sciendo
10.2478/AMB-2025-0044

ORIGINAL ARTICLE

SLEEP BRUXISM IN SCHOOL-AGED CHILDREN – ARE TOOTH WEAR AND ORTHODONTIC ANOMALIES COMMON RISK FACTORS?

M. Dimitrova, N. Mitova

Department of Pediatric Dental Medicine, Faculty of Dental Medicine, Medical University –Sofia, Bulgaria

Abstract. *Sleep bruxism is a parafunction characterized by squeezing and/or grinding of the teeth. It occurs in both adults and children, and is associated with a wide variety of risk factors like harmful habits, tooth wear, orthodontic anomalies, psychological issues, etc.* ***Aim:*** *The aim of the present study is to investigate the prevalence and clinical characteristics of sleep bruxism in school-age children and its relationship with tooth wear and orthodontic anomalies.* ***Materials and Methods:*** *The object of the study are 262 children in 2 age groups: elementary scholars (aged 7-10) and middle scholars (aged 11-14). They underwent clinical examinations, which included registration of dental status, type, degree and prevalence of tooth wear and orthodontic malocclusions. Afterwards the parents completed a questionnaire about the child's general health, bruxism, harmful habits, etc. The results were statistically processed with SPSS-19.* ***Results:*** *Sleep bruxism was found in 22.1% of the examined children without predominance in any gender but a slightly higher prevalence in the elementary school group. Tooth wear was registered in 70.6% of the examined patients. The registered orthodontic anomalies had almost the same frequency – 66.4%. None of the examined risk factors presented significant relation with sleep bruxism.* ***Conclusions:*** *Sleep bruxism occurs in 1/5 of the examined children but cannot be definitely related with tooth wear or orthodontic anomalies.*

Key words: *sleep bruxism, tooth wear, orthodontic anomalies, attrition*

Corresponding author: *Marianna Atanasova Dimitrova, Department of Pediatric Dentistry, Faculty of Dental Medicine, Medical University – Sofia, 1 Georgi Sofiisky Str., Sofia, Bulgaria, tel: 00359 883404155, email: drmatanasowa@gmail.com*

ORCID: *0000-0002-9069-1073 – M. Dimitrova*

ORCID: *0000-0003-4716-7724 – N. Mitova*

Received: *21 October 2024;* ***Accepted:*** *05 November 2024*

INTRODUCTION

The World Health Organization (WHO) defines sleep bruxism as a separate disease that is characterized by repetitive, rhythmic contractions of the jaw muscle that occur during sleep. They can be in the form of repetitive phasic muscle contractions or isolated prolonged jaw clenching (tonic contractions). They cause teeth grinding sounds during sleep, but the condition can often occur during the day as well [1, 2]. Symptoms may be severe enough to cause significant distress or impairment in personal, family, social, educational, occupational, or other important areas of the patient's life (e.g., due to frequent sleep interruptions) or significant dental damage [1, 3, 4].

According to its etiology, sleep-related bruxism can be primary/idiopathic or secondary. The primary type is not associated with a particular cause, while the secondary may be related to the use of various drugs and/or diseases [5]. Another classification, the result of a consensus adopted by an international group of experts, uses a new diagnostic scale for both clinical and research purposes. Authors categorize sleep and/or awake bruxism using the terms possible, probable, or definite bruxism [6].

Nocturnal bruxism usually occurs most frequently in children (with a prevalence of nearly 40% by 11 years of age) and becomes less frequent with age. No gender difference was found [7, 8]. Breda M. et al. studied children in Italy aged 1-18 years about different sleep habits and found that bruxism occurred in only 9.6% of them [9]. A 2022 article reported a 17.6% prevalence of bruxism, with the highest frequency found in the 0-6 year age group at 20.7%, decreasing to 14.6% in 12-17 year olds [10].

A frequent consequence of teeth grinding is dental attrition, but patients with bruxism cannot be distinguished solely based on tooth wear [11], as this can result from other factors (oral habits, food consistency, acid reflux, eating disorders, etc.) [12, 13, 14]. Therefore, tooth wear cannot be considered an accurate or sole indicator of bruxism but often accompanies it and should be diagnosed [15]. Local factors such as harmful oral habits [16], malocclusions and improper occlusal relationships [17] often associated with both tooth wear and bruxism should also be investigated.

AIM AND OBJECTIVES

The aim of the present study was to investigate the prevalence and clinical characteristics of sleep bruxism in school-age children and its relationship with tooth wear and orthodontic anomalies.

Objectives:

1. To investigate the prevalence of sleep bruxism in school-age children.
2. To study the frequency of tooth wear and orthodontic anomalies as related factors to nocturnal bruxism.

MATERIALS AND METHODS

In the present study, we examined 262 children aged 7-14 years attending “Nikolay Petrini” Primary School and “Hristo Smirnenski” Primary School in the town of Yambol. After completion of a KENIMUS-approved written informed consent form by a parent, children underwent a thorough examination, and parents were provided with a questionnaire to complete.

Clinical method

Clinical examination of the oral status and degree of tooth wear in the examined children, with registration on a specially developed form based on the established one in the Department of Pediatric Dentistry was completed. Additional elements were added regarding the specific study for the registration of tooth wear.

Tooth wear is registered by type through visual signs characteristic of different types of wear, after which it is registered according to the degree of structure loss, through an additional index. The clinical method ended with registration and assessment of the orthodontic status.

Questionnaire Method

The questionnaire was completed by the parents and contains questions to investigate the presence of sleep bruxism and related risk factors: sleep, harmful habits, psycho-emotional development of the child.

Statistical analysis was performed using IBM® SPSS® Statistics 19. A confidence interval of 95% ($p<0.05$) was selected as the significance level for rejecting the null hypothesis. Descriptive analysis, cross-tables, and T-criterion were used.

RESULTS

Prevalence of sleep bruxism

Based on the data collected from the parents of the examined children through the specially developed questionnaire, we found the following prevalence of probable sleep bruxism in the different age groups (Table 1).

Table 1. Prevalence of nocturnal bruxism according to age group

Age	With bruxism [a]		Without bruxism [b]		Total	
	n	%	n	%	n	%
Elementary school[1]	28	51	104	48.3	132	100
Middle school[2]	30	49	100	51.7	130	100
Total	58	22.1	204	77.9	262	100
T-criterion	$t^{1,2} = 0.37$		$t^{1,2} = 0.4$		$t^{a,b} = 15.4$	

Sleep bruxism was found in 22.1% of the examined children (p<0.05), with a slightly higher prevalence in elementary school children (51%) compared to those in middle school.

In relation to gender, an almost equal distribution was found between girls and boys.

Sleep bruxism and tooth wear

Tooth wear is a frequent consequence of sleep bruxism. During the clinical examination, the following prevalence of loss of dental structures was found in the examined children (Fig. 1).

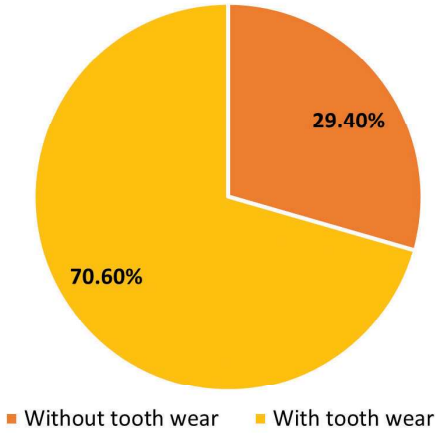

Fig. 1. Prevalence of dental attrition in the studied children

Tooth wear was observed in almost 2/3 of the examined children in varying degrees (p<0.05).

When comparing the data for sleep bruxism and loss of dental structures, the following distribution was found (Table 2).

Table 2. Relation of sleep bruxism and tooth wear in the examined children

	No tooth wear		With tooth wear		Total	
	n	%	n	%	n	%
Without bruxism [1]	64	31.4	140	68.6	204	100
With bruxism [2]	13	22.4	45	77.6	58	100
Total	77	29.4	185	70.6	262	100
T-criterion	$t^{1,2} = 1.41$					

The obtained data show that in 77.6% of the children with bruxism, tooth wear was also found, while in the children without bruxism, this was present only in 68.6% (p>0.05). These results are commonly found but they also confirm that the presence of tooth wear is not always related to bruxism.

Sleep bruxism and orthodontic anomalies

During the clinical examination, the orthodontic status of the children was also recorded. When comparing the data obtained from the clinical examination and the questionnaire, we found the following relations (Table 3).

Table 3. Relation of sleep bruxism and orthodontic anomalies in the studied children

	No orthodontic anomaly		With orthodontic anomaly		Total	
	n	%	n	%	n	%
Without bruxism	67	32.8	137	67.2	204	100
With bruxism	21	36.2	37	63.8	58	100
Total	88	33.6	174	66.4	262	100
Statistics	Chi-square test: t = 0.229; p = 0.632					

Orthodontic anomalies were found in 66.4% of the examined children (p<0.05). Among children with bruxism, 63.8% had some form of malocclusion, while among those without bruxism, 67.2% had orthodontic malocclusions (p>0.05).

DISCUSSION

In the present study, a 22.1% prevalence of probable bruxism was found among the examined children with no gender influence. A publication comparing the prevalence of teeth grinding among children from the Netherlands, Armenia and Indonesia found a different prevalence for each country, 19.5%, 36.5% and 24.2%, respectively [18]. Manfredini et al. reported a frequency of bruxism between 3.5-40.6%, which decreases with age and is not dependent on gender [19]. The variety of the indicators used for assessment of bruxism in children and the studied different age groups lead to large differences in the established frequency of the condition [20]. In this study, bruxism was more prevalent among elementary school children (50.4%) compared to middle school children [49.6%]. There is still no consensus on the influence of age on the frequency of bruxism, although a reverse correlation between age and teeth grinding seems to exist [21]. It is hypothesized that the decline in sleep bruxism with age may be due to less frequent parental visits to the child's room during the night [19].

Tooth wear was found in various stages in 2/3 of the examined children. Among children with bruxism, 77.6% had tooth wear, while among those without bruxism, 68.6% had loss of tooth structure. In a 2022 study, Martins et al. showed that the number of worn teeth correlates with the severity of teeth grinding in children [22]. A 2021 meta-analysis states that bruxism is most often associated with tooth wear and headaches, but it should be noted that most studies report loss of canine structures, which in the primary

dentition is often a result from function. It is important to distinguish pathological from physiological tooth wear [23] and to consider accompanying factors, e.g. gastro-esophageal reflux, which also lead to the loss of dental structures, and in combination with bruxism – to their greater severity [24].

In the present study, no significant correlation was found between the presence of an orthodontic anomaly and bruxism. Different types of malocclusions occur in 66.4% of the examined children. These are observed in 63.8% of children with bruxism, and in those without bruxism – in 67.2%. Other studies prove a correlation between bruxism in children with class I occlusion and overjet, with overjet with varying stages and deep bite [25, 26]. Probably due to the variations of orthodontic anomalies and the multifactorial etiology of bruxism, it is difficult to prove a relation between the two findings, as confirmed in a number of studies [27-30].

CONCLUSION

The diagnosis of probable sleep bruxism is dependent of numerous subjective factors, making it difficult to determine a clearly defined prevalence and relation with specific risk factors. It is a common condition in childhood with a frequency of 22.1% of the examined children, with a similar distribution in the different age groups and with no significant difference between genders. The present study found no significant relations between tooth grinding and tooth wear or the presence of orthodontic anomalies. The multifactorial etiology of bruxism complicates identifying its cause, requiring a comprehensive evaluation of orofacial structures and monitoring their condition.

Funding statement: *This publication is part of a study funded by the GRANT 2023 project (contract No. D-189/03.08.2023, project No. 8307/24.11.2022).*

Conflict of interest statement: *The authors declare no conflict of interest.*

Ethical statement: *This study has been performed in accordance with the ethical standards as laid down in the Declaration of Helsinki.*

Informed Consent from Participants: *Informed consent was obtained from all participants included in the study.*

REFERENCES

1. Sateia, MJ. International Classification of Sleep Disorders-Third Edition. Chest, 2014, 146 (5), 303-311. https://doi.org/10.1378/chest.14-0970
2. Strausz T, Ahlberg J, Lobbezoo F, et al. Awareness of tooth grinding and clenching from adolescence to young adulthood: a nine-year follow-up. J Oral Rehabil 2010;37(7):497-500.
3. The Glossary of Prosthodontic Terms: Ninth Edition. J Prosthet Dent. 2017 May;117(5S):1-e105. doi: 10.1016/j.prosdent.2016.12.001.
4. World Health Organization. 2021.[Internet]. International Classification of Diseases for Mortality and Morbidity Statistics (11th Revision). Available from: http://id.who.int/icd/entity/60908067
5. Kandasamy S, Greene CS, Rinchuse DJ, Stockstill JW, TMD and Orthodontics: A Clinical Guide for the Orthodontist, Springer International Publishing AG Switzerland; 2015, 63-79.
6. Lobbezoo F, et al. Bruxism defined and graded: an international consensus. J Oral Rehabil 2013;40:2–4.
7. Lavigne GJ, Montplaisir JY. Restless legs syndrome and sleep bruxism: prevalence and association among Canadians. Sleep 1994;17(8):739-43.
8. Ohayon MM, Li KK, Guilleminault C. Risk factors for sleep bruxism in the general population. Chest 2001;119(1):53-61.
9. Breda M, Belli A, Esposito D, et al. Sleep habits and sleep disorders in Italian children and adolescents: a cross-sectional survey. J Clin Sleep Med. 2023 Apr 1;19(4):659-672. doi: 10.5664/jcsm.10400.
10. Brandão de Almeida A, Rodrigues RS, Simão C, et al. Prevalence of Sleep Bruxism Reported by Parents/Caregivers in a Portuguese Pediatric Dentistry Service: A Retrospective Study. Int J Environ Res Public Health. 2022;19(13):7823.
11. Pergamalian A, Rudy TE, Zaki HS, Greco CM. The association between wear facets, bruxism, and severity of facial pain in patients with temporomandibular disorders. J Prosthet Dent. 2003; 90:194-200.
12. Field J, Walls A, Steele J, Wassell R. Recognizing Tooth Surface Loss. In: Wassell R, Nohl F, Steele J, Walls A. (eds) Extra-Coronal Restorations. BDJ Clinician's Guides. 2019, Springer, Cham
13. Mehl A, Gloger W, Kunzelmann KH, Hickel R. A new optical 3-D device for the detection of wear. Journal of Dental Research 1997; 76: 1799-1807.
14. 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. Brazilian Dental Journal, 2012, 23(6), 746-752.
15. Lavigne GJ, Goulet JP, Zuconni M, et al. Sleep disorders and the dental patient: an overview. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1999 Sep;88(3):257-72.
16. Castelo PM, Gavião MB, Pereira LJ, Bonjardim LR. Relationship between oral parafunction/nutritive sucking habits and temporomandibular joint dysfunction in primary dentition. Int J Paediatr Dent. 2005; 15:29-36.
17. Ghafournia M, Hajenourozali Tehrani M. Relationship between bruxism and malocclusion among preschool children in Isfahan. J Dent Res Dent Clin Dent Prospects. 2012; 6:138-42.
18. van Selms MKA, Marpaung C, Pogosian A, Lobbezoo F. Geographical variation of parental-reported sleep bruxism among children: comparison between the Netherlands, Armenia and Indonesia. Int Dent J. 2019 Jun;69(3):237-243.
19. Manfredini D, Ahlberg J, Winocur E, Lobbezoo F. Management of sleep bruxism in adults: a qualitative systematic literature review. J Oral Rehabil. 2015 Nov; 42(11):862-74.
20. Storari M, Serri M, Aprile M, et al. Bruxism in children: What do we know? Narrative Review of the current evidence. Eur J Paediatr Dent. 2023 Sep 1;24(3):207-210.
21. Manfredini D, Restrepo C, Diaz-Serrano K, et al. Prevalence of sleep bruxism in children: a systematic review of the literature. J Oral Rehabil. 2013 Aug;40(8):631-42.
22. Martins IM, Alonso LS, Vale MP, et al. Association between the severity of possible sleep bruxism and possible awake

bruxism and attrition tooth wear facets in children and adolescents. Cranio. 2022 Jul 25:1-7.
23. Soares JP, Moro J, Massignan C, et al. Prevalence of clinical signs and symptoms of the masticatory system and their associations in children with sleep bruxism: A systematic review and meta-analysis. Sleep Med Rev. 2021 Jun; 57:101468.
24. Nota A, Pittari L, Paggi M, Abati S, Tecco S. Correlation between Bruxism and Gastroesophageal Reflux Disorder and Their Effects on Tooth Wear. A Systematic Review. J Clin Med. 2022 Feb 19;11(4):1107. doi: 10.3390/jcm11041107.
25. da Costa SV, de Souza BK, Cruvinel T, et al. Factors associated with preschool children's sleep bruxism. Cranio. 2024 Jan;42(1):48-54. doi: 10.1080/08869634.2021.1903663.
26. Sari S, Sonmez H. The relationship between occlusal factors and bruxism in permanent and mixed dentition in Turkish children. J Clin Pediatr Dent. 2001;25(3):191-4.
27. Van Lierde KM, Luyten A, D'haeseleer E, et al. Articulation and oromyofunctional behavior in children seeking orthodontic treatment. Oral Dis. 2015 May;21(4):483-92.
28. Gomes MC, Neves ÉT, Perazzo MF, et al. Association between psychological factors, socio-demographic conditions, oral habits and anterior open bite in five-year-old children. Acta Odontol Scand. 2018 Nov;76(8):553-8.
29. Demir A, Uysal T, Guray E, Basciftci FA. The relationship between bruxism and occlusal factors among seven- to 19-year-old Turkish children. Angle Orthod. 2004 Oct;74(5):672-6.
30. Gonçalves LP, de Toledo OA, Otero SA. The relationship between bruxism, occlusal factors and oral habits. Dental Press J Orthod. 2010;15(2):97-104.