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## **It's not just adults who gnash their teeth- a comprehensive review of the latest information on bruxism in children**

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## **ABSTRACT:**

### **Introduction**

Bruxism is a parafunction characterized by excessive chewing muscle activity involving grinding or clenching of the teeth.

Bruxism has become a significant challenge in the field of pediatric dentistry.

### **Aim of the study**

The aim of this comprehensive review is to provide an overview of bruxism in children, focusing on etiology, symptoms, diagnosis, and current treatment options. To draw attention to the prevalence of the disorder and to raise awareness of the importance of early recognition and intervention for bruxism in children.

### **Materials and methods**

An analysis of scientific articles available in the PubMed and Google Scholar databases was conducted. Our research is supported by all relevant publications from recent years. The etiology, diagnosis, and treatment of bruxism in children were of particular interest in the study. This process involved the use of the following keywords: 'bruxism', 'children', 'sleep bruxism', 'tooth wear', 'bruxism diagnosis', 'bruxism etiology', 'bruxism treatment'.

### **Conclusions**

We evaluated 31 relevant publications. The results of the study indicate a variation in the prevalence of bruxism in children, oscillating between 13-49%. The etiology of this disorder

is multidimensional and remains incompletely elucidated. The primary methods of diagnosing bruxism in younger patients include observation by parents or caregivers, a thorough health history and intraoral and extraoral dental examination. Physiotherapy and psychotherapy are recommended for the treatment of nocturnal bruxism in children. Prompt recognition of the disorder and implementation of appropriate therapy can help to halt the progression of motor dysfunction of the masticatory apparatus in children.

Key words: bruxism; children; sleep bruxism; tooth wear; bruxism diagnosis; bruxism etiology; bruxism treatment

## **Introduction**

There are two types of bruxism: nocturnal bruxism, also known as SB, and bruxism occurring after waking up, referred to as AB. Both types of bruxism are masticatory muscle activities. SB occurs during sleep and can be either non-rhythmic or rhythmic, while AB occurs during wakefulness and is characterized by repetitive or sustained tooth contact and/or by bracing or thrusting of the mandible [1].

Studies have shown that SB prevalence rates in children range from 13% to 49% [2]. It is assumed that the highest incidence of SB is observed in children between the ages of 10 and 12 years, and a decreasing trend is observed thereafter [3].

Bruxism based on its etiopathogenesis can be classified into primary (idiopathic) and secondary (iatrogenic)- primary is unrelated to other diseases and secondary is related to comorbidities or to the use of certain medications [4].

The etiology of bruxism is complex. The most probable factors associated with bruxism in children are sleep disorders, parafunctions and psychosocial factors [5].

The diagnosis and assessment of bruxism is usually a complex process that involves multiple tests, a thorough history, analysis of the patient's medical history, and a clinical examination. Polysomnography (PSG), electromyography (EMG), recording of muscle activity, assessment with intraoral cameras are used [6]. According to the International Consensus on the Assessment of Bruxism, SB can be classified as follows: possible SB - is based only on self-report; probable SB - based on self-report and clinical examination. Definite sleep bruxism-confirmed by self-description, clinical examination and electromyography [1].

In the treatment of bruxism in children, a distinction is made between drug therapy, psychological methods, physiotherapy, and reversible and irreversible dental treatment. Untreated SB in children can result in a number of negative sequelae, including excessive tooth abrasion, tension headaches, pain, or fatigue in the muscles responsible for chewing, and temporomandibular joint (TMD) problems [8].

It is observed that the severity of bruxism in children decreases with age, especially after 9–10 years of age. Therefore, an observational approach and non-intervention strategies are recommended unless there is a need to treat underlying medical conditions [9]. No consensus has been reached as to which treatment is preferred over the other [7].

The analysis by Alves and co-authors revealed that parents' and children's caregivers' knowledge of the causes of bruxism, particularly in the case of nocturnal bruxism (SB), is incomplete. This lack of understanding may complicate the process of seeking appropriate support, which in turn may influence the severity of the problem of bruxism and its consequences in adult life [10].

## **Description of the state of knowledge**

### **1. Etiology of Bruxism in Children**

The etiology of bruxism is multifactorial, involving physical as well as psychological, hereditary and genetic factors [11]. Research describes that the central nervous system is the main regulator of bruxism. A variety of factors, such as temporomandibular joint disorders, bite abnormalities, difficulty breathing at night and high stress levels, can influence bruxism by affecting the central nervous system. This leads to disturbances in dopamine transmission, which can result in clenching and grinding of the teeth [12]. Polysomnography data reveal a characteristic sequence of physiological phenomena, such as increased cardiac activity within the sympathetic nervous system and intensification of electrical activity in the central nervous system. This occurs prior to the onset of muscle activity associated with grinding [13].

Some medications may interfere with the normal secretion and function of neurotransmitters in the central nervous system, contributing to bruxism in children [14].

In clinical child psychiatry, anxiety is a common issue [15]. In a study by Brancher, it was observed that school-aged children with emotional and behavioral disorders may be more likely to experience nocturnal bruxism [16]. Somatic anxiety causes increased muscle tension.

An increased incidence of SB has been shown in children with tension headaches [11]. Chronic bruxism during sleep is caused by the discharge of tension accumulated by children during the day. It has been investigated that children with a tendency to over experience negative emotions, anxiety and with low resilience to stress are at higher risk of SB [4]. An analysis of data from 2020 found a correlation between experiencing stress during childhood and behaviors such as nail-biting and chewing on objects, which may be associated with a higher risk of sleep bruxism in school-aged children [17]. In addition, observations from research studies confirm that in children, the occurrence of stress and the presence of its biological indicators may influence an increased risk of experiencing myofascial pain and headaches. These symptoms are associated with functional disorders of the mandibular musculoskeletal system, known as TMD. [18]. In contrast, the study that was conducted by Sampaio provided findings that differ from those obtained in previous analyses. Stress was found not to be an initiating or sustaining factor in the clinical condition of SB [19].

Research suggests that children and adolescents with a definitive diagnosis of ADHD are more likely to experience bruxism during sleep and wakefulness than those without the disorder [20].

Studies have shown that an increased incidence of nocturnal bruxism was observed among children aged 8–10 years during the COVID-19 pandemic [21].

A study involving 151 children aged 6–10 years showed a correlation between mouth breathing and sleep bruxism [22]. Oral physical factors in children such as nasal obstruction, tonsil hypertrophy and limited tongue mobility may have a synergistic relationship with the occurrence of SB [23].

In addition, it has been reported that sleep habits in children were significantly associated with sleep bruxism, temporomandibular disorders and dental caries [24].

A meta-analytic study conducted in 2021 identified prolonged exposure to screens and high sugar intake among children as potential risk factors that increase the frequency of sleep bruxism (SB). It was noted that these factors may affect the dopaminergic system, which is known to play a role in the potential etiology of SB [25].

Wieckiewicz et al. investigated the genetic basis of bruxism. Their meta-analysis found that the rate of bruxism episodes was significantly higher in HTR2A rs6313 TT homozygotes compared to heterozygous subjects. Furthermore, a statistically significant correlation was found between SB and sleep apnea index in HTR2A rs2770304 TT homozygotes. The results obtained appear to be very promising and provide a basis for further studies in the future [26].

Research in 2024 shows that the psychological condition of parents has a significant impact on the occurrence of bruxism in children during their school years. Analysis of the data showed that intense anxiety in mothers and pronounced symptoms of obsessive-compulsive disorder in fathers may increase the likelihood of bruxism in their children. In addition, it was identified that mother's depression may influence the development of SB in children [15].

## **2. Diagnosis of bruxism in children**

Research indicates that one in six children exhibits clinical symptoms associated with temporomandibular joint disorders (TMD), such as limited ability to open the mouth, clicking or popping sounds, temporomandibular joint pain, and muscle pain [4].

Bruxism presents with various signs and symptoms that are not always concurrently diagnosed. Tooth wear, commonly seen in children with both AB and SB, often manifests as flattening on the incisal and occlusal surfaces with an irregular pattern. However, tooth wear is not pathognomonic of bruxism and may result from other clinical conditions [5].

Currently, one of the most reliable methods for diagnosing bruxism in children is based on reports from parents or caregivers, who frequently describe specific grinding sounds during the child's sleep [9]. Other symptoms include reduced salivary flow, observable jaw muscle activity with audible grinding sounds, headaches, lip and cheek biting, tongue sores, masseter muscle hypertrophy, and tooth hypersensitivity [7]. A questionnaire and interview with the parent are essential for the assessment of bruxism, with careful consideration of medications and concomitant medical conditions. It is recommended that parents keep a diary of observations of their children's behavior [9]. Reports from parents are valuable for collecting data on observable bruxism behavior and potential risk factors. However, they do not allow precise determination of the strength or duration of chewing muscle activity. During the clinical examination, which includes an intraoral and extraoral assessment, the muscles of mastication should be carefully examined for excessive hypertrophy, the function of the temporomandibular joint, and whether there is pain or tenderness. It is also important to detect dysfunction, such as restrictions in full mouth opening. An internal oral assessment should include a detailed examination of the teeth and buccal and tongue mucosa to identify any changes, such as linea alba or traumatic damage [9].

In the digital age, mobile apps are being used to collect data from patients in real time, which is crucial when monitoring bruxism. The BruxApp app records subjective information

about jaw muscle activity, allowing patients to recognize habits and monitor changes. Patients report muscle status and facial pain by responding to notifications generated by the app at different times of the day.

The BruxxApp is designed to remind the patient to avoid tooth contact and to relax the muscles, thus aiming at re-education [27].

Instrumental monitoring of SB is mainly based on EMG recordings during sleep. These can be supplemented by other methods used in sleep analysis, such as sound or video recordings [9]. One diagnostic method for SB is polysomnography (PSG). Polysomnography is a technique for studying and recording the most relevant processes that occur in the human body during sleep [26].

Studies have shown that the single use of polysomnography as a diagnostic method for bruxism in children does not provide reliable results without a concurrent caregiver interview. Similarly, a caregiver interview alone is not sufficient for a complete diagnosis. To effectively diagnose bruxism in young children, a combination of both techniques is necessary [27].

Timely diagnosis of bruxism is crucial for effective treatment and prevention of complications [13].

### **3. Treatment of Bruxism in Children**

#### **a) Drug therapy**

A study by Mostafavi et al. examined the effect of low and moderate doses of diazepam on children with SB. The results showed that diazepam was no more effective than placebo in the long-term control of SB in the study population [28]. Various alternative treatments for bruxism have been described in the literature. Using a visual analogue scale and a sleep diary in children, Tavares-Silva et al. assessed the prevalence of patient-reported bruxism. They observed a reduction in bruxism symptoms when *Melissa officinalis* and *Phytolacca decandra* were used. Nevertheless, better results were observed with *Melissa officinalis* [29]. A study by Ierardo et al. focused on the pharmacological treatment of sleep bruxism in children. The authors noted that pharmacotherapy with hydroxyzine may have been effective in reducing the signs and symptoms of this disorder, but the level of evidence is low. However, it is worth to remember that this finding is based on a single primary study of very low methodological quality [7].



Studies using drugs such as hydroxyzine, trazodone and flurazepam have reported reductions in patient-reported bruxism symptoms and headaches associated with this disorder [30].

#### **b) Physiotherapy**

Physiotherapy is crucial for treating muscle pain and fatigue by relieving discomfort and restoring muscle and joint function. It also aids in strengthening pain management skills and implementing cognitive-behavioral strategies. Although there is no standardized physiotherapy regimen, various methods appear similarly effective [9].

#### **c) Psychological methods**

Behavioral therapies, including biofeedback, relaxation, and improved sleep hygiene, are effective for both AB and SB. Biofeedback provides real-time information about behavior, helping patients consciously re-educate themselves. Techniques include occlusal splints, which produce an unpleasant aftertaste during grinding or clenching, devices to wake the patient during an SB episode, and EMG feedback from auditory, vibratory, or electrical stimulation [6].

A study by Lopez et al. with 16 participants did not confirm that sleep hygiene and relaxation have an impact on reducing psychological distress in people with SB[4]. When treating young children aged 3 to 6 years, relaxation techniques are the preferred therapeutic option, as opposed to oral appliances such as mouth guards, which are not recommended due to the variability of occlusal conditions [9]. Psychiatrists and family therapists who identify separation anxiety in young children should suggest that parents visit the dentist regularly to detect and monitor symptoms of sleep bruxism. A more in-depth understanding of separation anxiety as a potential risk factor in the etiology of sleep bruxism may help to improve psychological approaches to therapy in children suffering from this problem [31].

#### **d) Dental treatment**

The use of occlusal braces during sleep is intended to protect the teeth from excessive abrasion. For deciduous or mixed dentition, treatment with occlusal braces is effective, although it may affect the development of the alveolar bone. Despite the potential side effects, occlusal splints can provide relief to patients by reducing muscle tension. However, occlusal

brace therapy for children requires further research to determine efficacy and develop specific treatment strategies [4].

### **Summary**

Bruxism is a common issue among children. An in-depth understanding of the causes, symptoms, methods of diagnosis and treatment options is important. Ongoing research makes an influential contribution to the overall knowledge of bruxism, providing the information necessary for clinicians and researchers to develop effective treatments. Early diagnosis and appropriate interventions are extremely essential to mitigate the negative impact of bruxism on oral health and overall wellbeing in children. Continued research is essential to fully understand this parafunction in children to minimize the prevalence of this disorder.

### **Author's contribution**

Conceptualization, Barbara Wajdowicz, Gabriela Broniec and Klaudia Kowalska; methodology, Weronika Kiełt; software, Rozalia Czapiewska; check, Weronika Kiełt, Aleksandra Kudła and Aleksandra Wróbel; formal analysis, Laura Pacek and Aleksandra Dziewulska; investigation, Julia Kozłowska and Aleksandra Dziewulska; resources, Laura Pacek; data curation, Gabriela Broniec; writing-rough preparation, Barbara Wajdowicz; writing- review and editing, Aleksandra Wróbel, Julia Kozłowska; visualization, Barbara Wajdowicz; supervision Rozalia Czapiewska; project administration, Weronika Kiełt; receiving funding, Klaudia Kowalska

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The authors report no conflict of interest.

## References

1. Lobbezoo F, Ahlberg J, Raphael KG, Wetselaar P, Glaros AG, Kato T, i in. International consensus on the assessment of bruxism: Report of a work in progress. *J Oral Rehabil.* 2018;45(11):837–44. <https://doi.org/10.1111/joor.12663>
2. Alfano CA, Bower JL, Meers JM. Polysomnography-Detected Bruxism in Children is Associated With Somatic Complaints But Not Anxiety. *J Clin Sleep Med.* 2018;14(01):23–9. <https://doi.org/10.5664/jcsm.6872>
3. Van Selms MKA, Marpaung C, Pogolian A, Lobbezoo F. Geographical variation of parental-reported sleep bruxism among children: comparison between the Netherlands, Armenia and Indonesia. *Int Dent J.* 2019;69(3):237–43. <https://doi.org/10.1111/idj.12450>
4. Bulanda S, Ilczuk-Rypuła D, Nitecka-Buchta A, Nowak Z, Baron S, Postek-Stefańska L. Sleep Bruxism in Children: Etiology, Diagnosis, and Treatment—A Literature Review. *Int J Environ Res Public Health.* 2021;18(18):9544. <https://doi.org/10.3390/ijerph18189544>
5. Viscuso D, Storari M, Aprile M, Denotti G, Serri M. Bruxism in children: What do we know? Narrative Review of the current evidence. *Eur J Paediatr Dent.* 2023;24(3):207–10. <https://doi.org/10.23804/ejpd.2023.24.03.02>
6. Beddis H, Pemberton M, Davies S. Sleep bruxism: an overview for clinicians. *Br Dent J.* 2018;225(6):497–501. <https://doi.org/10.1038/sj.bdj.2018.757>
7. Ierardo G, Mazur M, Luzzi V, Calcagnile F, Ottolenghi L, Polimeni A. Treatments of sleep bruxism in children: A systematic review and meta-analysis. *CRANIO®.* 2021;39(1):58–64. <https://doi.org/10.1080/08869634.2019.1581470>
8. Guo H, Wang T, Niu X, Wang H, Yang W, Qiu J, i in. The risk factors related to bruxism in children: A systematic review and meta-analysis. *Arch Oral Biol.* 2018;86:18–34.

<https://doi.org/10.1016/j.archoralbio.2017.11.004>

9. Manfredini D, Colonna A, Bracci A, Lobbezoo F. Bruxism: a summary of current knowledge on etiology, assessment, and management. *Oral Surg.* 2020;13(4):358–70. <https://doi.org/10.1111/ors.12454>

10. Alves CL, Fagundes DM, Soares PBF, Ferreira MC. Knowledge of parents/caregivers about bruxism in children treated at the pediatric dentistry clinic. *Sleep Sci.* 2019;12(03):185–9. <https://doi.org/10.5935/1984-0063.20190083>

11. Lee YH. Relationship Analogy between Sleep Bruxism and Temporomandibular Disorders in Children: A Narrative Review. *Children.* 2022;9(10):1466. <https://doi.org/10.3390/children9101466>

12. Luconi E, Togni L, Mascitti M, Tesei A, Nori A, Barlattani A, i in. Bruxism in Children and Adolescents with Down Syndrome: A Comprehensive Review. *Medicina (Mex).* 2021;57(3):224. <https://doi.org/10.3390/medicina57030224>

13. Alves EG, Fagundes DM, Ferreira MC. Sleep bruxism in children and its association with clinical and sleep characteristics: cross-sectional study. *RGO - Rev Gaúcha Odontol.* 2022;70:e20220011. <https://doi.org/10.1590/1981-86372022001120200077>

14. De Baat C, Verhoeff MC, Ahlberg J, Manfredini D, Winocur E, Zweers P, i in. Medications and addictive substances potentially inducing or attenuating sleep bruxism and/or awake bruxism. *J Oral Rehabil.* 2021;48(3):343–54. <https://doi.org/10.1111/joor.13061>

15. Korkmaz C, Bellaz İB, Kılıçarslan MA, Dikicier S, Karabulut B. Influence of psychiatric symptom profiles of parents on sleep bruxism intensity of their children. *Acta Odontol Scand.* 2024;82(1):33–9. <https://doi.org/10.1080/00016357.2023.2254374>

16. Brancher LC, Cademartori MG, Jansen K, Da Silva RA, Bach S, Reyes A, i in. Social, emotional, and behavioral problems and parent-reported sleep bruxism in schoolchildren. *J Am Dent Assoc.* 2020;151(5):327–33.  
<https://doi.org/10.1016/j.adaj.2020.01.025>
17. Drumond CL, Paiva SM, Vieira-Andrade RG, Ramos-Jorge J, Ramos-Jorge ML, Provini F, i in. Do family functioning and mothers' and children's stress increase the odds of probable sleep bruxism among schoolchildren? A case control study. *Clin Oral Investig.* 2020;24(2):1025–33.  
<https://doi.org/10.1007/s00784-019-02997-8>
18. Restrepo-Serna C, Santamaría-Villegas A. Association between stress and catecholamines with painful TMD in children. *Int J Paediatr Dent.* 2024;ipd.13176.  
<https://doi.org/10.1111/ipd.13176>
19. Sampaio NM, Oliveira MC, Andrade AC, Santos LB, Sampaio M, Ortega A. Relationship between stress and sleep bruxism in children and their mothers: A case control study. *Sleep Sci.* 2018;11(04):239–44.  
<https://doi.org/10.5935/1984-0063.20180038>
20. Souto-Souza D, Mourão PS, Barroso HH, Douglas-de-Oliveira DW, Ramos-Jorge ML, Falci SGM, i in. Is there an association between attention deficit hyperactivity disorder in children and adolescents and the occurrence of bruxism? A systematic review and meta-analysis. *Sleep Med Rev.* 2020;53:101330.  
<https://doi.org/10.1016/j.smrv.2020.101330>
21. Lima LCMD, Leal TR, Araújo LJSD, Sousa MLC, Silva SED, Serra-Negra JMC, i in. Impact of the COVID-19 pandemic on sleep quality and sleep bruxism in children eight to ten years of age. *Braz Oral Res.* 2022;36:e046.  
<https://doi.org/10.1590/1807-3107bor-2022.vol36.0046>
22. Lamenha Lins RM, Cavalcanti Campêlo MC, Mello Figueiredo L, Vilela Heimer M, Dos Santos-Junior VE. Probable Sleep Bruxism in Children and its Relationship with Harmful Oral Habits, Type of Crossbite and Oral Breathing. *J Clin Pediatr Dent.*

2020;44(1):66–9.

<https://doi.org/10.17796/1053-4625-44.1.12>

23. Oh JS, Zaghi S, Ghodousi N, Peterson C, Silva D, Lavigne GJ, i in. Determinants of probable sleep bruxism in a paediatric mixed dentition population: a multivariate analysis of mouth vs. nasal breathing, tongue mobility, and tonsil size. *Sleep Med.* 2021;77:7–13.

<https://doi.org/10.1016/j.sleep.2020.11.007>

24. Topaloglu-Ak A, Kurtulmus H, Basa S, Sabuncuoglu O. Can sleeping habits be associated with sleep bruxism, temporomandibular disorders and dental caries among children? *Dent Med Probl.* 2022;59(4):517–22.<https://doi.org/10.17219/dmp/150615>

25. Restrepo C, Santamaría A, Manrique R. Sleep bruxism in children: relationship with screen-time and sugar consumption. *Sleep Med X.* 2021;3:100035.

<https://doi.org/10.1016/j.sleepx.2021.100035>

26. Wieckiewicz M, Bogunia-Kubik K, Mazur G, Danel D, Smardz J, Wojakowska A, i in. Genetic basis of sleep bruxism and sleep apnea—response to a medical puzzle. *Sci Rep.* 2020;10(1):7497. <https://doi.org/10.1038/s41598-020-64615-y>

27. Osiewicz MA, Lobbezoo F, Bracci A, Ahlberg J, Pytko-Polończyk J, Manfredini D. Ecological Momentary Assessment and Intervention Principles for the Study of Awake Bruxism Behaviours, Part 2: Development of a Smartphone Application for a Multicenter Investigation and Chronological Translation for the Polish Version. *Front Neurol.* 2019;10:170. <https://doi.org/10.3389/fneur.2019.00170>

28. Mostafavi SN, Jafari A, Hoseini S, Khademian M, Kelishadi R. The efficacy of low and moderate dosage of diazepam on sleep bruxism in children: A randomised placebo-controlled clinical trial. *J Res Med Sci.* 2019;24(1):8. [https://doi.org/10.4103/jrms.JRMS\\_131\\_18](https://doi.org/10.4103/jrms.JRMS_131_18)

29. Tavares-Silva C, Holandino C, Homsani F, Luiz RR, Prodestino J, Farah A, i in. Homoeopathic medicine of *Melissa officinalis* combined or not with *Phytolacca decandra* in the treatment of possible sleep bruxism in children: A crossover randomised triple-

blinded controlled clinical trial. *Phytomedicine*. 2019;58:152869. <https://doi.org/10.1016/j.phymed.2019.152869>

30. Chisini LA, San Martin AS, Cademartori MG, Boscato N, Correa MB, Goettems ML. Interventions to reduce bruxism in children and adolescents: a systematic scoping review and critical reflection. *Eur J Pediatr*. 2020;179(2):177–89. <https://doi.org/10.1007/s00431-019-03549-8>

31. Garmroudinezhad Rostami E, Touchette É, Huynh N, Montplaisir J, Tremblay RE, Battaglia M, i in. High separation anxiety trajectory in early childhood is a risk factor for sleep bruxism at age 7. *Sleep*. 2020;43(7):zsz317. <https://doi.org/10.1093/sleep/zsz317>