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ORIGINAL ARTICLE

Anxiety and depression accompanying bruxism

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ABSTRACT

Objectives: This study aimed to investigate whether bruxism was accompanied by anxiety and depression.

Patients and methods: A total of 41 bruxers (26 females, 15 males; mean age: 44.5±14.2 years; range, 20 to 72 years), diagnosed from dental and clinical history, and 37 healthy individuals (17 females, 20 males; mean age: 41.5±12.4 years; range, 16 to 73 years) were included in the study between May 2017 and May 2019. They were asked to answer the State-Trait Anxiety Inventory and Beck Depression Inventory.

Results: While there was no difference between the bruxer and control group for the scores from the State-Trait Anxiety Inventory, depression scale scores were significantly higher in bruxers ($p=0.033/p<0.05$). When the anxiety-depression relationship was examined in the bruxer and control groups, a positive significant correlation was found with trait anxiety scores in the control group ($p=0.001$, $r=0.541$). In the bruxer group, a significant and moderate correlation was found between depression and trait anxiety ($r=526$, $p=0.001$).

Conclusion: We believe that our study about the role of psychogenic factors in the pathogenesis of bruxism, a condition with an unclear etiology, makes a meaningful contribution to the literature.

Keywords: Anxiety, depression, sleep bruxism.

Bruxism is considered to have multifactorial etiology, and central, peripheral, and psychogenic factors are blamed in its pathogenesis. Bruxism is a parafunctional activity that can occur during sleep and daytime (diurnal and nocturnal bruxism), manifesting in the form of tooth clenching, grinding, and jaw clenching. It is defined as secondary bruxism if it is caused by a neurological or psychiatric disease or drug use. The daytime form is more common (about 20%), while sleep bruxism (SB) is less common (8%).[1]

While peripheral causes such as occlusal disorders and anatomical differences were blamed in the etiology until a few years ago, new studies focused on central pathophysiology and psychogenic factors.[2] Sleep bruxism is not considered to be primarily a psychological disorder, but behavioral factors are important in the etiology. When the personality traits of sleep bruxers were examined, it was observed that the psychological responses of these individuals to stress-causing events were very different from others,[3] and those with SB were successful and performance-oriented people with anxious personalities (not anxiety disorder). Michalek-Zrabkowska et al.[4] found a positive correlation between the bruxism episode index (BEI) and the concentrations of 17-hydroxycorticosteroids, C-reactive protein, and fibrinogen in urine samples. A positive correlation was also found between phasic BEI and glucose concentration 2 h after the consumption of a glucose solution. They revealed that participants with SB had metabolic and hormonal disturbances, probably due to stress and sympathetic activity.

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Furthermore, young sleep bruxers potentially had high cardiovascular risk due to the increased level of inflammatory and stress markers.

Many studies examined the relationship of bruxism with anxiety and depression with different conclusions.[5-8] Anxiety is defined as an abnormal state of nervousness and fear without cause accompanied by somatic symptoms. It may be evaluated with various psychological scales. The state and trait anxiety assessment scales on the State-Trait Anxiety Inventory (STAI) are widely used in Türkiye, and the validity and reliability studies of the Turkish version were conducted.[9] The Beck Depression Inventory (BDI) is a 21-item self-report assessment scale that measures the characteristic attitudes and symptoms of depression, and it is a valid and reliable self-assessment scale in Turkish.[9] We hypothesized that psychogenic factors such as anxiety and depression contributed to the etiology of SB. Thus, we aimed to evaluate the presence of depression and anxiety in bruxers with these scales.

PATIENTS AND METHODS

A cross-sectional study with a control group was conducted at the Dokuz Eylül University Faculty of Medicine, Department of Neurology, Sleep Disorders Polyclinic between May 2017 and May 2019. A total of 41 bruxers (26 females, 15 males; mean age: 44.5±14.2 years; range, 20 to 72 years) and 37 healthy individuals (17 females, 20 males; mean age: 41.5±12.4 years; range, 16 to 73 years) were included in the study. Participants were selected from subjects who applied to the Neurology Department of the Sleep Disorders Center with various complaints and met the diagnostic criteria for bruxism after dental examination by a dentist.[10] Participants with the complaint of bruxism for at least six months were included in the study. The inclusion criteria were as follows: *(i)* having a history of teeth grinding at least three days a week for six months; *(ii)* the presence of pain and tenderness in the jaw muscles in the morning; *(iii)* having abnormal tooth wear on dental examination; *(iv)* the presence of masseter muscle hypertrophy. Written informed consent was obtained from all participants. The study protocol was approved by the Dokuz Eylül University Non-Interventional Research Ethics Committee (Date: 30.03.2017, No: 2017/06-34). The study was conducted in accordance with the principles of the Declaration of Helsinki.

The BDI and STAI[9] were answered by the participants. The results were obtained by referencing the assessment table to determine the equivalent total score obtained at the end of the test. The assessment was as follows: 0 to 9 points, normal; 10 to 18 points, mild; 19 to 29 points, moderate; and 30 to 63 points, severe depression. The scale showed high internal consistency for psychiatric and nonpsychiatric populations.

The STAI consists of a total of 40 expressions such as "I am calm right now" and "I feel safe," aiming to evaluate the patient's state and trait anxiety levels. On the scale, 20 items assess state anxiety, and 20 items assess trait anxiety. While the state scale evaluates the individual in their current state, the trait scale identifies the general state. Responses to these expression range from "not at all," "a little," "somewhat," to "very much so," and they are scaled with numerical values of 1, 2, 3, and 4.[9]

Statistical analysis

Statistical analysis was performed using the PASW version 18.0 software (SPSS Inc., Chicago, IL, USA). In addition to descriptive statistics, hypothesis tests were performed: the chi-square test for categorical variables, and the t-test or ANOVA for continuous variables, or their non-parametric equivalents when appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

There was no difference between the groups regarding age ($p=0.339$, $p>0.05$). In terms of sex, 39.5% of the control group and 60.5% of the bruxers were female, while 57.1% of the control group and 42.9% of the bruxers were male.

In the bruxer group, four (9.8%) patients had hypertension, one (2.4%) patient had diabetes mellitus, two (4.9%) patients had depression and were receiving pharmacological treatment (escitalopram 20 mg and sertraline 50 mg, respectively), two (4.9%) patients had cardiac arrhythmia, and one (2.4%) patient had hypothyroidism. In the control group, six (16.2%) patients had hypertension, three (8.1%) patients had diabetes mellitus, and one (2.7%) patient had a history of depression and was receiving sertraline 50 mg (Table 1).

The BDI scores were significantly higher in bruxers (8.95±8.636) than in the control group (5.64±5.682), and this difference was statistically significant ($p=0.033$), (Table 2).

TABLE 1
Demographic data

	Control group (n=37)			Bruxer group (n=41)		
	n	%	Mean±SD	n	%	Mean±SD
Age (year)			44.5±14.2			41.5±12.4
Sex						
Male	20	57.1		15	42.9	
Female	17	39.5		26	60.5	
Medical history						
Hypertension	6	16.2		4	9.8	
Diabetes mellitus	3	8.1		1	2.4	
Depression	1	2.7		1	2.4	
Cardiac arrhythmia	0	0		2	4.9	
Hypothyroidism	0	0		1	2.4	

SD: Standard deviation.

TABLE 2
Beck Depression Inventory scores

	Control group	Bruxer group	
	Mean±SD	Mean±SD	*p*
Beck's Depression Scale	5.64±5.682	8.95±8.636	0.047

SD: Standard deviation.

TABLE 3
State and trait anxiety scores

	Control group	Bruxer group	
	Mean±SD	Mean±SD	*p*
State Anxiety Scale	43.33±4.92	43.82±4.171	0.595
Trait Anxiety Scale	45.46±4.793	46.71±5.572	0.274

SD: Standard deviation.

The mean score for the state anxiety scale was 43.33±4.92 in the control group and 43.82±4.171 in the bruxer group. Trait anxiety scale scores were comparable with values of 45.46±4.793 in controls and 46.71±5.572 in the bruxer group. No statistically significant difference was found in both groups regarding state and trait anxiety scales (p=0.478 for state anxiety; p=0.739 for trait anxiety; Table 3).

When the correlation between depression and anxiety in both groups was examined, a positive significant correlation was found between trait anxiety and depression scores (p=0.001, r=0.541). In the bruxer group, a moderately strong (r=526) and significant (p=0.001) linear relationship was observed between trait anxiety and BDI scores.

DISCUSSION

Psychoemotional factors are important in the etiology of bruxism. Although some studies argued that the levels of stress and anxiety and bruxism were related,[11,12] other studies showed that they were not related.[8,13] The relationship between depression and SB is controversial. Some studies demonstrated that depression was more common and severe in people with bruxism.[1,11] In our study, depression was found to be significantly higher in the bruxer group compared to controls, and no difference was observed between the groups in subgroup analyses performed in terms of age and sex. Yağcı et al.[1] found that anxiety, depression, and childhood traumatic experiences scale scores were higher in the bruxism group

compared to the control group. In a study of 212 dental students, the mean Depression, Anxiety, and Stress Scale-21 scores in those with self-reported SB was significantly higher than those without SB.[11] However, many other studies in the literature showed that bruxism was not associated with depression.[5,8] In the study carried out by Smardz et al.[8] using BDI with polysomnographic recordings, no significant correlation was found between the BEI and BDI scores.

In most studies, a positive correlation was demonstrated between bruxism and anxiety[5,14,15] Bandodkar et al.[15] concluded that bruxers had higher scores on the Hospital Anxiety and Depression Scale than normal individuals. In a different study conducted among academics, bruxism was observed only in 12.4% of the whole group, while 60% of the anxious group were evaluated to be bruxers.[14] Among 2,251 patients, Chattrattrai et al.[5] concluded that bruxers were more anxious, but SB was not directly associated with depression. Unlike these studies, we did not find a significant difference between bruxers and controls concerning state and trait anxiety. The findings of Przystańska et al.[16] support our study with respect to the role of anxiety. Similarly, in the study by Bayar et al.,[17] which was conducted using the SCL-90-R (symptom checklist-90-revised) scale, no difference was found between bruxers and controls. Similarly, the groups were found to be comparable in terms of anxiety in two separate studies conducted by Cruz-Fierro et al.[3]in different countries. Montero and Gómez-Polo[18] found no significant difference for Modified Dental Anxiety total scores between bruxers and nonbruxers.

When the relationship between depression and anxiety was examined, a significant and positive correlation was found between trait anxiety score and depression in both the bruxer group (p=0.001, r=526) and the control group (p=0.001, r=0.541). There is substantial evidence in the literature suggesting that trait anxiety may be an important risk factor for the development of depression.[19] However, the factors and mechanisms that lead to the transformation of an anxious personality into clinical depression are not clear.

There is significant comorbidity between depression and anxiety disorders, and anxiety disorders are considered to lead to the onset of depression and follow a temporal relationship. The genetic and environmental factors underlying anxious personality traits are almost the same as the reasons that increase predisposition to anxiety disorders and depression.[20] The correlation between trait anxiety and depression scores in both the bruxer and control groups coincides with the findings in the literature.

This study had some limitations. As in our study, self-assessment scales and tooth enamel examination are dominant among the methods mentioned in the literature for investigating the relationship of bruxism with depression and anxiety. However, these methods also have many limitations. Tooth enamel examination is not sufficient to demonstrate bruxism and cannot distinguish tooth clenching from tooth grinding. The assessment of tooth wear severity in the diagnosis of sleep bruxism is still a subject of debate. While some studies reported a positive relationship between tooth wear and self-reported bruxism,[21] others reported no significant correlation.[22] Diagnosing bruxism only by dental examination without sleep records causes difficulties in distinguishing this from parafunctional activities. Lack of sleep recordings was a deficiency of our study, but we aimed to strengthen the diagnosis of bruxism by performing masseter muscle palpation in addition to dental examination. The small sample size was also another limitation of our study.

In conclusion, emotional factors in the etiology of bruxism are much-debated issues. While there are publications that argue that bruxism is associated with depression and anxiety, there are also opinions claiming that depression is more common, but there is no difference in terms of anxiety, similar to our study. However, unlike other studies, our study compared the state and trait anxiety scores between sexes and groups with subgroup analyses and also examined the relationship between depression and anxiety. We believe that the unknowns in our results will encourage further studies with larger patient populations and provide significant contributions to the literature.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea/concept, design: B.A.Ş., İ.Ö.; Control/supervision, critical review: İ.Ö.; Data collection and/or processing: G.Y., B.A.Ş., A.Ö.Ç.; Analysis and/or interpretation: B.A.Ş., A.Ö.Ç.; Literature review: G.Y., B.A.Ş.; Writing the article: G.Y.; References and fundings: B.A.Ş., G.Y.; Materials: G.Y., B.A.Ş., A.Ö.Ç.

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