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Investigation of The Relationships Between Temporomandibular Disorder, Parafunctional Oral Behaviors, Trait Anxiety, and Quality of Life in Students of The Faculty of Health Sciences

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ABSTRACT

This study aimed to investigate the prevalence of temporomandibular disorder (TMD) and the associations between TMD, parafunctional oral behaviors (POBs), trait anxiety, and quality of life in undergraduate students in the health sciences. 720 university students participated in the study (mean age: 21.03± 1.49, 201 male, 519 female). A two-part online survey prepared by the researchers was sent to the students via e-mail. The first part of the questionnaire consisted of items regarding gender, age, undergraduate level, department of education, and awareness of TMD and POBs. The second part included the Oral Behaviors Checklist (OBC), assessing the frequency of POBs; the Fonseca Anamnestic Index (FAI), detecting the severity and presence of TMD; the Trait Anxiety part of the State-Trait Anxiety Inventory (STAI-Trait Anxiety), assessing trait anxiety level; and the Oral Health Impact Profile-14 (OHIP-14), assessing quality of life. The prevalence of TMD in all students was 68.2%, with mild (25%) and moderate (25%) TMD being more common than severe TMD (18.2%). As the undergraduate level of education increased, the severity and prevalence of TMD, the frequency of POBs, and the trait anxiety level increased, and quality of life decreased ($p<0.05$). Strong associations between FAI, OBC, STAI-Trait Anxiety, and OHIP-14 scores (r values >0.80, $p<0.05$) confirmed that TMD severity, frequency of POBs, trait anxiety level, and quality of life were interrelated in students.We consider that increasing the awareness of health sciences students about TMD and POBs and assessing TMD, POBs, and anxiety levels in students at an early stage is important for preventing and more effective management of TMDs.

Sağlık Bilimleri Fakültesi Öğrencilerinde Temporomandibular Bozukluk, Parafonksiyonel Oral Davranışlar, Sürekli Kaygı ve Yaşam Kalitesi Arasındaki İlişkilerin İncelenmesi

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ÖZ

Bu çalışmanın amacı, sağlık bilimleri lisans öğrencilerinde temporomandibular bozukluk (TMB) prevalansını ve TMB, parafonksiyonel oral davranışlar (POD), sürekli kaygı ve yaşam kalitesi arasındaki ilişkileri araştırmaktır. Çalışmaya 720 üniversite öğrencisi katılmıştır (yaş ortalaması: 21,03± 1,49, 201 erkek, 519 kadın). Araştırmacılar tarafından hazırlanan iki bölümlü çevrimiçi anket öğrencilere e-posta yoluyla gönderilmiştir. Anketin ilk bölümü cinsiyet, yaş, lisans düzeyi, öğrenim görülen bölüm, TMB ve POD farkındalığı ile ilgili maddelerden oluşmuştur. İkinci bölümde ise POD'ların sıklığını değerlendiren Oral Davranışlar Kontrol Listesi (ODKL); TMB'nin şiddetini ve varlığını tespit eden Fonseca Anamnestik İndeksi (FAI); sürekli kaygı düzeyini değerlendiren Durumluk-Sürekli Kaygı Envanterinin (STAI-Sürekli Anksiyete) Sürekli Kaygı bölümü ve yaşam kalitesini değerlendiren Ağız Sağlığı Etki Profili-14 (OHIP-14) yer almıştır. Tüm öğrencilerde TMB prevalansı %68,2 olup, hafif (%25) ve orta (%25) TMB şiddetli TMB'den (%18,2) daha yaygındır. Lisans eğitim düzeyi arttıkça, TMB şiddeti ve yaygınlığı, POD sıklığı ve sürekli kaygı düzeyi artmış, yaşam kalitesi ise azalmıştır ($p<0,05$). FAI, ODKL, STAI-Sürekli Anksiyete ve OHIP-14 skorları arasındaki güçlü ilişkiler (r değerleri >0,80, $p<0,05$) öğrencilerde TMB şiddeti, POD sıklığı, sürekli anksiyete düzeyi ve yaşam kalitesinin birbiriyle ilişkili olduğunu doğrulamıştır.TMB ve POD'lar hakkında sağlık bilimleri öğrencilerinin farkındalığının artırılmasının ve öğrencilerde TMB, POD'lar ve anksiyete düzeylerinin erken dönemde değerlendirilmesinin TMB'lerin önlenmesi ve daha etkili yönetimi için önemli olduğunu düşünüyoruz.

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INTRODUCTION

Temporomandibular disorder (TMD) is a generic term that encompasses several medical conditions linked to the masticatory muscles, the temporomandibular joint (TMJ), and other associated tissues. Multifactorial etiology of TMD comprises parafunctional oral behaviors (POBs), posture disorders, emotional and psychological factors, and trauma (1). TMD symptoms include pain in the TMJ and masticatory muscles, myofascial pain, clicking sounds, headache, reduced mandibular movement, chewing muscle fatigue, tinnitus, and neuralgia (1, 2). TMD is most prevalent in university students. Epidemiological studies have suggested that TMD could present in undergraduate students at a rate as high as 77% (3). Various studies have presented that the prevalence of TMD in university students in Turkey varies between 53% and 80% (4-7). However, although TMD is most prevalent in undergraduate students, the students who have TMD are often unaware of its existence. This leads to worsening of TMD complaints and progression of the disorder, especially in university students (8, 9). Therefore, early detection of TMD symptoms and signs in students is very important regarding the minimization of TMD complaints and prevention of TMD (4).

One of the instruments utilized to detect TMD is the Fonseca Anamnestic Index (FAI). The cost-effectiveness and easy application of FAI enable it to be preferred for the detection of TMD (9). The FAI allows the detection of the severity and presence of TMD by assessing the presence of pain, especially in the head and neck regions, joint sounds, pain during chewing, POBs, emotional stress, movement limitation, and malocclusion (10). POBs, which is considered one of the possible causes of TMD, is highly prevalent in societies (11). POBs, which can damage the TMJ by causing extra loading, might also cause a variety of negative effects such as microtrauma in the TMJ and muscles leading to high muscle tension, increased proinflammatory cytokine levels in the TMJ, and pain pathways' sensitization. In this aspect, POBs are considered to be influential in the emergence and progression of TMD (12).

Young adults, such as undergraduate students, frequently suffer from TMD, and TMD in students may be affected by POBs (13). However, most studies exploring the associations between POBs and TMD have centred on children or adolescents, and few research have been conducted on university students (14). The number of studies analyzing the links between POBs and TMD in university students in Turkey is quite limited, and some inconsistent findings have been reported in these studies (4-6, 15). Based on present etiologic concepts, it has been proposed that psychological factors as well as physical and systemic conditions may be responsible for the progression of TMD. Stress, anxiety, and depression may alter an individual's pain threshold via the alteration of nociceptive impulses from the central nervous system and the release of neurotransmitters (16). Moreover, these psychological problems cause POBs, such as bruxism, leading to hyperactivity of the masticatory muscles and overloading of the TMJ and masticatory muscles. These effects may promote the emergence and progression of TMD (17, 18).

The pain and stress linked to TMD reflect a negative impact on systemic health and quality of life, which can negatively affect students' social activities at work or school, social functioning, emotional and cognitive equilibrium, physical activity, and sleep. Oral diseases such as TMD have negative effects that can impact various aspects of life and deteriorate the quality of life (19). In the previous study, only 21% of TMD patients reported having no quality of life problems, while 79% had some oral complaints concerning the quality of life (20).

Although the prevalence of TMD is more prevalent in undergraduate students compared to other individuals in society, the number of studies examining the associations between TMD and POBs, trait anxiety, and quality of life in university students is limited. The majority of these studies were conducted on dentistry students (4-6, 21), and the number of studies conducted on health sciences students is quite rare (9, 15). On the other hand, students in health sciences are affected by high levels of stress, as they are in a highly demanding environment. High levels of

stress and anxiety can affect students' academic performance and increase the risk of developing harmful oral habits such as POBs (22). In this context, revealing/clarifying the associations between TMD and POBs may contribute to the design of more effective management programs for TMD by allowing for different viewpoints (15). Based on these, this study aimed to explore the prevalence of TMD and the associations between TMD, POBs, trait anxiety, and oral health-related quality of life (OHRQoL) among health sciences students.

MATERIALS AND METHODS

Study design and participants

This cross-sectional study was implemented among university students at Karamanoğlu Mehmetbey University, Faculty of Health Sciences. The sample of the study included a group of 720 volunteer university students. Volunteers were informed about the aims and advantages of the research before the survey. The necessary ethics committee permission (Decision No: 01-2024/05, Date: 04.01.2024) from the Scientific Research and Publication Ethics Committee of the Karamanoğlu Mehmetbey University and institutional permission (Date: 23.01.2024) from the Deanship of the Faculty of Health Sciences were granted for this study. After the information, written informed consent was obtained from the volunteers accepting to participate in the research. The study was administered in compliance with the Declaration of Helsinki.

The study recruited students in the Faculty of Health Sciences who volunteered to participate and marked the box “I agree to participate voluntarily in the study” in the online questionnaire, whose native language was Turkish and who were over 18 years of age. Participants with a diagnosed neurological or psychiatric disorder, those who did not complete the online questionnaire or who submitted incomplete questions, and those who did not volunteer to participate were excluded from the research.

Data collection

The online survey form developed by the researchers consisted of two parts. The first part contained items regarding gender, age, undergraduate level, department of education, and awareness of TMD and POBs. The second part included the Oral Behaviors Checklist (OBC), assessing the frequency of POBs; the Fonseca Anamnestic Index (FAI), detecting the severity and presence of TMD; the Trait Anxiety part of the State-Trait Anxiety Inventory (STAI-Trait Anxiety), assessing trait anxiety level; and the Oral Health Impact Profile-14 (OHIP-14), assessing quality of life. The online questionnaire was transferred to an online survey platform (Google Forms, [Google LLC, California, USA]) and sent to students through e-mail. The students sent the completed questionnaire back to the researchers by e-mail.

Fonseca Anamnestic Index

The severity and presence of TMD in students were determined using the Turkish version of the FAI, which was found to be valid and reliable (10). The scale consists of 10 questions answered “no” (0 points), “sometimes” (5 points), or “yes” (10 points). The total score obtained by summing the answers given to all questions varies between 0-100 and a high score indicates a high severity of TMD. In addition, a total score between 0-15 is interpreted as absence of TMD, between 20-40 as mild TMD, between 45-65 as moderate TMD, and between 70-100 as severe TMD (10).

Oral Health Impact Profile-14

OHRQoL of the students was assessed with the Turkish version of OHIP-14, which was confirmed to be valid and reliable (23). 1 In the scale composed of 14 items, each item is scored between 0-4. The total score of the scale is computed by summing the scores given to each item and this score ranges from 0-56. A higher total score implies a poorer OHRQoL (23).

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Oral Behaviors Checklist

The Turkish version of the 21-item OBC, which is valid and reliable, was employed to identify the presence and frequency of POBs in students (24). The responses to the 21 items are scored from 0 ("none of the time") to 4 (" all of the time"). The total score, obtained by summing the scores of the marked items, ranges from 0 to 84. A higher overall score means that the frequency of POBs is greater (24).

State-Trait Anxiety Inventory

The trait anxiety levels of the students were measured with the STAI-Trait Anxiety, which was shown to be valid and reliable (25). Each of the 20 questions in the survey is scored between 1-4. A high score represents a high level of trait anxiety (25).

Sample Size

Sample size was determined with the G*Power program (Version 3.0.10 Universität Düsseldorf, Düsseldorf, Germany). In the pilot study with 15 students, based on the association between TMD severity and POB frequency, the minimum sample size was assumed to be 614 participants with an effect size of 0.13, assuming an alpha level of 0.05 and a power of 90%. Considering the 15% drop-out rate of the participants, a total of 720 students were recruited to the study.

Statistical Analysis

Statistical analyses were conducted using SPSS software, version 24.0 (IBM SPSS Statistics for Windows, Version 24.0, Armonk, NY, USA: IBM Corp.). Both analytical methods (Kolmogorov-Smirnov test) and visual methods (probability plots and histograms) were utilized to assess the normality of variable distributions. Descriptive statistics are presented as mean and standard deviation for numerical variables and as frequency and percentage for categorical variables. The distribution of TMD severity across different years of education was compared using the chi-square test. One-way analysis of variance (ANOVA) was employed to compare measurement parameters among individuals with varying years of education, with post-hoc analyses conducted using the Bonferroni test. Relationships between evaluation parameters were assessed using Pearson correlation analysis. A p-value of <0.05 was considered statistically significant.

RESULTS AND DISCUSSION

The current study was conducted with a sample of 720 out of a total of 1082 undergraduate students in education at three departments of the Faculty of Health Sciences, namely Nutrition and Dietetics, Nursing, and Health Management, who met the inclusion criteria and fulfilled the online questionnaires thoroughly. Demographic features of the students in three departments are summarized in Table 1. Regarding the preferred chewing side, bilateral chewing was more frequent among the students in all three departments separately. The percentage of the students who were not aware of the TMD in the departments of Nutrition and Dietetics, Nursing, and Health Management was 46.6%, 48.1%, and 57.1%, respectively. The rates of the students who were not aware of the OPBs in the same departments were 78.0%, 75.6%, and 80.4%, respectively (Table 1).

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Tablo 1. Demographic properties of the participants according to the department and education years

Department			Nutrition and Dietetics (n=232)	Nursing (n=320)	Health Management (n=168)
Age (years)		X±SD	21.08±1.45	21.16±1.63	20.68±1.75
BMI (kg/m^2)		X±SD	22.34±3.31	22.92±3.20	23.18±3.38
FAI score		X±SD	36.72±4.71	34.83±4.62	32.96±4.22
OBC score		X±SD	32.48±4.27	30.96±4.05	29.18±4.13
OHIP-14 score		X±SD	23.68±3.93	22.04±3.47	19.72±3.81
STAI-Trait Anxiety score		X±SD	43.23±5.53	39.45±4.92	41.84±5.17
Gender	Male	n (%)	43 (18.5)	101 (31.6)	57 (33.9)
	Female	n (%)	219 (68.4)	189 (81.5)	111 (66.1)
Education years	First	n (%)	61 (26.3)	81 (25.3)	66 (39.3)
	Second	n (%)	54 (23.3)	74 (23.1)	34 (20.2)
	Third	n (%)	49 (21.1)	79 (24.7)	13 (7.7)
	Fourth	n (%)	68 (29.3)	86 (26.9)	55 (32.7)
Preferred chewing side	Unilateral	n (%)	63 (27.2)	99 (30.9)	48 (28.6)
	Bilateral	n (%)	169 (72.8)	221 (69.1)	120 (71.4)
Being aware of TMD	Yes	n (%)	124 (53.4)	166 (51.9)	72 (42.9)
	No	n (%)	108 (46.6)	154 (48.1)	96 (57.1)
Being aware of OPBs	Yes	n (%)	51 (22.0)	78 (24.2)	33 (19.6)
	No	n (%)	181 (78.0)	242 (75.6)	135 (80.4)

X: Mean, SD: Standard deviation, BMI: Body mass index, FAI: Fonseca Anamnestic Index, OBC: Oral Behaviors Checklist, OHIP-14: Oral Health Impact Profile-14, STAI: State-Trait Anxiety Inventory, TMD: Temporomandibular disorder, OPBs: Oral parafunctional behaviors.

The distribution of the severity and presence of TMD based on the FAI in the first, second, third, and fourth years of students, regardless of department, is given in Table 2. Considering the rates in the four education years, the percentage of those without TMD was the highest in the first class (39.4%), while the percentage of those with severe TMD was the lowest (12.0%). In the fourth class, the percentage of those without TMD was the lowest (25.8%), while the percentage of those with severe TMD was the highest (23.0%). As the education years were increased, the rate of those without TMD decreased, whereas the rate of those with severe TMD increased. Regarding the overall sample, 31.8% of the participants had no TMD, while the percentage of those with mild and moderate TMD was equal and was 25.0%. Furthermore, 18.2% of all participants had severe TMD. (Table 2).

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Table 2. Distribution of the presence and severity of TMD among whole participants according to education years

TMD classification based on FAI	Education years					p
	First	Second	Third	Fourth	Total	
	n (%)	n (%)	n (%)	n (%)	n (%)	
Absense	82 (39.4)	52 (32.1)	41 (29.1)	54 (25.8)	229 (31.8)	0.001
Mild	59 (28.4)	42 (25.9)	33 (23.4)	46 (22.0)	180 (25.0)	
Moderate	42 (20.2)	39 (24.1)	38 (26.9)	61 (29.2)	180 (25.0)	
Severe	25 (12.0)	29 (17.9)	29 (20.6)	48 (23.0)	131 (18.2)	
Total	208 (28.9)	162 (22.5)	141 (19.6)	209 (29.0)	720 (100)	

TMD: Temporomandibular disorder. FAI: Fonseca Anamnestic Index, p: Chi-square test.

The comparisons of the FAI, OBC, OHIP-14, and STAI-Trait Anxiety scores according to the education years of the participants are presented in Table 3. Students in the fourth and third classes had significantly higher FAI scores than those in the second and first classes ($p<0.05$). While the FAI scores of the first and second year students were similar ($p=0.360$), the scores of the fourth year students were higher than the scores of the third year students ($p=0.015$). The OBC scores were similar between the students in the first and second classes ($p=0.574$) and between the students in the third and second classes ($p=0.735$). The OBC scores of the students in the fourth class were higher than those of the students in the first ($p=0.012$), second ($p=0.007$), and third ($p=0.027$) classes. Students in the fourth and third classes had significantly higher OHIP-14 scores than those in the second and first classes ($p<0.05$). While the OHIP-14 scores of the first and second year students were similar ($p=0.631$), the scores of the fourth year students were higher than the scores of the third year students ($p=0.011$). While the STAI-Trait Anxiety scores of the students in the second class were higher than those of the first class ($p=0.031$), the scores of the students in the second and third classes were similar ($p=0.468$). The STAI-Trait Anxiety scores of the students in the fourth class were higher than those of the students in the first ($p=0.036$), second ($p=0.013$), and third ($p=0.029$) classes (Table 3)

Table 3. The comparisons of the FAI, OBC, OHIP-14, and STAI-Trait Anxiety scores according to the education years of the participants

	Education years				Pairwise comparisons	p
	First[a] (n=208)	Second[b] (n=162)	Third[c] (n=141)	Fourth[d] (n=209)		
	X±SD	X±SD	X±SD	X±SD		
FAI score	27.47±4.63	29.62±4.39	37.12±5.12	44.67±6.17	a-c, a-d, b-c, b-d, c-d	0.016
OBC score	26.73±4.29	28.54±4.58	32.26±5.18	39.12±5.38	a-c, a-d, b-d, c-d	0.024
OHIP-14 score	18.63±3.71	20.23±4.02	25.42±4.28	30.65±4.36	a-c, a-d, b-c, b-d, c-d	0.020
STAI-Trait Anxiety score	36.15±4.87	40.58±5.53	42.89±6.14	47.78±6.27	a-b, a-c, a-d, b-d, c-d	0.004

X: Mean, SD: Standard deviation, FAI: Fonseca Anamnestic Index, OBC: Oral Behaviors Checklist, OHIP-14: Oral Health Impact Profile-14, STAI: State-Trait Anxiety Inventory, p: One-way analysis of variance.

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Table 4 demonstrates the correlations between the scores of all participants on the FAI, OBC, OHIP-14 and STAI-Trait Anxiety surveys. Accordingly, there were significantly high associations between the FAI score and the OBC (r=0.90), OHIP-14 (r=0.86), and STAI-Trait Anxiety (r=0.84) scores ($p<0.05$). The OBC score had significantly high correlations with both the OHIP-14 (r=0.81) and STAI-Trait Anxiety (r=0.83) scores ($p<0.05$). Furthermore, the OHIP-14 score was highly correlated with the STAI-Trait Anxiety score (r=0.88, $p<0.05$).

Table 4. The relationships between the scores of the all participants on the FAI, OBC, OHIP-14, and STAI-Trait Anxiety questionnaires

	FAI	OBC	OHIP-14	STAI-Trait Anxiety
	r (p)	r (p)	r (p)	r (p)
FAI	1	0.90 (<0.001)	0.86 (<0.001)	0.84 (<0.001)
OBC	0.90 (<0.001)	1	0.81 (<0.001)	0.83 (<0.001)
OHIP-14	0.86 (<0.001)	0.81 (<0.001)	1	0.88 (<0.001)
STAI-Trait Anxiety	0.84 (<0.001)	0.83 (<0.001)	0.88 (<0.001)	1

FAI: Fonseca Anamnestic Index, OBC: Oral Behaviors Checklist, OHIP-14: Oral Health Impact Profile-14, STAI: State-Trait Anxiety Inventory, r: Pearson correlation coefficient.

This study has detected the presence and severity of TMD in health sciences students and examined the associations between TMD severity, POB frequency, trait anxiety level, and OHRQoL. According to the study findings, it was observed that the prevalence of TMD was 68.2% in whole students; about half of the students were unaware of TMD, and more than 75% were unaware of POBs, which are regarded as etiologic factors for TMD. In general, as the level of undergraduate degree increased, the severity and prevalence of TMD, the frequency of POBs, and trait anxiety levels increased, and OHRQoL decreased. Robust associations were established between TMD severity, frequency of POBs, trait anxiety level, and OHRQoL.

The FAI utilized in this study is a valid, reliable, and practical instrument that allows the assessment of the severity and presence of TMD in a short period of time with less cost (10). Especially in research with a high number of participants, it has been recommended to employ a practical tool such as FAI in the detection of the severity and presence of TMD (4). In this study, based on the FAI, the rate of students in health sciences with any level of TMD (68.2%) was higher than the rate of students without any TMD symptoms (31.8%). Of the whole students, 25% had mild TMD (n=180), 25% had moderate TMD (n=180), and 18.2% had severe TMD (n=131). Also, the rate and severity of TMD increased as the undergraduate level increased. Similar results have been observed in studies of the literature. In studies on dentistry students, Eraslan and Öztürk (6) detected a significant difference in the TMD prevalence in the first, second, third, fourth, and fifth classes and found that the TMD prevalence was higher in the fourth and fifth classes compared to the first class, while Karaman and Sapan (5) reported that the TMD severity was higher in the fifth class compared to the other classes. Pedroni et al. (1) concluded that the TMD presence in university students was 68%. In another study, Conti et al. (26) noted that the TMD prevalence rate in university and high school students was 61%. The TMD prevalence in dentistry students was detected as 53.3% by Karaman and Sapan (5), 66.8% by Eraslan and Öztürk (6), and 79.65%

by Türken et al. (4). In the first of two studies researching the TMD prevalence rate in health sciences students, Özdinç et al. (7) detected the TMD prevalence rate as 60.5%, while Karabıçak and Hazar Kanık (15) reported this rate as 72.9% in the other study. The prevalence of TMD was 68.2% in our study, consistent with the previous reports in the literature. These findings reveal that the TMD prevalence rate in health sciences students is quite high.

The suggestion that psychological distress is linked to TMD has been supported by research using psychometric instruments and biochemical markers of emotional stress, such as creatinine ratios and elevated urinary cortisol levels. It has been stated that changes in personality features such as stressful life conditions, depression, hysteria, anxiety and hypochondria might be related to TMD (27). Psychological distress is thought to cause tension, particularly in the masticatory muscles, through neural or endocrine mechanisms transmitted via motor cortex and limbic system interactions that translate emotional and cognitive processes into motor responses that can increase muscle tension (28). Berger et al. (29) emphasized that stress and anxiety can intensify parafunctional activity that can lead to the emergence or aggravation of TMD, and that problems such as anxiety, somatization, and catastrophizing can contribute to the occurrence of chronic TMD, especially by causing myofascial pain. Bal et al. (21), who found that there was no difference between anxiety levels in dentistry students of different classes, recommended that the relations between TMD, OHRQoL, and psychological status should be explored in further research. Sood et al. (30) observed a weak correlation between TMD severity and anxiety level in dentistry students with TMD. However, other studies have suggested that there could be strong relations between TMD severity and anxiety level. In a study carried out by Yap et al. (31) in TMD patients, strong relations were observed between the TMD severity and the level of psychological problems. The researchers also pointed out that psychological problems and OHRQoL might be linked in TMD patients. In another study, De Melo Rocha et al. (32) suggested that there could be considerable relations between stress and anxiety with TMD severity in dentistry students. The fact that different findings were reported in the literature emphasizes the importance of investigating the associations between TMD and anxiety among students in further research. In the present study, the trait anxiety level was higher in the fourth-class students than in the other classes of students. Second-class students had higher trait anxiety levels than first-class students. There were also robust associations between trait anxiety level and TMD severity, POBs frequency, and OHRQoL. We believe that the current findings revealing that the increase in anxiety level as the undergraduate level progresses could increase the TMD severity and the POBs frequency in health sciences students and that these might decrease the OHRQoL will make considerable contributions to the literature.

POBs are harmful behaviors that affect the masticatory system at various levels through repetitive trauma and can damage the TMJ and masticatory muscles by causing extra loading. The high muscle tension levels caused by POBs can be influential in the development of TMD by resulting in a number of negative effects, including microtrauma to the TMJ and muscles (12). It is considered that POBs, which are linked to TMD pain, may also have a critical role in the worsening of TMD (6). In a study conducted on university students, it was claimed that POBs could be related to depression and anxiety, and that having POBs may be linked to a higher risk of TMD and worse OHRQoL (33). Studies in dentistry students have suggested that there could be links between POBs and TMD (4, 5). In the study of Yıldız et al. (24) carried out in adult patients with TMD, it was noted that there might be relations between POBs and TMD severity, psychological status and OHRQoL. A previous study performed on health sciences students suggested that there could be moderate relations between the POBs and TMD severity; however, this should be explored in further research with a larger sample size (15). The current research revealed that the POBs frequency increased as the undergraduate level progressed in the students.

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Additionally, consistent with the literature, it was determined that the TMD severity and trait anxiety level increased as the POBs frequency increased. As undergraduate level progresses, the increase in the trait anxiety level of students due to the increase in stress, course loads, and future worries might have led to a higher prevalence of POBs. A higher frequency of POBs could have been influential in the higher prevalence and severity of TMD in higher classes (24, 34).

OHRQoL represents the impact of orofacial disorders on a person's daily activities, health, or overall quality of life (33). In TMD, high anxiety levels and related POBs may cause complaints such as pain, negatively affecting essential jaw functions of individuals and decreasing OHRQoL. In this regard, the evaluation of quality of life in TMD is crucial (33). The present study detected that the OHRQoL of students decreased as the undergraduate level increased, and there were robust associations between OHRQoL and TMD severity, POBs frequency, and trait anxiety level. These findings affirmed that OHRQoL was a multidimensional phenomenon influenced by the POBs frequency, anxiety level, and TMD severity in students. Studies analyzing the relations between TMD and OHRQoL in university students considering factors such as POBs and anxiety are quite limited (4-6, 33). Bal et al. (21) observed that the OHRQoL of second, third, and fourth years of dentistry students was lower than that of first and second-year students. The researchers recommended that the possible relations between TMD and OHRQoL in university students should be studied in further research. Karaman and Sapan (5) proposed that there may be a link between TMD severity and OHRQoL in dentistry students. Another study (6) stated that there may be low to moderate relations between TMD severity, OHRQoL, and POB in dentistry students. Yang et al. (35) highlighted that there may be associations between TMD risk and OHRQoL in university students; however, it would be necessary to study these in further research. Regarding the findings of the current research, which are consistent with the literature, it can be concluded that having POB may be linked to a poorer psychological status, greater risk and severity of TMD, and poorer OHRQoL.

This study has some limitations. Firstly, only the students of the faculty of health sciences and only 3 departments in this faculty were included in this study. Secondly, the severity and presence of TMD were assessed utilising the FAI, which has been validated for more practical use. Due to the large number of participants, clinical and radiologic examinations of students could not be carried out. Further research with a larger sample size in students from different departments, in which the presence of TMD is verified through clinical and radiologic examinations, may provide more different and beneficial perspectives.

CONCLUSION AND RECOMMENDATIONS

This study determined that students in health sciences had a high TMD prevalence, POB frequency, and trait anxiety level. As the undergraduate level progressed, the frequency and severity of TMD, POBs frequency, and trait anxiety level increased while OHRQoL decreased. Moreover, there were robust associations between TMD severity, POBs frequency, trait anxiety level, and OHRQoL. On the basis of these findings, it can be concluded that an increase in the frequency of POBs and trait anxiety level may exacerbate the TMD severity, which may reduce the OHRQoL of students. As university is an important transition stage from school to society, many students suffer from a significant amount of psychological stress and anxiety during this period due to factors such as a rigorous course and exam loads and worries about the future. These may cause an increased level of psychological tension and frequency of POBs, a higher prevalence and severity of TMD, and lower OHRQoL. We consider that it is essential to increase the awareness of students in health sciences about TMD and POBs and to assess TMD, POBs, and

trait anxiety in students at an early stage in terms of preventing and more effectively managing TMDs.

Ethical Approval

The necessary ethics committee permission (Decision No: 01-2024/05, Date: 04.01.2024) from the Scientific Research and Publication Ethics Committee of the Karamanoğlu Mehmetbey University and institutional permission (Date: 23.01.2024) from the Deanship of the Faculty of Health Sciences were granted for this study.

Conflict of Interest

No conflict of interest was declared by the authors. The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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