Vol. 14, No. 1, January - March 2022

ASSOCIATION BETWEEN VARIOUS PATHOLOGIES AND BRUXISM
- A LITERATURE REVIEW –

Nică Iulia-Karla[1], Păuna Mihaela-Rodica[1], Farcașiu Alexandru-Titus[1]

1. Carol Davila University of Medicine and Pharmacy, Bucharest, Romania, Faculty of Dentistry, Department of Removable Prosthodontics

Corresponding author; *e-mail: iulia.nica@umfcd.ro*

ABSTRACT

Bruxism is a parafunction characterized by clenching and grinding of teeth, while making movements that are not part of the masticatory function and that lead to occlusal trauma. Although there are many signs and symptoms of bruxism, the most common sign is the presence of abnormal teeth wear. Recent studies showed the association between bruxism and other diseases, both in children and in adults. The present paper reviewed current studies of bruxism alterations, enclosed physiology and pathology, emphasizing its effects on dental structures in an attempt to ease the clinical diagnosis.

Keywords: bruxism, tooth grinding, bruxism association pathology, occupational bruxism, children with bruxism

INTRODUCTION

Bruxism is defined as an oral habit of involuntary rhythmic pressing, clenching and grinding of the teeth when performing movements that are not part of the masticatory function that leads to occlusal trauma [1].

In most cases, the parafunction is discovered when the patient attends a regular check-up. One of its most prominent clinical signs apart from muscular pain is the abnormal tooth wear, caused by teeth grinding and clenching. This is not a decisive sign for bruxism, because tooth wear can occur when eating acidic foods or by incorrect tooth brushing (erosion and/or dental abrasion). Thus, we must see the evidence of antagonist teeth wear [2].

Bruxism may alter the results and the duration of treatments performed by clinicians. It may lead to fracture of natural teeth, dental prostheses or dental restorations. Bruxism may also be a contraindication to implants, as it may influence implant prognosis [3].

Oral parafunctions may alter occlusal loads of natural teeth, prostheses, and dental implants, both in terms of force direction and intensity. Dental attrition, abfraction, and occlusal pits on natural teeth have been documented in patients with self-reported parafunctions. Many authors suggested that oral parafunctions represent a risk factor for marginal bone loss around implants and implant failure [4].

Over the years, various definitions, classifications and theories regarding the aetiology of bruxism have been presented, reflecting the evolution and growth of knowledge of this subject. Currently bruxism is divided into two distinct entities, awake and sleep bruxism, based on when the activity occurs. Sleep bruxism (SB) is a masticatory muscle activity during sleep that is characterised as rhythmic (phasic) or non-rhythmic (tonic) and is not a movement disorder or a sleep disorder in otherwise

healthy individuals. Awake bruxism (AB) is a masticatory muscle activity during wakefulness that is characterised by repetitive or sustained tooth contact and/or by bracing or thrusting of the mandible and is not a movement disorder in otherwise healthy individuals [5].

Publications reported the association of bruxism with various types of movement disorders and showed that in Parkinsonian syndromes, awake bruxism was rarely reported, but seems to be exacerbated by medical treatment, whereas sleep bruxism is mainly observed during *non-rapid eye movement* sleep (non-REM sleep), as in restless leg syndrome. Awake bruxism is occasionally reported in Huntington's disease, primary dystonia, and secondary dystonia; however, its highest incidence and severity is reported in syndromes combining stereotypies and cognitive impairment, such as Rett's syndrome (97%), Down syndrome (42%), and autistic spectrum disorders (32%) [6].

MATERIAL AND METHODS

The data source used was PubMed, using the following keywords:”bruxism”, ”tooth grinding”, ”bruxism association”. In the last twenty years, more than 2700 studies have been published in the literature containing studies about bruxism. For this paper were assesed reviews and case control articles related to psychological diseases, bruxism among children and different types of jobs.

RESULTS AND DISCUSSIONS

Prevalence

Prevalence rate of AB and SB is about 20% and 8–16% respectively in adult population. AB occurs predominantly among females while no gender difference is seen for SB. The onset of SB is about 1 year of age soon after the eruption of deciduous incisors. The disorder appears more frequently in the younger population. In children the prevalence is between 14 to 20% [7].

In a study made by the Federal University of the Jequitinhonha and Mucuri Valleys in Brazil, results showed that 31.6% of the students had bruxism. Of the 7084 teeth evaluated, 376 (5.3%) had some type of facet wear. Canines are the teeth that had the highest prevalence of wear facets. Stress, muscle pain, temporomandibular joint (TMJ) pain, and TMJ noise were highly associated with bruxism [8].

The prevalence of SB in children reported in studies varies widely. In addition, SB has been shown to be more common among children compared to adults, with the prevalence rates ranging from 13% to 49%. A study by Sousa showed that the incidence of SB in adolescents was 22.2% and the prevalence was higher in male adolescents as indicated by multivariate analysis. In another study, Manfredini et al. reported variations in the incidence of bruxism between 3.5% and 40.6%, with a decrease observed with age, regardless of gender. The differences in results between studies might be mainly related to the use of unreliable tools for the diagnosis of SB in children [9].

Physioloy and pathology – associations

Major factors in the etiology of sleep bruxism are considered to be stress and psychological factors, but some studies observed that masticatory muscle activity and periodic pain during sleep increased during stressful periods among those reporting sleep bruxism. Also, it was shown that children and adults reporting awareness of tooth grinding are more anxious, aggressive and hyperactive [5].

Many studies examining the prevalence of bruxism showed that this parafunction can be encountered among different occupations and pathologies (table 1).

Table 1. Prevalence condition encountered among patients with bruxism.

Author/Year	Prevalence condition	Ref.
Drumond et al. (2017)	SB was more prevalent among children with rhinitis (PR = 1.45; 95%CI 1.08–1.93; p = 0.012) and sinusitis (PR = 1.58; 95%CI 1.06–2.36; p = 0.023)	[10]
Nekora-Azak et al. (2010)	Prevalence of clenching teeth was 45.7% and that of grinding teeth was 21.6%. Tooth wear in the married group was higher than the single group. There were significant correlations between bruxism and job categories.	[11]
Melis & About-Atme (2003)	Prevalence of bruxism was 27.2%. No association was found between bruxism and age, gender and job. Divorced people reported higher parafunctional activity compared to widows/widowers who reported the least.	[12]
Hirotsu et al. (2014)	In this Brazilian population, prevalence of bruxism showed that women (8%) were more affected than men (5%). There is evidence of an association between bruxism and tension, stress, and emotional disturbance.	[13]
Nota et al. (2019)	Military pilots affected by bruxism showed a statistically significant lower (reduced of 85%) mean occlusion time compared with healthy control subjects ($p < 0.0001$).	[14]
Phuong et al. (2020)	Prevalence of bruxism, sleep bruxism, awake bruxism, and both conditions in Vietnamese medical students were 51.2%, 38.2%, 23.4%, and 10.4% respectively. Stress, temporomandibular joint pain, masticatory muscle pain, and tooth attrition were associated with the presence of bruxism.	[15]
Marín et al. (2019)	Significant association between the variable bruxism and the level of work stress between the military aviators ($p<0.001$). The sub-officers presented a higher percentage in the category "with bruxism", while in the rank of officers the category of "non-bruxism" was the most prevalent.	[16]
Van Selms et al. (2020)	Musicians who sleep 7 hours or less per night report more sleep bruxism, as compared to those who sleep 8 hours or more. Female gender and high-stress experience were associated with more sleep bruxism.	[17]
Carvalho et al. (2008)	Prevalence of bruxism was 50.2% and a prevalence of emotional stress 45.7%. No significant association was found between emotional stress and type of work.	[18]

Previous studies have shown that the complex origin of SB can be related to the psychological features of the affected individual, consumption of caffeine and alcohol, smoking, obstructive sleep apnoea, diabetes, increased body mass index,

hypertension, thyroid diseases, and probable genetic vulnerability, also it was found that young sleep bruxers potentially have a high cardiovascular (CV) risk due to the increased level of inflammatory and stress markers [19].

A systematic review investigated the impact of SB on oral health-related quality of life (OHRQoL) of 0- to 6-year-old children. SB was associated with respiratory problems, presence of tooth wear, dental caries, malocclusion as well as income and pacifier use. Risk of bias ranged from moderate to high, and the quality of evidence was judged as very low [20].

A total of 240 individuals were included in a cross-sectional clinical study evaluated the associations between sociodemographic, occupational, clinical conditions, psychological and sleep quality variables on definite sleep bruxism. All records were obtained from adults (aged 20-60 years) and the elderly (aged >60 years) who had undergone polysomnography at a private medical outpatients' clinic. Data from a questionnaire, based on the criteria of the American Academy of Sleep Medicine, were also gathered. This study found associations between definite SB and clinical conditions (respiratory allergy) and sleep behaviour (restless sleep) [21].

A cross-sectional study was performed in the city of Diamantina, Brazil, with 448 randomly selected schoolchildren aged 8 to 11 years. The schoolchildren underwent an oral examination for the evaluation of bruxism. Rhinitis and sinusitis were associated with sleep bruxism. Moreover, sleep bruxism was more prevalent among children whose mothers had a higher level of schooling and those with higher degrees of stress [10].

Two complementary studies were performed: a case-control study to verify the linkage between gastroesophageal reflux disease (GERD) and bruxism and a cross-sectional study on the same cohort to establish the connection between GERD and tooth wear in bruxism patients. A cohort of 363 consecutive bruxism patients and 363 matched control participants were recruited. Bruxism with reflux symptoms for extensive time-periods was associated with severe tooth wear for the whole dentition (odds ratio, 4.70, 95% confidence interval, 2.04–10.83). Increased odds ratios for severe tooth wear were also found in all tooth locations and palatal/lingual and occlusal/incisal surfaces of bruxism patients with GERD for extensive time-periods [22].

To evaluate in inflammatory bowel disease patients, the prevalence of sleep bruxism and its correlation with the presence of oral diseases, quality of sleep, and psychological disturbances, 47 patients and 46 controls were included in this study. Sleep bruxism and enamel wear disorders were more frequent in Crohn's disease patients when compared with ulcerative colitis patients and controls (p=0.03 respectively p=0.02). Among groups, no differences were noted for enamel hypoplasia, temporomandibular disorders, recurrent aphthous stomatitis, depression, and sleep disorders. We found a positive correlation between bruxism and temporomandibular disorders (Spearman 0.6, $p < 0.001$) and between bruxism and pathological sleep (Pittsburgh Sleep Quality Index > 5) (Spearman 0.3, p <0.005) [23].

The literature contains reports of some association between bruxism either awake or asleep and sleep respiratory disturbances. Dentists studying sleep bruxism also need to be aware that sleep breathing disorders such as snoring and airway resistance with or without apnoea-hypopnoea may be

concomitant with sleep bruxism. The most prevalent respiratory disturbances during sleep is snoring, which is defined as an oropharyngeal sound caused by air turbulence inducing soft tissue vibrations. A sleep laboratory study reveals that 35% of tooth grinders also present snoring and that only 1 out of 6 patients present sleep apnoea-hypopnoea syndrome [24].

In a study lead to answer the question "Is there an association between any specific signs and symptoms of bruxism and the presence of tori?" result have shown that presence of abnormal tooth wear increased the odds of having tori, mainly for mandibular torus and this association could help clinicians on the recognition of patients susceptible to bruxism. A possible pathophysiological hypothesis is that grinding could increase the loading on teeth, transferring the force to the bone, remodelling it over time, and strengthening it to resist that loading [25].

The findings of a study made on 102 volunteer adult Greek subjects, classified into 2 groups (50 self-reported bruxers and 52 non-bruxers), suggested a significant association between the self-reported bruxism and the occurrence of 4 clinical signs (abfraction lessions, occlusal pits, and dental attrition in posterior and anterior regions). The 4 clinical signs were noticeable more frequent in self-reported bruxers than non-bruxer subjects. The greatest differences between the 2 groups were found for the relative occurrence of the anterior and posterior attrition signs. This finding suggests that, primarily, the signs of dental attrition may differentiate self-reported bruxers from non-bruxers [26].

One study showed that individuals with attrition-type tooth wear did not have greater EMG activity during sleep than matched controls. This suggests that the clinician cannot use the presence of tooth wear as a direct indication of active sleep bruxism. The hypothesis that there is no difference in SB activity as evaluated by portable home ambulatory EMG equipment, in subjects with or without attrition-type tooth wear was supported [27].

Another study suggested that HIV+ patients, who are on anti-retroviral therapy have significant tooth wear, although more studies with larger sample size are needed to confirm this. The mean tooth wear index was higher in HIV+ patients than HIV- patients (8.2 vs. 7.8) [28].

Psychological diseases

Manfredini's study confirmed poor evidence of a relationship between occlusion and bruxism, while psychiatric evaluation showed an association with anxiety, depressive and manic symptom [29].

A study suggested that schizophrenic patients report less pain in their daily lives does not necessarily mean they would report less sensitivity to a provoked pain in a clinical setting. Therefore, the high pain report of the psychiatric patients, does not necessarily mean that the actual painful condition is even more severe than apparently presented by the patients and it is not surprising that the psychiatric patients experienced severe dental damage, as evident by an extensive attrition of teeth. Approximately 50% of these patients presented abnormal attrition of their general dentition. Because a not surprising that the psychiatric patients experienced severe dental damage, as evident by an extensive attrition of teeth [30].

Children with bruxism

A population-based case-control study carried out involving 120 children, 8 years

of age, with sleep bruxism and 240 children without sleep bruxism concluded that there is an association between sleep bruxism and other parafunctions. Children whith parafunctions of biting on objects, such a pencils and pens, and wake-time bruxism were more susceptible to develop sleep bruxism. (31)

Study supported by the State University of Paraiba, Brazil concluded that the prevalence of sleep bruxism was 29.1% among children and their respective parents/caregivers. Also sleep bruxism among preschool children was associated with tooth wear and poor sleep quality of the child. Moreover, children who snore and those who have nightmares are more likely to exhibit sleep bruxism [32].

In evaluation of bruxist children with primary teeth, dental wear present in bruxist and non-bruxist children was used to compare the size and shape differences of dental wear between the two groups. It was found to be more significant in the bruxist group, being located mainly in the incisive zone. In this work, more anterior and downward head postures and kyphotic necks were found in the bruxist group, with hyperflexion of the head posture. These characteristics could affect the airflow in the bruxist children and could be part of the aetiology of their parafunction. Anterior and downward head postures, like those found in the bruxist children in this study, make the masticatory muscles be more hypertonic [33].

Moreover, the risk of suffering from or of developing SBD increases if associated with retrognathia, micrognathia, macroglossia, hypertrophy of the tonsils or adenoids and a Mallampati score of III or IV. The Mallampati score ranks oropharyngeal obstructions from I, corresponding to “no obstruction” (the tonsils, faucial pillars and soft palate are clearly visible), to IV in cases of “major obstruction” (only the hard palate is visible). Also, clinicians can observe directly the patient’s breathing habits (mouth breathing versus nose breathing), behavior (agitated, anxious) and any tendency to doze off [34].

Occupations

A study showed that dental students experience higher stress levels than do medical students and there is a positive association of psychosocial factors such as anxiety, and stress with self-reported bruxism. It has been shown that bruxers reported significantly longer sleep durations compared with non-bruxers. Individuals who slept for longer durations exhibited higher levels of subjective sleepiness after sleep deprivation, while those who slept for shorter durations exhibited no significant increase in sleepiness levels. With regard to the duration of daytime naps, 56.9% bruxers napped for longer than 3 hours, as opposed to only 37.4% non-bruxers also those who sleep for shorter durations tend to develop subclinical hypomania, whereas those who sleep longer tend to be depressed more frequently or almost daily. Bruxers were found to be more anxious and depressed compared with non-bruxers [35].

Study carried on military firefighters, showed that only awake bruxism was an independent risk factor for developing frequent episodic tension-type headache with non-painful TMDs. Increased frequency of both high and low-intensity diurnal tightening episodes was correlated with masticatory muscle pain. Self-reported bruxism activity, when individuals agreed that they ground their teeth, was related to the presence of frequent episodic tension-type headache and painful TMDs. In addition, the symptoms of anxiety were

correlated with the presence of headaches TMDs and awake bruxism [36].

The present study showed that the relative search volume for bruxism, teeth grinding, and teeth clenching, as an indication of public interest and demand, was increased both worldwide and in the United States during the May–October 2020 period compared to similar periods of the previous 4 years. Therefore, the finding indicates that the public remarkably searched for bruxism and its symptoms in the initial pandemic period. After the initial period, relative search volume of bruxism, teeth grinding and teeth clenching all were significantly increased compared to similar periods of the previous 4 years. This finding may indicate that the COVID-19 pandemic had a negative impact on bruxism and its symptoms. Several factors might have contributed to this observed increase. COVID-19-related deaths, strict quarantine/lockdown measures, and economic recession/financial crisis/rise in unemployment have led to considerable increases in the levels of psychological distress in the general public [37].

During pandemic COVID-19 studies were conducted as cross-sectional online surveys using similar anonymous questionnaires in Israel and Poland. The authors obtained 700 complete responses from Israel and 1092 from Poland. In the first step, data concerning TMDs and bruxism were compared between the two countries. In the second step, univariate analyses were performed to investigate the effects of anxiety, depression, and personal concerns of the Coronavirus pandemic, on the symptoms of TMD, and bruxism symptoms and their possible aggravation. Finally, multivariate analyses (logistic regression models) were carried out to identify the study variables that had a predictive value on TMD, bruxism, and symptom aggravation in the two countries. The results showed that the Coronavirus pandemic has caused significant adverse effects on the psycho-emotional status of both Israeli and Polish populations, resulting in the intensification of their bruxism and TMD symptoms [38].

Discussion

Bruxism diagnosis is a challenge and is usually made clinically and is based on the clinical history of the patient and the presence of typical signs, including tooth mobility, damage to teeth, hypersensitive teeth, and pain in the masticatory muscles. The earlier it is diagnosed the faster it can be avoided the damage of teeth, muscle and TMJ.

Due to the fact that bruxism is correlated with psycho-emotional factors, it should be considered a public health problem that can affect at some point each individual.

Some studies highlighted the involvement of stress in the onset of bruxism, but other studies shown no significant association between emotional stress and type of work. However, bruxism was found among population with jobs related to higher responsibilities.

Bruxism among children is significantly spread, associated with tooth wear and poor sleep quality of the child. Parents should be aware that some habits or head postures can lead to bruxism.

Students with anxiety and muscle pain symptoms were more likely to develop bruxism than patients who do not have such comorbidities, regardless of age and gender

Studies have shown that aethiology includes genetic, neuro-physiological, psycho-emotional and pharmacological factors therefore the treatment for bruxism requires a multidisciplinary approach, including psychology and/or psychotherapy

as the bruxism cannot be understand as an isolated condition.

CONCLUSIONS

1. Assessing such abundant information on the field of bruxism, leads to awareness that bruxism has a high frequency of appearance in all age groups and is associated with many diseases.
2. This parafunctional activity has a significant impact on oral cavity and on life quality. Prevention should be taken into account in the treatment of bruxism, avoiding the risk of development of various oral diseases with their complications. A multidisciplinary approach is indicated for the reduction of injuries regarding osseous and dental tissue.

REFERENCES

1. The Glossary of Prosthodontic Terms: Ninth Edition. J Prosthet Dent. 2017; 117(5S):e1-e105.
2. Veiga N, Ângelo T, Ribeiro O, Baptista. Bruxism – Literature review. Int J Dent Oral Health 2015; 1:(5).
3. Singh, A, Tandon, R, Singh A, & Gupta. Bruxism: An Ignored Malady. Orthodontic Journal of Nepal 2014; 4(1), 48–51.
4. Lumetti S, Ghiacci G, Macaluso GM, et al. Tardive Dyskinesia, Oral Parafunction, and Implant-Supported Rehabilitation. Case Rep Dent 2016; 2016:7167452.
5. Lobbezoo F, Ahlberg J, Raphael KG, et al. International consensus on the assessment of bruxism: Report of a work in progress. J Oral Rehabil 2018; 45: 837– 844.
6. Ella B, Ghorayeb I, Burbaud P. et al. Bruxism in Movement Disorders: A Comprehensive Review. Journal of Prosthodontics 2017; 26: 599-605.
7. Prasad DK, Swaminathan AA and Prasad DA. A Review Of Current Concepts In Bruxism - Diagnosis And Management. Journal of Health and Allied Sciences NU 2014; 4:129-136
8. Soares LG, Costa IR, Brum Júnior JDS, et al. Prevalence of bruxism in undergraduate students. Cranio 2017; 35(5):298-303.
9. Bulanda S, Ilczuk-Rypuła D, Nitecka-Buchta A, et al. Sleep Bruxism in Children: Etiology, Diagnosis, and Treatment-A Literature Review. Int J Environ Res Public Health 2021; 18(18):9544.
10. Drumond CL, Souza DS, Serra-Negra JM, et al. Respiratory disorders and the prevalence of sleep bruxism among schoolchildren aged 8 to 11 years. Sleep Breath 2017; 21(1):203-208
11. Nekora-Azak A, Yengin E, Evlioglu G, et al. Prevalence of bruxism awareness in Istanbul, Turkey. Cranio 2010; 28(2):122-127.
12. Melis M, Abou-Atme YS. Prevalence of bruxism awareness in a Sardinian population. Cranio 2003; 21(2):144-151.
13. Hirotsu C, Bittencourt L, Garbuio S, et al. Sleep complaints in the Brazilian population: Impact of socioeconomic factors. Sleep Sci. 2014; 7(3):135-142.
14. Nota A, Tecco S, Cioffi C, et al. Occlusion time analysis in military pilots affected by bruxism. Sci Rep. 2019; 9:1408.
15. Phuong NTT, Ngoc VTN, Linh LM, et al. Bruxism, Related Factors and Oral Health-Related Quality of Life Among Vietnamese Medical Students. International Journal of Environmental Research and Public Health 2020; 17(20):7408.

16. Marín M, Rodríguez Y, Gamboa E, et al. Level of work stress and factors associated with bruxism in the military crew of the Peruvian Air Force. Medical Journal Armed Forces India 2019; 75(3), 297-302.
17. Van Selms M, Kroon J, Tuomilehto H, et al. Self-reported sleep bruxism among Finnish symphony orchestra musicians: Associations with perceived sleep-related problems and psychological stress. Cranio: the journal of craniomandibular practice 2020; 2020: 1-8.
18. Carvalho AL, Cury AA, Garcia RC. Prevalence of bruxism and emotional stress and the association between them in Brazilian police officers. Braz Oral Res. 2008; 22(1):31-35.
19. Michalek-Zrabkowska M, Wieckiewicz M, Smardz J, et al. Determination of Inflammatory Markers, Hormonal Disturbances, and Sleepiness Associated with Sleep Bruxism Among Adults. Nat Sci Sleep. 2020; 12:969-979.
20. Rodrigues JA, Azevedo CB, Chami VO, et al. Sleep bruxism and oral health-related quality of life in children: A systematic review. Int J Paediatr Dent. 2020; 30: 136– 143.
21. Azario de Holanda T, Castagno CD, Barbon FJ, et al. Influence of respiratory allergy and restless sleep on definite sleep bruxism: a cross-sectional clinical study. Sleep Med. 2020; 70:43-49
22. Li Y, Yu F, Niu L, et al. Associations among Bruxism, Gastroesophageal Reflux Disease, and Tooth Wear. J Clin Med. 2018; 7(11):417.
23. Bucci C, Amato M, Zingone F, et al. Prevalence of Sleep Bruxism in IBD Patients and Its Correlation to Other Dental Disorders and Quality of Life. Gastroenterology Research and Practice 2018; 2018:7274318.
24. Lobbezoo F, van der Zaag J, van Selms MK, et al. Principles for the management of bruxism. J Oral Rehabil. 2008; 35(7):509-523.
25. Bertazzo-Silveira E, Stuginski-Barbosa J, Porporatti AL, et al. Association between signs and symptoms of bruxism and presence of tori: a systematic review. Clin Oral Investig. 2017; 21(9):2789-2799.
26. Tsiggos N, Tortopidis D, Hatzikyriakos A, Menexes G. Association between self-reported bruxism activity and occurrence of dental attrition, abfraction, and occlusal pits on natural teeth. J Prosthet Dent. 2008; 100(1):41-46.
27. Jonsgar C, Hordvik PA, Berge ME, et al. A. Sleep bruxism in individuals with and without attrition-type tooth wear: An exploratory matched case-control electromyographic study. J Dent. 2015; 43(12):1504-1510
28. Sehgal HS, Kohli R, Pham E, et al. Tooth wear in patients treated with HIV anti-retroviral therapy. BMC Oral Health 2019; 19(1):129.
29. Manfredini D, Landi N, Romagnoli M, Bosco M. Psychic and occlusal factors in bruxers. Aust Dent J. 2004; 49(2):84-89.
30. Winocur E, Hermesh H, Littner D, et al. Signs of bruxism and temporomandibular disorders among psychiatric patients. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2007; 103(1):60-63.
31. Serra-Negra JM, Paiva SM, Auad SM, et al. Signs, symptoms, parafunctions and associated factors of parent-reported sleep bruxism in children: a case-control study. Braz Dent J. 2012; 23(6):746-752.
32. Gomes MC, Neves ÉT, Perazzo MF, et al. Evaluation of the association of bruxism, psychosocial and sociodemographic factors in preschoolers. Braz Oral Res. 2018; 32:e009.
33. Vélez AL, Restrepo CC, Peláez-Vargas A, et al. Head posture and dental wear evaluation of bruxist children with primary teeth. J Oral Rehabil. 2007; 34(9):663-670.
34. Carra MC, Bruni O, Huynh N. Topical review: sleep bruxism, headaches, and sleep-disordered breathing in children and adolescents. J Orofac Pain. 2012; 26(4):267-276.

35. Shokry SM, El Wakeel EE, Al-Maflehi N, et al. Association between Self-Reported Bruxism and Sleeping Patterns among Dental Students in Saudi Arabia: A Cross-Sectional Study. Int J Dent. 2016; 2016:4327081.
36. Wagner BA, Moreira Filho PF. Painful temporomandibular disorder, sleep bruxism, anxiety symptoms and subjective sleep quality among military firefighters with frequent episodic tension-type headache. A controlled study. Arq Neuropsiquiatr. 2018; 76(6):387-392.
37. Kardeş E, Kardeş S. Google searches for bruxism, teeth grinding, and teeth clenching during the COVID-19 pandemic. J Orofac Orthop. 2021; 1-6.
38. Emodi-Perlman A, Eli I, Smardz J, et al. Temporomandibular Disorders and Bruxism Outbreak as a Possible Factor of Orofacial Pain Worsening during the COVID-19 Pandemic-Concomitant Research in Two Countries. J Clin Med. 2020; 9(10):3250.