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# A review about risk factors for bruxism in adults

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***Abstract:*** *Bruxism is the involuntary occurrence of rhythmic activity of the masticatory muscles in a non-physiological functional state in humans, resulting in rhythmic, intermittent grinding or clenching of the maxillary and mandibular teeth. The etiology of bruxism is complex and the pathogenesis is unknown; it may be associated with a number of factors. Risk factors for the development of bruxism in children and adolescents differ from those for adult bruxism. Emotional stress, tobacco, alcohol or coffee, sleep apnea syndrome and anxiety disorders are considered important factors for adult bruxism. In this paper, we will discuss the risk factors for the development of adult teeth grinding disorder from the following aspects: psychosomatic factors, exogenous factors, occlusal factors, and pharmacological factors, by synthesizing the relevant literature.*

***Keywords:*** *bruxism, risk factors*

## 1. Introduction

Bruxism is the involuntary occurrence of rhythmic activity of the masticatory muscles in a non-physiological functional state in humans, resulting in rhythmic, intermittent grinding or clenching of the maxillary and mandibular teeth. Literature assessing epidemiological studies of teeth grinding in different regions found that in children and adolescents, the prevalence of bruxism ranged from 13% to 49% [1], in adults the prevalence of waking bruxism was approximately 22.1% to 31% and nocturnal bruxism was approximately 8% to 31.4%, with no gender differences and the prevalence decreasing with age [2]. Depending on when the grinding occurs, it can be divided into diurnal bruxism and nocturnal bruxism: diurnal bruxism, also known as awake bruxism (AB), and nocturnal bruxism, also known as sleep bruxism (SB), which occurs at night and is a manifestation of sleep-wake disorder [3-5]. Prolonged grinding or clenching of the teeth can aggravate the non-physiological wear and tear of the teeth, leading to excessive wear and tear, pulpal trauma, destruction of periodontal tissue, etc. In severe cases, it can be accompanied by masticatory muscle pain, TMJ pain and headache [6].

The etiology of bruxism is complex and the pathogenesis is unknown; it may be associated with a number of factors. Risk factors for the development of bruxism in children and adolescents differ from those for adult bruxism. Emotional stress, tobacco, alcohol or coffee, sleep apnea syndrome and anxiety disorders are considered important factors for adult bruxism, whereas in children and adolescents, b both behavioral abnormalities and sleep disorders account for the dominant risk factors for bruxism [7]. A history of SB in childhood, gastroesophageal reflux disease and genetic polymorphisms appear to be important risk factors for SB in adults [8]. In this paper, we will discuss the risk factors for the development of adult teeth grinding disorder from the following aspects: psychosomatic factors, exogenous factors, occlusal factors, and pharmacological factors, by synthesizing the relevant literature.

## 2. Risk factors

### *2.1. Psychological factors*

Psychosocial factors have long been considered to be important risk factors for the development of bruxism. Much of the data on the relationship between psychological factors and bruxism comes from studies using clinical and/or self-reported diagnoses of bruxism, which have shown an association with

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anxiety, stress sensitivity, and depression [9].

Scholars have often used various scales and questionnaires as experimental tools to analyse the correlation between bruxism and psychosocial factors. To investigate the correlation between teething disorder and stress among university students, Italian scholars used the Perceived Stress Scale -10 (PSS-10) to measure their perceived stress in 278 students and found that stress was higher among female than male university students, but the correlation between stress and teething disorder was only present in males [10]. In a Brazilian cross-sectional survey of police officers [11], to assess the relationship between the type of work of police officers and bruxism and emotional stress, the Stress Symptoms Inventory (SSI) was used to assess emotional stress, and the results showed that emotional stress was associated with bruxism, independent of the type of work of police officers. Stress can even affect the level of activity of SB. Giraki et al [12] used the Stress Factor Identification Short Questionnaire (Kurzer Fragebogen zur Erfassung von Belastungen, KFB), the Recovery and Stress Questionnaire (Erholungs Belastungs Fragebogen, EBF- 24 A/3) and the Stress Response Questionnaire (StressVerabeitungsFragebogen-78, SVF-78) were used to assess stress in 68 subjects, while the level of SB activity was measured by a bruxism monitoring device, and it was found that subjects with a high level of SB activity felt more stress at work and in everyday life. There is an association between bruxism and certain psychopathic symptoms. Manfredini et al [13] used a self-report questionnaire on public place phobia (PAS-SR) and found variability in PAS-SR scores between the teeth grinding and non-teeth grinding groups, with significant differences particularly in scores on the domains of panic, stress sensitivity and desensitization symptoms. A questionnaire study including 874 respondents also found that self-aware individuals who grind their teeth frequently had more severe anxiety relative to the non-grinding group [14]. In a cross-sectional study of factory workers in Japan that included 1944 men and 736 women, assessing their stress at work with 13 job stress variables, it was concluded that low social support and high depressive symptoms significantly increased the risk of SB among male workers, and that the occurrence of SB was weakly associated with job stress among male workers, but no association has been found among women [15].

Stress is stress, and biological responses to stress are reflected in both somatic behavior and changes in physiological levels. Therefore, in clinical research, in addition to using scale questionnaires to assess stress to subjectively investigate the relationship between bruxism and stress, physiological indicators of stress can also be measured to objectively reflect stress levels in order to investigate the correlation between bruxism and stress. Physiological indicators such as cortisol, alpha-amylase, catecholamines, heat shock proteins, and pro-inflammatory cytokines can all reflect stress levels [16].

Karakoulaki et al [17] combined both scales and stress physiological indicators to measure perceived stress in 45 participants by using the Perceived Stress Scale questionnaire; collected unstimulated whole saliva and measured salivary cortisol and α-amylase levels by enzyme-linked immunosorbent assay test and enzyme kinetic reaction, respectively, and the analysis showed that the perceived stress levels were higher in patients with molarization than in non-molarization and the cortisol level was higher in molar patients than in non-molar patients. In contrast, salivary alpha-amylase levels did not differ significantly between molar and non-molar teeth. Abekura et al [18] assessed stress in 76 subjects by measuring salivary chromogranin A levels and subjectively using a 10-point visual analog scale and found that the mean salivary CgA levels in the non-grinding t dentition group (n=54) were not significantly different before and after the stressful task. In contrast, mean salivary CgA levels in the teething disorder group (n=22) were significantly higher after the stressful task; mean VAS scores in the non-teething disorder and teething disorder groups were significantly higher after the stressful task compared to before the stressful task, but there was no difference between the two groups in the stressful task, suggesting an association between sleep teething disorder and psychological stress.

However, a small number of articles have found a very weak association between bruxism and stress. Ohlmann et al [19], in their study of the relationship between bruxism and chronic stress and sleep quality, used the Trier Inventory for the Assessment of Chronic Stress, TICS, to assess chronic stress, and the Pittsburgh Sleep Quality Index (PSQI) Sleep Quality Index (PSQI) to assess sleep quality, the results showed no statistically significant association between sleep teething disorder and self-reported stress or sleep quality. However, there was a significant association between specific items of chronic stress and poor sleep quality. Smardz [20] et al. assessed the possible correlation between the occurrence of sleep teething disorder and perceived stress and depressive symptoms, and perceived stress exposure was assessed using the Perceived Stress Scale-10 (PSS-10), and depressive symptoms were assessed using the Beck's Depression Inventory (BDI) was used to assess the occurrence of depressive symptoms. Analysis of the results showed a lack of statistically significant correlations between the Bruxism Episode Index (BEI) and Perceived Stress Inventory-10 and Beck’s Depression Inventory scores, also when

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comparing the study group (bruxism patients) and the control group (non-bruxism patients)). There was no statistically significant correlation between the intensity of sleep teething disorder and self-reported perceived stress and depression. The relationship between teething disorder and stress needs to be further investigated.

### *2.2. Exogenous factors*

We have categorized smoking, alcohol and coffee as exogenous factors associated with bruxism. Studies have shown that smoking, alcohol consumption, and coffee are independent risk factors for bruxism [21, 22]. A systematic review by Bertazzo et al [23] demonstrated that SB was positively associated with alcohol, coffee and smoking, with 8 cups of coffee per day increasing the prevalence of SB by nearly 2-fold and smokers by nearly 1.5-fold compared to non-smokers. Alajbeg et al [24] found a 2.72-fold higher risk of SB in smokers compared to non-smokers in a survey of 1092 Croatian navy grinders.

Some studies have also found a correlation between secondhand smoke and bruxism. Toyama et al [25], in elucidating the relationship between sleep teething disorder, sleep quality, and secondhand smoke exposure, found poor sleep quality and indirect association between secondhand smoke exposure and sleep teething disorder in young adult Japanese women, but no association was found in young adult men.

### *2.3. Occlusal factors*

In the early days, the etiology of bruxism was mostly limited to the teeth, and it was thought that abnormalities in the anatomy of the teeth and occlusal interference led to the development of bruxism [26]. Young et al [27] compared the craniofacial morphological structures of molar and non-molar patients and divided 155 volunteers into molar and non-molar groups using a questionnaire and clinical examination of the wear status of the teeth, showing that compared to the non-molar group The results showed that the cranial and facial widths were significantly greater in the molar group compared to the non-molar group, but there was no correlation between head shape, facial shape and overlap in terms of tooth grinding. In recent years, as the etiology of molarity has been explored, it has become clear that peripheral anatomical factors play a very low role in the development of molarity. The vast majority of the literature has concluded that there is no causal relationship or association between occlusal factors and molarity [28, 29]. Manfredini et al [30] assessed various occlusal characteristics of the natural dentition in two groups of gender- and age-matched patients with and without molarity and found a low correlation between occlusion and molarity through multiple regression model analysis. The role of peripheral anatomical structural factors in the pathogenesis of molarity was greatly diminished.

### *2.4. Related diseases*

Temporomandibular disorders (TMD), sleep disorders, and gastroesophageal reflux disease (GERD) are among the conditions that have been found to be associated with the occurrence of teeth grinding in current studies. Blanco et al [31] found a statistically significant association between self-reported sleep teething disorder and women under 60 years of age with TMD pain symptoms when assessing the relationship between self-reported sleep teething disorder and patients previously diagnosed with TMD by age, gender, clinical subtype, pain intensity, and chronic pain rating.

An epidemiological survey of a representative population of three countries (Germany, UK, Italy) on teething disorders [32] found that patients with anxiety and sleep breathing disorders were at higher risk of developing teething disorders. Obstructive sleep apnea hypoventilation syndrome (OSA) is the most common sleep disorder. Sleep bruxism (SB) is a parafunctional activity of the oral cavity that occurs during sleep, usually in conjunction with OSA. Martynowicz et al [33] evaluated 110 adult patients for OSA and SB in a sleep laboratory using polysomnography. The prevalence of OSA and SB was 86.37% and 50% respectively. Mild and moderate OSA (apnea hypopnea index (AHI, apnea-hypopnea index) < 30) groups had an elevated bruxism episode index (BEI, bruxism episode index) compared to the severe OSA group (AHI ≥ 30). In the group with AHI < 30, a positive correlation between AHI and BEI was observed. Regression analysis showed that high AHI, male and diabetes were independent predictors of increased BEI in the AHI<30 group. The relationship between OSA and SB depended on the severity of OSA. In the group of patients with increased risk of OSA, OSA was associated with SB in patients with mild and moderate OSA.

The correlation between gastroesophageal reflux disease and teething disorder was demonstrated in

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a case-control study that matched 887 Continuous clinically diagnosed teething patients aged 18-75 years with 887 non-teething patients and concluded that clinically diagnosed teething disorder was associated with symptomatic GERD, mediated in part through depression, anxiety and impaired sleep quality. As molarity is closely associated with symptomatic GERD and patients suffering from frequent symptoms of molarity tend to have long-standing GERD, dentists should consider assessing GERD status as an essential part of the medical examination for molarity, particularly for severe molarity.

### *2.5. Drugs*

There is a correlation between antidepressants and teeth grinding disorder. 5-hydroxytryptamine (5-HT)-ergic antidepressants, such as selective 5-HT reuptake inhibitors (SSRIs) and 5-HT and norepinephrine (NE), reuptake inhibitors (SNRIs), can cause bruxism [34]. Uca et al [35] studied 807 patients, 506 in the antidepressant group and 301 in the control group, and found that the prevalence of teething disorder was significantly higher in the antidepressant group (24.3%) than in the control group (15.3%), and the prevalence of antidepressant-induced teething disorder was 14.0%, and the antidepressants most associated with teething disorder were paroxetine, venlafaxine, and duloxetine. Antidepressant-associated teeth grinding may occur in pediatric and adult patients, most commonly in female patients. Patients may experience teeth grinding symptoms after short- and long-term antidepressant use, which may begin within 3-4 weeks after starting the medication and may disappear within 3-4 weeks after stopping the medication, adding bupropion, or replacing it with another medication [34].

The mechanism of antidepressant-induced bruxism is unknown, and it has been suggested that the interaction between 5-HT and DA plays a role in 5-HTergic antidepressant-induced bruxism. 5-HTergic drugs act on the midbrain cortex in the ventral tegmental area, causing hyperexcitability of 5-HTergic neurons, which inhibits the release of DA from the midbrain cortical pathway and results in masticatory muscle dystonia causing teeth grinding [36, 37].

### *2.6. Genetic factors*

Genetic factors are one of the risk factors for the development of bruxism [38]. In a case-control study on the association of genetic, psychological and behavioral factors with sleep teething disorder in a Japanese population, 13 polymorphisms in four genes associated with 5-hydroxytryptaminergic neurotransmission (SLC6A4, HTR1A, HTR2A and HTR2C) were genotyped, and the rs6313 genotype, the rs2770304 genotype and the rs4941573 genotypes were logistic regression analyses with sleep teething disorder, and the results showed that only carriers of the C allele of the HTR2A single nucleotide polymorphism rs6313 were significantly associated with an increased risk of sleep teething disorder, suggesting that the etiology of sleep teething disorder may be related to genetic factors [39].

In addition, other risk factors for bruxism are gender, age, and marital status [24, 31].

## 3. Conclusion

In summary, psychosomatic factors, exogenous factors such as smoking, alcohol and coffee consumption, antidepressant medication and genetic factors are important risk factors for the development of adult teeth grinding disorder. The causal relationship between these factors and edentulism and the mechanisms underlying their effects on edentulism remain to be further investigated. Exploration of these risk factors and clarification of the pathogenesis of bruxism will help us in the prevention and treatment of bruxism.

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