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Original Research Article

A Psychological Perspective on Temporomandibular Disorders: Evaluating Anxiety and Depression Symptoms

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ABSTRACT

Objective: Temporomandibular disorders (TMD) are multifactorial conditions affected by both physical and psychological factors. The present study aimed to compare the levels of anxiety and depression in individuals with TMD with those in healthy controls, as well as to examine the associations of these psychological parameters with demographic variables.

Materials and Methods: A total of 62 participants, including 31 patients with TMD and 31 healthy individuals aged between 18 and 40 years, were included in the study. Clinical and demographic data were collected, and psychological assessments were conducted using the Beck Depression Inventory (BDI) and the State-Trait Anxiety Inventory (STAI-I and STAI-II).

Results: State anxiety levels were found to be significantly higher in the TMD group as compared to the control group (p=0.007) by Student's t-test. No statistically significant differences were observed between the groups in terms of trait anxiety levels (p>0.05). Similarly, BDI scores did not differ significantly between the groups (p>0.05). No significant associations were found between psychological parameters and age, sex, or educational level (p>0.05).

Conclusion: Within the limitations of this study, individuals with TMD exhibited higher levels of state anxiety compared with healthy controls. Based on this finding, we conclude that psychological assessments may constitute an integral part of the management of patients with TMD, and the treatment should address not only the TMD condition itself but also the accompanying psychological factors.

Keywords: Anxiety; Depression; Psychology; Temporomandibular joint disorders

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INTRODUCTION

Temporomandibular disorders (TMD) are complex musculoskeletal conditions characterized by pain and/or dysfunction involving masticatory muscles, temporomandibular joints (TMJ), and associated structures. Clinical manifestations of TMD encompass a wide range of symptoms, including tenderness in masticatory muscles, TMJ dysfunction, pain during mandibular movements, joint sounds, jaw locking or dislocation, and limited mandibular mobility.[1,2] Although the etiology of TMD remains unclear, numerous studies support its multifactorial and biopsychosocial nature, encompassing both physical and psychological components including the interplay of psychological, physiological, structural, postural, and genetic factors.[3–7] Therefore, TMD may be considered not merely as a physiological disorder, but as a multidimensional clinical condition encompassing also psychological and social aspects.

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Psychological effects of TMD on patients can be evaluated using various psychometric tools. Among these, the most widely used ones are the Beck Depression Inventory (BDI) and the State-Trait Anxiety Inventory (STAI). The BDI is a 21-item self-report instrument designed to evaluate severity of depressive symptoms. Each item consists of four statements arranged in increasing order of severity, and respondents are asked to select the one that best describes their condition over the past two weeks, including the day of assessment. The total score in the BDI ranges from 0 to 63, with higher scores indicating greater severity of depressive symptoms.[8,9] The STAI is a 40-item self-report tool that measures the frequency of anxiety responses. Items are rated on a four-point Likert scale, with subscale scores ranging from 20 to 80. The STAI-I is the State Anxiety Inventory, whereas the STAI-II is the Trait Anxiety Inventory. Higher scores reflect more severe levels of anxiety.[10] The Turkish adaptation of the BDI, introduced by Hisli, was reported to have high levels of reliability and validity for the scale.[11] The STAI-I and STAI-II were adapted into Turkish by Öner and Le Compte.[12]

Available evidence supports the association between TMD and psychological conditions. Sadrzadeh Afshar *et al*. reported that soldiers exposed to chronic stress were more likely to develop TMD when exhibiting higher levels of depression.[14] Similarly, in a Turkish sample, Ekici demonstrated that patients with bruxism had significantly higher STAI and BDI scores, which correlated with increased bruxism frequency.[13] Despite these findings, studies investigating the psychological dimensions of TMD within the Turkish population remain scarce, the need for further research in this area. The hypothesis of this study is that, considering the multifactorial nature of TMD, individuals with TMD would exhibit higher levels of anxiety and depression compared to healthy controls. In this context, the present study aims to evaluate the levels of anxiety and depression in individuals diagnosed with TMD, as well as to investigate potential associations of these psychological conditions with various demographic variables.

MATERIALS AND METHODS

This study was conducted at the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, with patients who presented for routine dental examinations. The research protocol fully complied with the ethical principles of the Declaration of Helsinki, and written informed consent was obtained from all participants. Ethical approval was also granted by the Non-Interventional Clinical Research Ethics Committee (Approval Date: 29.01.2025, protocol no: 2025.01.28).

The participants were divided into two groups: Group 1 (study group) consisted of individuals diagnosed with TMD, while Group 2 (control group) included individuals without any active symptoms or pathology in the oral and maxillofacial region, who presented solely for routine check-ups. Individuals of both sexes aged between 18 and 40 years were included in the study.

Exclusion criteria were as follows: (1) the presence of systemic diseases, (2) regular use of medication, (3) history of previous TMD treatment, or (4) a diagnosed psychological disorder. No medical intervention or treatment was administered to the participants within the scope of the study.

Demographic data, including age, sex, educational level, and occupation, were recorded for all participants. All patients underwent a standardized clinical examination performed by an oral and maxillofacial surgeon with at least 5 years of clinical experience. The diagnosis of temporomandibular disorders was established in accordance with the Diagnostic Criteria for Temporomandibular Disorders Axis I (DC/TMD). The DC/TMD protocol was applied through a standardized clinical examination, which included assessment of mandibular range of motion, joint sounds, deviation or deflection during opening, and palpation of the temporomandibular joint and masticatory muscles (masseter, temporalis, medial and lateral pterygoids) to identify pain or tenderness. Internal derangements identified during this process were further classified according to the Wilkes staging system (Stages I–V) for descriptive analysis.

In the study group, the impact of TMD on quality of life was evaluated using a Visual Analog Scale (VAS), scored from 0 (“no impact”) to 10 (“severe impact”). The VAS was used exclusively within the TMD group to quantify the perceived impact of the disorder on quality of life; it was not intended

for direct comparison with the control group. For psychological evaluation, all participants completed the BDI, the STAI-I, and the STAI-II. The instruments were administered in a paper-and-pencil format under researcher supervision and were completed individually. The data collected were then used for both within-group and between-group statistical analyses.

Sample Size Estimation

The sample size of the study was determined a priori using the GPower 3.1.9.7 software for an independent samples t-test, based on an expected medium effect size derived from Reissmann *et al*. [15] According to this effect size, significance level of 5% and a statistical power of 80%, approximately 30 participants per group were deemed sufficient.

Statistical Analyses

The distribution of numerical variables was evaluated using the Kolmogorov–Smirnov test. For the variables showing a normal distribution, descriptive statistics were presented as mean ± standard deviation (Mean ± SD). To compare differences between means/medians of two independent groups, the independent samples t-test was used when parametric assumptions were met; otherwise, the Mann–Whitney U test was performed. The Chi-square test was employed to evaluate differences between categorical variables. To examine relationships between numerical variables, Pearson correlation coefficients were computed for the data in normal distribution, while Spearman's rank correlation coefficient was calculated for data that did not meet normality assumptions. A p-value of less than 0.05 was considered to be statistically significant in all analyses.

RESULTS

The study was conducted with a total of 62 participants (mean age 27.4 ± 6.3 years). Among the participants, 34 (54.8%) were female and 28 (45.2%) were male. As summarized in Table 1, there were no statistically significant differences between the groups in terms of age, gender distribution, or educational level, indicating that both groups were comparable demographically.

STAI-I scores were significantly higher in Group 1 (45.2±5.3) as compared to the control group (38.3 ± 3.8; p = 0.007) No statistically significant associations were found between STAI-I scores and age, gender, or educational level (p=0.25, p=0.25, and p=0.66, respectively). STAI-II scores were 43.2±9.6 in Group 1 and 39.65±6.79 in the control group; however, the difference was not statistically significant (p=0.18). Similarly, STAI-II scores did not show significant associations with age, gender, or educational level (p=0.50, p=0.63, and p=0.24, respectively). The mean BDI score was 10.9±7.3 in Group 1 and 9.2±7.6 in the control group, with no statistically significant difference (p=0.32) (Table 2; Figure 1). Likewise, no significant associations were found between BDI scores and gender or education level (p=0.98 and p=0.09, respectively), while a statistically significant correlation was observed with age (p=0.02).

Additionally, the weak positive correlation noted between STAI-I and STAI-II scores (r = 0.13, p = 0.33) was not statistically significant. Another weak negative correlation observed between STAI-I and BDI scores (r = –0.11, p = 0.4) also was not statistically significant. In contrast, a moderate positive correlation was found between STAI-II and

Table 1. Distribution of Demographic Characteristics

Variable	Total (n = 62)	Group 1 (n = 31)	Group 2 (Control)	P
Age (Mean±SD)	27.3±6.3	27.5±6.3	27.1±6.4	0.72
Gender, n (%)				0.20
- Female	34 (54.8%)	11 (35.4%)	17 (54.8%)	
- Male	28 (45.1%)	20 (64.5%)	14 (45.1%)	
Education Level, n (%)				0.84
- High School	18 (29.3%)	10 (32.2%)	8 (25.8%)	
- Bachelor's Degree	38 (61.2%)	18 (58.0%)	20 (64.5%)	
- Master's Degree	6 (9.6%)	3 (9.6%)	3 (9.6%)	

Table 2. Distribution of Inventory Scores

Variable	Group 1 (n = 31)	Group 2 (n = 31)	Total (n = 62)	P
STAI-I (Mean±SD)	45.2±5.3	38.2±3.8	41.7±5.8	0.007*
STAI-II (Mean±SD)	43.2±9.5	39.6±6.7	41.4±8.5	0.18
Beck Depression Score (Mean±SD)	10.8±7.3	9.1±7.5	10.0±7.4	0.31
VAS	4.7±1.4	-	-	-

*STAI-I: State Anxiety Inventory, **STAI-II and the Trait Anxiety Inventory; p>0.05

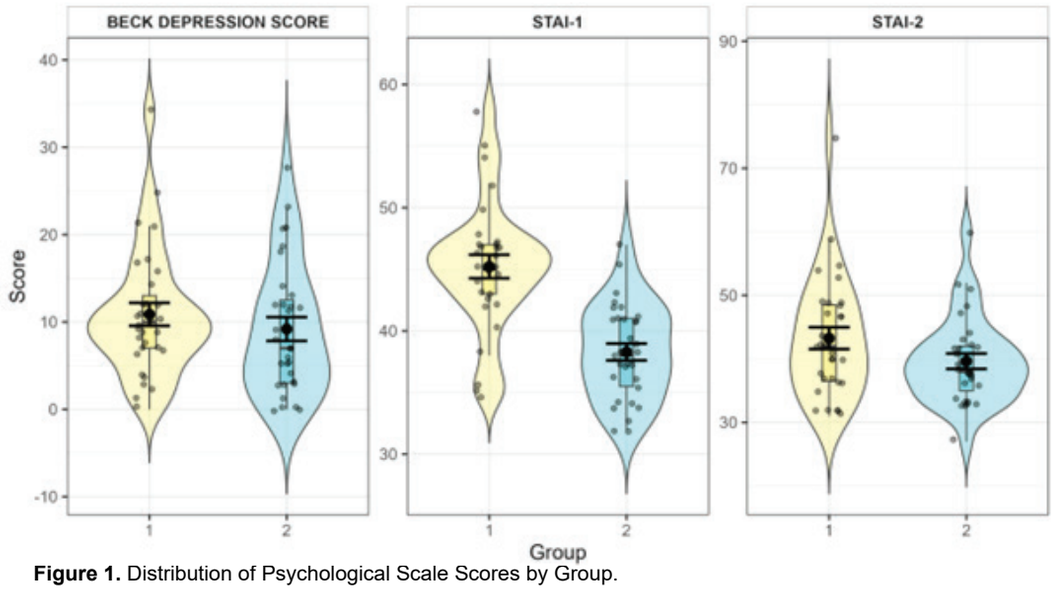

Figure 1. Distribution of Psychological Scale Scores by Group.
Distribution of Beck Depression Inventory (BDI), State Anxiety Inventory Form-I (STAI-1), and Form-II (STAI-2) scores across study groups. Each dot represents an individual participant; black circles and error bars indicate mean ± SE. Group 1: TMD; Group 2: Controls.

BDI scores (r=0.31, p=0.01), which was a statistically significant relationship.

The mean VAS score among Group 1 participants was 4.74±1.4. No statistically significant associations were found between VAS scores and age (p=0.88), gender (p=0.11), Wilkes staging (p=0.13), BDI (p=0.30), or STAI-I scores (p=0.60). However, weak negative correlations were observed between VAS scores and educational level (ρ = –0.33, p=0.06) and between VAS and STAI-II scores (ρ = –0.34, p=0.06).

According to the RDC/TMD Axis I classification, 7 participants were diagnosed with muscle disorders (Group I), 15 with internal derangements (Group II), and 9 presented with both categories simultaneously. BDI scores were significantly higher in individuals with muscular disorders as compared to those with internal TMJ derangements alone (p=0.01). BDI scores were significantly higher in individuals with muscular disorders as compared to those with only internal TMJ derangements (p=0.01). Additionally, a statistically significant positive correlation was found between the presence of muscle disorders and BDI scores (r=0.39, p=0.03).

However, no statistically significant associations were found between muscular disorders and STAI-I or STAI-II scores (p>0.05). Similarly, among participants with internal TMJ derangements, there were no significant differences or correlations with BDI, STAI-I, or STAI-II scores (p>0.05). Among the 24 patients with internal derangements, 17 were classified as Wilkes Stage I and 7 as Stage II. No significant correlations were found between Wilkes stages and BDI, STAI-I, or STAI-II scores (p>0.05).

DISCUSSION

TMD are multifactorial conditions resulting from the interaction of physical and psychological factors. Their pathophysiology involves complex biomechanical, neuromuscular, and biological mechanisms, with psychological components playing a critical role in both onset and persistence.[1,16,17] Consistent with previous findings, individuals with TMD in the present study exhibited significantly higher state anxiety levels compared to healthy controls, suggesting that pain and function al limitation may exacerbate situational anxiety.

Although anxiety is commonly reported among TMD patients, previous studies such as those by Fernandes Azevedo *et al*. found no significant association between TMD and anxiety.[18] Similarly, our study revealed no difference in trait anxiety levels between groups. This may indicate that anxiety in TMD is more reactive to current symptoms rather than a stable personality trait. An increase in depression levels may be positively associated with the prevalence of TMD. Individuals under chronic stress were previously found to have significantly higher rates of TMD as compared to their non-stressed peers.[14] However, in the present study, we found no statistically significant difference between the groups in terms of BDI scores. This outcome can be attributed to individual variations in pain sensitivity and duration of symptoms in TMD patients.

Participants with muscular TMD demonstrated significantly higher BDI scores compared to those with internal TMJ derangements. This is consistent with previous studies reporting that myofascial pain tends to cause more persistent and diffuse discomfort, thereby imposing greater psychological burden.[19,20,21] Accordingly, TMD subtypes may require targeted psychosocial assessment and intervention.

TMD are most commonly observed in individuals aged 20–40 years old and particularly in women of reproductive age.[22,23] For instance, Giannakopoulos *et al*. reported that depressive symptoms are more frequent in women with TMD-related pain, whereas men with similar conditions may exhibit more severe depressive symptoms.[24] These findings suggest that TMD are closely associated with psychological effects regardless of gender. However, in the present study, no significant relationship was found between age or gender and the levels of anxiety or depression.

Furthermore, socioeconomic variables such as educational level are thought to significantly influence pain perception and expression. Martins *et al*. reported that individuals with lower educational levels experience more intense pain as compared to those with higher levels of education. However, in the present study, there was no statistically significant relationship between educational level and anxiety or depression scores.[25]

The present study has several limitations. These include a relatively small sample size, the cross-sectional design that precludes causal inference, reliance solely on self-reported inventories to evaluate anxiety and depression, and the absence of clinical psychiatric diagnoses. These limitations warrant using larger sample sizes and multidimensional assessment tools in further research.

TMD can adversely affect quality of life, particularly in chronic cases.[26] In the present study, individuals with TMD exhibited significantly higher state anxiety levels compared to healthy controls, indicating that situational psychological distress is common among these patients. However, trait anxiety and depression scores did not differ significantly between the groups. From a clinical perspective, the observed increase in state anxiety suggests the need for interdisciplinary management approaches that include psychological assessment as an integral component of TMD care. Psychological evaluation and individualized interventions may be particularly beneficial for patients presenting with muscular forms of TMD.

CONCLUSION

Within the limitations of the present study, TMD should be regarded not merely as physiological conditions, but as multifactorial disorders encompassing significant psychological components. Accurate diagnosis and effective management of TMD therefore require acknowledging the close interaction between physical and psychological factors. A comprehensive, multidisciplinary approach including a psychological evaluation may assist with individualized treatment planning for TMD patients.

Temporomandibular Bozukluklara Psikolojik Bir Bakış: Anksiyete ve Depresyon Belirtilerinin Değerlendirilmesi

ÖZET

Amaç: Temporomandibular bozukluklar, hem fiziksel hem de psikolojik faktörlerden etkilenen multifaktöriyel yapıya sahip durumlardır. Bu çalışmanın amacı, temporomandibular bozukluğu olan bireylerde anksiyete ve depresyon düzeylerini sağlıklı bireylerle karşılaştırmak ve bu psikolojik parametrelerin demografik değişkenlerle ilişkilerini incelemektir.

Gereç ve Yöntemler: Çalışmaya yaşları 18–40 arasında değişen, 31 temporomandibular bozukluğu olan hasta ve 31 sağlıklı birey olmak üzere toplam 62 katılımcı dahil edilmiştir. Klinik ve demografik veriler toplanmış; psikolojik değerlendirmeler için Beck Depresyon Envanteri (BDE) ile Durumluk ve Sürekli Kaygı Envanteri (STAI-I ve STAI-II) uygulanmıştır.

Bulgular: Temporomandibular bozukluğu olan grupta durumluk kaygı düzeyleri kontrol grubuna kıyasla anlamlı derecede yüksek bulunmuştur (p=0.007). Sürekli kaygı düzeyleri açısından gruplar arasında istatistiksel olarak anlamlı fark saptanmamıştır (p>0.05). Benzer şekilde, Beck Depresyon Envanteri puanları da gruplar arasında anlamlı farklılık göstermemiştir (p>0.05). Yaş, cinsiyet ve eğitim düzeyi ile psikolojik parametreler arasında istatistiksel olarak anlamlı bir ilişki bulunmamıştır (p>0.05).

Sonuç: Çalışma bulguları, temporomandibular bozukluğu olan bireylerde durumluk kaygı düzeyleri sağlıklı bireylere kıyasla daha yüksek olabildiğini göstermiştir. Bu bulguya dayanarak, psikolojik değerlendirmeler temporomandibular bozukluğu olan hastaların tedavisinde ayrılmaz bir parça oluşturabilir ve tedavi sadece temporomandibular durumun kendisini değil, aynı zamanda buna eşlik eden psikolojik faktörleri de ele almalıdır.

Anahtar Kelimeler: Anksiyete; Depresyon; Psikoloji; Temporomandibular eklem bozuklukları

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