeutic modalities. The AADR statement also states that "many of the conservative modalities have proven to be at least as effective in providing symptomatic relief as most forms of invasive treatment."[1]

One of the most controversial topics in the field concerns the temporomandibular joint, its related structures, and the methods used to diagnose and manage TMD. The present study aimed to identify the strategies used for the diagnosis and treatment of TMD patients by GDPs in the city of Istanbul using a questionnaire-based survey.

METHODS

The total population of Turkey was estimated at 77.7 million people in 2014, and the most populated province was Istanbul, with 18.5% (14 377 018) of the total population. In Turkey, 15 412 private dentists are registered in the Turkish Dental Association; however, the number of specialists in TMD and orofacial pain (OFP) is unclear. Istanbul includes almost 37% (5743) of the private dentists in Turkey, indicating that there are an estimated 2504 individuals per practitioner in Istanbul. In this study, the contact information of 400 GDPs who were not affiliated to any academic institution or public corporation in Istanbul was requested from the Istanbul Chamber of Dentists. Venancio and Camparis[8] reported that this sample size was sufficient for this category of study. All contact numbers were dialed and 163 dentists answered the call. Detailed information about the study was explained before starting the survey. The researcher indicated to the participants that there was no obligation to participate and they were permitted to stop responding to the questionnaire at any time if they did not want to continue the survey. Explicit informed consent was obtained via cellular phone conversation. One hundred fifty-seven GDPs agreed to take part in the present study and 6 of the dentists contacted refused to join at the beginning of the telephone interview. All interviews were conducted individually by one researcher to avoid interrater variation. The telephone interviews lasted 15-20 minutes. Three participants chose not to complete the survey during the telephone interview and these questionnaires that were incompletely filled were discarded (n = 154). Inclusion in the sample was independent of the school of origin, age, gender, professional experience, or year of graduation. The study was approved by the Research Ethics Committee (2017/21).

The questionnaire used in the present study was similar to a survey conducted by Aldrigue et al.[3] in Brazil that focused on data from the AADR, the European Academy of Craniomandibular Disorders, and the American Academy of Orofacial Pain. They reported that a systematic review of agreements based on the international recommendations for TMD and OFP management was conducted to confirm the questionnaire used in their study. A revision was made by adding only 1 question (Q9) to the questionnaire used in the sample survey study. There were no differences in questions or their meanings, between the Turkish questionnaire used for this study and the original English questionnaire.

In the present study, while the first 5 questions (Q1-Q5) determined the behavior of GDPs when they first encounter TMD patients, Q6-Q12 determined the treatment approach of GDPs (n = 78) who answered "occlusal splinting" to Q5. Q13-Q14 were asked to determine the perspective regarding cause–effect relationship in TMD disorder. Participants could choose more than 1 answer in the questionnaire, except for the yes/no option questions.

Statistical Analysis

All interviews were conducted individually by a single researcher. For all statistical tests, the NCSS 2007 and PASS 2008 Statistical & Power Analysis Software (NCSS, Kaysville, Utah, USA) were used. Descriptive statistics (mean, standard deviation, median, correlation, minimum, maximum, and frequency) were calculated for all variables, and the results were analyzed at a 95% confidence interval and a statistical power of 80% with the significance level set at $P < .05$. Dichotomic answers were compared using a binomial test, and multiple answers were evaluated using a Clopper–Pearson test. Pearson's chi-square test and the Fisher–Freeman–Halton test were used for comparison of qualitative data.

RESULTS

Of the GDPs surveyed, 50.6% reported that they received potential TMD patients in their office ($P > .05$). The diagnostic procedure employed, the approach toward each patient, and the place of referral were significantly different among GDPs ($P < .05$). The medical history (33.1%), physical examination (37.7%), and a combination of diagnostic methods (29.2%) were the most frequently employed strategies for obtaining a diagnosis. Of the practitioners who responded, 44.2% reported that they referred their patients to an academic institution. Prosthodontics (62.2%) and maxillofacial surgery (36.9%) were common specialties for patient referral. All practitioners who received potential TMD patients in their office specified that they offered occlusal splinting as the treatment for TMD (Table 1).

Table 2 shows the responses to the occlusal splint-related questions. Hard stabilization appliances (62.8%) and soft stabilization appliances (35.9%) were the most frequently used types of splints ($P < .05$). During splint fabrication, 61.5% of GDPs did not use semi-adjustable articulators, and 43.6% performed occlusal adjustments at the time of application. Occlusal splints were fabricated in maximum habitual intercuspation or in a centric relationship by 50% of the GDPs, with the treatment based on the features of the individual patients ($P < .05$). A total of 64.1% of GDPs believed that an increase in the vertical dimension should be patient-dependent ($P < .05$), and although 46.2% of GDPs instructed their patients on nocturnal splint use, 46.2% believed that the duration of splint use should be patient-dependent ($P < .05$). Most GDPs (75.6%) followed up with their patients monthly ($P < .05$).

Table 3 indicates the responses to the cause–effect relationship questions for TMD. Half of the GDPs considered the etiology of TMD to involve stress-related factors, whereas 49.4% believed

Table 1. Distribution of Behavior-Related Questions

Questions	Frequency	Percentage	*P*
Q1. Have potential TMD patients sought treatment at your office?			
Yes	78	50.6	.935
No	76	49.4	
Q2. What procedures do you use to diagnose these patients?			
Medical history	51	33.1	.001**
Physical examination	58	37.7	
Radiological visualization	0	0	
Study model	0	0	
Combination of these methods	45	29.2	
Q3. What is your approach toward these patients?			
Offer treatment	42	27.3	.018*
Refer to another dentist	44	28.6	
Refer to an academic institution	68	44.2	
Q4. If you do not treat these patients, to what specialty do you refer them?			
Prosthodontics	69	62.2	.001**
Orthodontics	1	0.9	
Otorhinolaryngology	0	0	
Physiotherapy	0	0	
Neurology	0	0	
Maxillofacial surgery	41	36.9	
Q5. If you do treat these patients, what treatments do you offer them?			
Counseling	0	0	-
Diet plans	0	0	
Thermotherapy	0	0	
Physiotherapy	0	0	
Pharmacotherapy	0	0	
Occlusal splinting	78	100	
Occlusal adjustment	0	0	
Orthodontics	0	0	
Oral rehabilitation and prosthetic treatment	0	0	
Other	0	0	

Binomial test and Clopper–Pearson test, *$P < .05$; **$P < .01$.

that TMD is of multifactorial etiology ($P < .05$). All GDPs considered multidisciplinary medical and dental treatment to be necessary ($P < .05$).

Table 4 shows the answers of the participants, some of whom received potential TMD patients in their office (group 1), and some who did not (group 2), to the determinated questions (Q2 and Q13), and the significant differences between groups indicated with a sign. Answers of "physical examination" and "combination of diagnostic methods" were significantly higher in the group 1, and an answer of "medical history" was significantly higher in the group 2 ($P < .05$). Furthermore, answers to Q13 did not show significant differences between the groups ($P = .171$).

DISCUSSION

Most GDPs diagnose TMD based on the patient's medical history and a physical examination,[3] although some different diagnostic methods have been discussed in previous studies.[1,5,9-14] In the present study, all GDPs diagnosed TMD based on the medical history of the patient and a physical examination, and none applied a radiological visualization or achieved a study model.

Two consensus papers suggested that patients with TMD should be treated with conservative and reversible treatment modalities.[1,4] In the present study, GDPs who referred their TMD patients to a specialist preferred to refer them to prosthodontic (62.2%),

Table 2. Frequencies and Percentages of the Answers to Each Splint-Related Question, Considering That Splints Are the Most Common Choice of Treatment for TMD

Questions	Frequency	Percentage	*P*
Q6. What type of splint do you employ?			
Anterior bite appliances	0	0	.001**
Posterior bite appliances	1	1.3	
Hard stabilization appliances	49	62.8	
Anterior positioning appliances	0	0	
Soft stabilization appliances	28	35.9	
Q7. Do you use semi-adjustable articulators?			
Yes	30	38.5	.054
No	48	61.5	
Q8. In what occlusal relationship do you fabricate the splint?			
Maximum habitual intercuspation	8	10.3	.001**
Centric relationship	31	39.7	
Depends on the individual patient	39	50.0	
Q9. By how much do you increase the occlusal vertical dimension with the splint?			
1 mm	0	0	.001**
2 mm	8	10.3	
3 mm	19	24.4	
≥4 mm	1	1.3	
Depends on the individual patient	50	64.1	
Q10. Do you adjust the occlusal surface of the splint at the time of fitting?			
Yes	34	43.6	.308
No	44	56.4	
Q11. What are your instructions regarding the duration of splint use?			
Nocturnal	36	46.2	.001**
Daytime	2	2.6	
All the time	4	5.1	
Depends on the individual patient	36	46.2	
Q12. How often do the patients return to the office for follow-up?			
Weekly	0	0	.001**
Monthly	59	75.6	
Depends on the individual patient	19	24.4	

Binomial test and Clopper–Pearson test, $^{**}P < .01$.

maxillofacial surgery (36.9%), and orthodontic specialists (0.9%). The choice of TMD treatment modality by the prosthodontists and orthodontists is mostly conservative and reversible in accordance with the suggestions in the consensus statements. Thus, maxillofacial surgeons, who were the second common specialties for TMD patient referral, should know when and how to treat and/or when and to whom to refer the TMD patients. Only 1 GDP referred the TMD patients to orthodontics (0.9%), whereas the study by Aldrigue et al.[3] indicated that most GDPs in Brazil referred their TMD patients to orthodontists.

Velly et al.[15] examined the treatment modalities of GDPs for TMD patients, and occlusal splinting was the preferred treatment (96.6%). The same study revealed that hard acrylic custom stabilization splints were the common treatment appliance (60.1%), which was similar with the present study. A meta-analysis performed by Fricton et al.[16] found that the hard occlusal splints showed reasonable efficacy in the treatment of TMD pain when compared with non-occluding splints or no treatment. However, studies have revealed that both active and placebo splints equally improved the patient outcomes.[17] Alencar and Becker[18] randomly selected 42 patients with myofascial pain and treated 3 groups of patients with hard splints, soft splints, or non-occlusal splints. The results of their study showed that all 3 appliances reduced the symptoms, and no significant differences were observed among the 3 groups after 90 days. Thus, in the present study, the use of splints appears to be an appropriate choice for the initial treatment of TMD patients as a conservative treatment, regardless of the contact surfaces of the splints or the material from which they are produced. Otherwise,

Table 3. Frequency and Percentages of the Answers to Each Cause–Effect Question

Questions	Frequency	Percentage	*P*
Q13. To what do you attribute the etiology of TMD?			
Stress	77	50.0	.001**
Parafunction	1	0.6	
Trauma	0	0	
Occlusion-related factors	0	0	
Medical muscle-skeletal disorders	0	0	
Multifactorial	76	49.4	
Q14. Do you believe in multidisciplinary medical and dental treatment?			
Yes	154	100	.001**
No	0	0	

Binomial test and Clopper–Pearson test, **$P < .01$.

Terebesi et al.[19] investigated the relationship between the motor unit recruitment and vertical changes in the jaws and reported that the amount of vertical separation of the splints had a positive correlation with the therapeutic outcome of patients with myofascial pain syndrome. In the present study, half of the GDPs (50%) adjusted the thickness of the occlusal splint depending on the needs of individual patients and 24.4% adjusted the thickness of the occlusal splint by 3 mm.

The pharmacotherapy of TMD patients has been defined by several publications.[2,4,20] Heir et al.[2] suggested that medication can include analgesics, antidepressants, antianxiety agents, muscle relaxants, corticosteroids, antihistamines, local anesthetics, antihypertensives, antiepileptic drugs, adjunctive neuropathic pain medications, tryptans, and ergot derivatives. The dentists' routine use of various categories of these advised drugs requires superior skills and knowledge. In addition, the side effects and the addiction risk of these drugs must be considered by practitioners.[21] In the present study, none of the GDPs preferred pharmacotherapy as the treatment for TMD.

Table 4. Comparison of Answers and Statistical Contrasts in Variables Between Groups

		Q1. Have potential TMD patients sought treatment at your office?		
Questions	Answer	Group 1, Yes (n=78), Mean (%)	Group 2, No (n=76), Mean (%)	*P*
Q2	Medical history	3 (3.8)	48 (63.2)	.001[a,**]
	Physical examination	35 (44.9)	23 (30.3)	
	Combination of these methods	40 (51.3)	5 (6.6)	
Q13	Stress	35 (44.9)	42 (55.3)	.171[b]
	Parafunction	0	1 (1.3)	
	Multifactorial	43 (55.1)	33 (43.4)	

[a]Pearson's chi-square test; [b]Fisher–Freeman–Halton test, **$P < .01$.

The etiology of TMD remains unclear. Among the various hypotheses proposed to explain the onset and maintenance of symptoms, those advocating occlusal factors and psychological disturbances are among the most common, and the etiology of TMD is usually described as multifactorial in the literature.[22-24] In the present study, the greater part of GDPs considered the etiology of TMD to be multifactorial, and most of the GDPs believed that stress was the main issue, whereas only one GDP thought that parafunction was key to the etiology. Similarly, Lei et al.[25] reported that stress may contribute to the incidence of TMD.

There is no specific consensus on the treatment options for patients with TMD in the field of dentistry. The probable reason for this situation is that the etiologies of TMDs are multifactorial. Therefore, the subject of TMD disorders is covered in different specialties during the dental education and PhD programs.

Occlusal stability is a very important issue for dysfunctional patients. These patients have a lower capability to adapt to occlusal changes and are easily disturbed by occlusal instability. Thus, orthodontic treatment has to be performed according to the rules that allow an "ideal and stable" result to be achieved.[26] There are different opinions in the literature regarding the relationship between orthodontic treatment and TMD. In 1988, Greene and Laskin[27] explained that there were statistically positive correlations between orthodontics and TMD treatment. On the contrary, in 1995, McNamara et al.[28] explained that there was no raised risk for TMD associated with any type of orthodontic mechanics and concluded that while a stable occlusion is a reasonable orthodontic treatment goal, failure to achieve a specific gnathologically ideal occlusion does not result in TMD signs and symptoms. Even if most of the research do not support the correlation between orthodontic treatment and TMD, it should be highlighted that absolute conclusions cannot be drawn because the etiologies of TMDs are multifactorial.[26]

Before determining orthodontics–TMD relationship and the associated treatment approach, it is useful to determine whether this relationship occurs before or during orthodontic treatment.[26] If the patient has signs or symptoms of TMD before starting orthodontic treatment, diagnosis is crucial. When the

main complaint is pain, a differential diagnosis is important to determine whether the pain is because of TMD.[26] After diagnosis of TMD-related pain, a conservative treatment protocol including pharmacotherapy, counseling, behavioral therapy, home exercises, physical therapy, and/or occlusal appliances should be assessed.[29] As a rule, orthodontic treatment should not be started as long as a patient suffers from facial pain.[26] Orthodontic treatment may be considered after a certain period of time after the facial pain subsides. Patients with generalized musculoskeletal pain or with a systemic inflammatory disease should be rehabilitated with an interdisciplinary perspective.[26]

If TMD signs and symptoms show up during active orthodontic treatment, the first step is always to make the diagnosis.[26] The second step is to stop active orthodontic treatment temporarily to avoid aggravating factors.[26] Activating orthodontic appliances subjects the teeth to forces that may cause temporary discomfort or pain.[26] Orthodontic pain induced by means of separators may result in a temporary reduction in the pressure pain thresholds of the muscles of mastication.[30] The third step is to manage the pain by following the same conservative treatment protocol as suggested above.[26] An occlusal splint can also be used to evaluate the interference-free position of the mandible. Finally, when the patient is pain-free, orthodontic treatment can be continued as previously planned, or, if necessary, modified according to the patient's condition.[26]

DC/TMD examination forms are frequently used in the diagnosis and treatment of TMD patients.[5] However, these forms cannot be used typically and it might be due to fact that they contain very detailed information and applications in TMDs. For this reason, a simplified examination form is needed for both GDPs and PhDs to make the initial diagnosis of patients with TMD. The use of this form should be aimed at providing accurate diagnosis and referral to the right specialty area before the treatment of TMDs. It is recommended that this examination form is created with the efforts of the practitioners in the specialty areas, and that it should be integrated into the curricula of dentistry and PhD education. Thus, both the early diagnosis of TMDs and the participation of the specialties in the treatment protocol can be provided.

There are some methodological limitations in this study. First, the study group was from a specific region and further studies can be focused on transnational comparisons, which can highlight the knowledge of GDPs and the education modality of each country regarding TMD and related topics. Second, a study population with greater sample size could provide clearer findings on strategies used by GDPs to diagnose and treat patients with TMD.

CONCLUSION

In the present study, GDPs clarified that TMD patients were mostly treated with occlusal splints and this datum is consistent with the suggestions of previous consensus papers. However, it cannot be concluded that the treatment approach has been successfully applied because there are no data on the clinical outcomes of the patients.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of İstanbul University Faculty of Dentistry (2017/21).

Informed Consent: Explicit informed consent was obtained via cellular phone conversation.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - T.C.; Design - T.C., A.S.; Supervision - T.C.; Materials - T.C.; Data Collection and/or Processing - T.C.; Analysis and/or Interpretation - T.C.; Literature Review - T.C., A.S.; Writing - T.C.; Critical Review - T.C., A.S.

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