

Association of gender, oral habits, and poor sleep quality with possible sleep bruxism in schoolchildren

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Abstract: The aim of this study was to verify the oral habits, symptoms, and characteristics of some children aged 8 to 10 years that could be associated with possible sleep bruxism. A cross-sectional study was performed. Questionnaires were sent to parents to obtain information on sex, age, school shift, sleep quality, parents' perception of children's behavior, and children's oral habits (nail biting, object biting, and lip biting), and symptoms such as headache or earache. In addition, parents reported the frequency of sleep bruxism (no day to 7 days a week). Descriptive analysis and multinomial logistic regression were performed and the level of significance was set at 5%. A total of 1,554 parents of children aged 8 to 10 years participated in this study. Possible sleep bruxism was reported as mild for 65.7%, moderate for 25.3%, and severe for 9% of the children. In the adjusted multinomial logistic regression, boys were 79% more likely to have sleep bruxism (OR: 1.79; 95%CI 1.23–2.60) and were 2.06 more times at risk of being in the habit of lip biting (OR: 2.06; 95%CI 1.26–3.37). Children with possible severe sleep bruxism were 61% more likely to develop object biting (OR: 1.61; 95%CI 1.09–2.39), 52% more likely to have headaches (OR: 1.52; 95%CI 1.01–2.28), and 3.29 more times at risk of poor sleep quality (OR: 3.29; 95%CI 2.25–4.82). Based on the report, boys with lip and object biting habits, headaches, and poor sleep quality presented a higher chance of possible severe sleep bruxism.

Keywords: Sleep Bruxism; Child, Preschool.

Introduction

Parents commonly seek pediatric dentists when concerned about the audible sounds their children make during sleep. This noise is produced through the clenching and grinding of teeth and is defined as bruxism.¹ The presence of tooth-to-tooth contact is not necessary.^{1,2} In 2018, the international consensus on the assessment of bruxism conceptualized this disorder as a behavior that involves more than tooth-to-tooth contact and included activities of the masticatory muscles.² Bruxism occurs during wakefulness by repetitive tooth contact and bracing or thrusting of the mandible – awake bruxism (AB), or during sleep characterized as unusual orofacial movement – sleep bruxism (SB), which is regulated by the central nervous system and is associated with several factors, some of which are still unknown.^{1,2}



The prevalence of sleep bruxism in children varies, as described in a systematic review that found differences between country and age.³ Finland has the highest prevalence with 40.6%, followed by the United States with 36.8%, and Brazil with 35.3%, whereas Hong Kong has the lowest prevalence (5.9%).^{3,4} The associations between prevalence and age are contradictory.⁴ Some studies found that bruxism decreases with age, but others show the opposite.^{5,6,7,8,9} These differences can be explained by lifestyles such as sleep duration, chronotype profile, anxiety, respiratory problems, and habits.^{10,11}

There is evidence of factors such as sleep disorders, breathing problems, chronotype, among others, associated with sleep bruxism.^{5,6,12,13} Some factors have a low quality of evidence, such as deleterious oral habits; however, these factors are often reported by parents. Population-based studies on the etiology and possible factors associated with sleep bruxism in children, given its multifactorial nature, should provide consistent data. In addition, the assessment of the frequency of bruxism in children, as proposed in the new consensus, is also important, because it lends credibility to the study, and also because existing studies do not make this type of evaluation.² Therefore, this study verified the association of schoolchildren's oral habits, symptoms, and characteristics with sleep bruxism.

Methods

Ethical aspects

This study was approved by the Research Ethics Committee of the Federal University of Santa Catarina (process no. 902.633/2015). All parents and children received information about the research and signed a consent form authorizing their participation and allowing the use of the questionnaire results.

Study design and sample characteristics

This is a cross-sectional population-based study. The investigation consisted of a sample of children and their parents, living in Florianopolis, southern Brazil. The city had an estimated population of 421,240 inhabitants in 2015, and at the time of the study, there were 16,234 children aged 8 to 10 years

enrolled in 36 local public elementary schools.¹⁴ The study was conducted between September and December 2015.

The sample size was calculated based on a previous study on Brazilian schoolchildren with sleep bruxism⁸ with an 80% power and 95% confidence interval. Thus, the sample should include 1,305 participants, and this figure was multiplied by 1.2 correction factor to compensate for the cluster effect, and 20% was added for possible losses, totaling 1,880 children.

Stratified cluster sampling was used for the sample selection, according to the age of the children and proportionality between the ages. Also, a two-step draw was conducted for the selection of the schools in the health districts and for the classes students took part in.¹⁵

Eligibility criteria

The children had to be enrolled in public schools, should be aged between 8 and 10 years, and should have at least one erupted permanent tooth. Illiterate parents, children on medication that interfered with the central nervous system, with neurological diseases, or who did not meet the inclusion criteria were excluded.

Pilot study

A pilot project was carried out with 20 children to test the methodology and to allow for oral clinical examinations to be performed. The pilot study showed no need to change the methodology and its data were not included in the final sample.

Research variables

In this study, the variables were obtained from a questionnaire sent to the parents.¹⁶ Questions regarding sex, age, school shift, sleep quality, and parents' perception of children's behavior were answered. The school shift referred to the time when the children went to school, i.e., in the morning or in the afternoon. Sleep quality was classified by parents as good or poor. Parents could choose either of the following responses to describe their children's behavior: "quiet," "happy," "hectic," "anxious," "aggressive," "shy," or "sad." Questions about oral habits (nail biting, object biting, and

lip biting)¹³ and children's report of headache or earache¹⁷ were also included.

For the diagnosis of possible sleep bruxism, parents reported whether their children had produced audible nocturnal sounds of grinding and/or clenching teeth during sleep in the past month. This question was based on the Brazilian version of the Pittsburg Sleep Quality Index (PSQI-BR).¹⁸ The parents reported the frequency of possible sleep bruxism (less than once or once a week; twice to 4 times a week; more than 5 times a week). The variable was categorized as follows: "mild" if grinding occurred less than once or once a week; "moderate" if grinding occurred twice to 4 times a week; and "severe" if grinding occurred 5 to 7 times a week. "Mild" was regarded as the best condition and "severe" as the worst one.¹⁹

Statistical analysis

SPSS version 21.0 was used for the statistical analysis. Descriptive statistics and multinomial logistic regression were performed. The dependent variable was possible sleep bruxism classified into three categories (mild, moderate, or severe). For the regression, one category needed to be considered the reference; in this case, the reference category was possible mild sleep bruxism. The analyses were performed with the reference category *versus* possible moderate sleep bruxism and *versus* possible severe sleep bruxism, both associated with the independent variables. The independent variables with $p < 0.20$ in the unadjusted model were included in the adjusted model. The measure of association was demonstrated with odds ratio (OR) and confidence intervals (95%CI). The level of significance was set at 5%.

Results

The participants of this study were children aged 8 to 10 years and their parents or legal guardians. A total of 1,554 participants answered the questionnaire (response rate of 82%). Some questionnaires were not returned and some parents refused to participate.

Table 1 shows the descriptive data. The parents' reports of possible sleep bruxism were classified as mild (65.7%), moderate (25.3%), or severe (9%). Among oral habits, nail biting was the most frequent and was

present in 41.5% of the children, followed by object biting (36.2%) and lip biting (13.6%). Sleep quality, according to the parents' reports, was considered good in 72.1% and poor in 27.9% of the children.

Table 1. Descriptive data, Florianopolis/SC, Brazil. (n = 1,554).

Variables	n(%)
Sex	
Female	916 (57.5)
Male	673 (42.5)
Age (years)	
10	486 (30.6)
9	570 (35.9)
8	533 (33.5)
Self-report of bruxism	
Mild	1,021 (65.7)
Moderate	393 (25.3)
Severe	140 (9.0)
Nail biting habit	
No	915 (58.5)
Yes	648 (41.5)
Lip biting habit	
No	1,343 (86.4)
Yes	211 (13.6)
Object biting habit	
No	991 (63.8)
Yes	563 (36.2)
Headaches	
Absent	1,153 (74.3)
Present	398 (25.7)
Earaches	
Absent	1,452 (93.7)
Present	97 (6.3)
Parents' perception of children's behavior	
Quiet	111 (7.2)
Happy	35 (2.3)
Hectic	654 (42.3)
Anxious	418 (27)
Aggressive	30 (1.9)
Shy	287 (18.6)
Sad	11 (0.7)
Child's sleep quality	
Good	1,122 (72.1)
Poor	435 (27.9)
School shift	
Morning	749 (47.1)
Afternoon	840 (52.9)

The adjusted analysis of the multinomial logistic regression in Table 2 indicates that possible moderate sleep bruxism was associated with sex, age, lip biting, earaches, and sleep quality. Boys were 28% more likely to have possible moderate sleep bruxism (OR: 1.28; 95%CI 1.00–1.65) and twice as likely to have lip biting habits (OR: 2.08; 95%CI 1.46–2.95). Also, children with possible moderate sleep bruxism were 77% more likely to have earaches (OR: 1.77; 95%CI 1.09–2.88) and 89% more likely to have a poor sleep quality (OR: 1.89; 95%CI 1.44–2.48).

Possible severe sleep bruxism was associated with sex, lip and object biting, headaches, and sleep quality. Boys were 79% more likely to have possible severe sleep bruxism (OR: 1.79; 95%CI 1.23–2.60) and twice more likely to have lip biting habits (OR: 2.06; 95%CI 1.26–3.37). Children with possible severe sleep bruxism were 61% more likely to have object biting

habits (OR: 1.61; 95%CI 1.09–2.39) and 52% more likely to have headaches (OR: 1.52; 95%CI 1.01–2.28). Besides, children with possible severe sleep bruxism were three times more prone to have a poor sleep quality (OR: 3.29; 95%CI 2.25–4.82).

Discussion

The present study demonstrated that possible moderate sleep bruxism was associated with sex, age, lip biting habit, earaches, and sleep quality. Besides, possible severe sleep bruxism in children aged 8 to 10 years is related to sex, lip and object biting habits, headaches, and sleep quality.

The prevalence of possible sleep bruxism according to parents' reports was in agreement with other Brazilian studies.^{6,8,20} This significant variation may be attributed to the different diagnostic methods

Table 2. Unadjusted and adjusted model by multinomial logistic regression showing the association of possible sleep bruxism (all degrees) with other independent variables.

Multinomial logistic regression	n	Possible mild sleep bruxism vs. possible moderate sleep bruxism						Possible mild sleep bruxism vs. possible severe sleep bruxism					
		Unadjusted			Adjusted			Unadjusted			Adjusted		
		OR	95%CI	p-value	OR	95%CI	p-value	OR	95%CI	p-value	OR	95%CI	p-value
Sex													
Female	916	1			1			1			1		
Male	673	1.19	0.94–1.151	0.140	1.28	1.00–1.65	0.047	1.65	1.18–2.40	0.004	1.79	1.23–2.60	0.002
Age													
10 years	486	1			1			1			1		
9 years	570	1.39	1.04–1.87	0.016	1.38	1.01–1.89	0.040	1.14	0.73–1.79	0.544	1.56	0.97–2.49	0.064
8 years	533	1.44	1.07–1.94	0.026	1.57	1.14–2.15	0.005	1.40	0.90–2.18	0.131	1.17	0.73–1.89	0.502
Nail biting habit													
No	915	1			1			1			1		
Yes	648	1.23	0.97–1.56	0.076	1.05	0.81–1.36	0.671	1.39	0.97–1.96	0.065	1.05	0.71–1.55	0.789
Lip biting habit													
No	1,343	1			1			1			1		
Yes	211	2.25	1.61–3.07	<0.001	2.08	1.46–2.95	<0.001	2.47	1.57–3.89	<0.001	2.06	1.26–3.37	0.004
Object biting habit													
No	991	1			1			1			1		
Yes	563	1.21	0.95–1.52	0.112	0.98	0.75–1.28	0.903	2.07	1.45–2.97	<0.001	1.61	1.09–2.39	0.017
Headaches													
Absent	1,153	1			1			1			1		
Present	398	1.27	0.97–1.66	0.075	1.09	0.81–1.47	0.534	1.79	1.22–2.62	0.003	1.52	1.01–2.28	0.041
Earaches													
Absent	1,452	1			1			1			1		
Present	97	2.01	1.28–3.14	0.002	1.77	1.09–2.88	0.020	1.51	0.74–3.05	0.250			

employed, as some were self-reports by parents, others were clinical examinations, and some were obtained from polysomnography.²¹ Another important factor in this study is that the frequency of episodes of possible sleep bruxism was considered and so the analyses do not take into account only the presence of sleep bruxism, but also the intensity of the report, thereby increasing the accuracy of the diagnosis.^{2,22} The 2018 consensus classifies bruxism as a behavior, so frequent behaviors tend to cause greater impairment compared to behaviors that occur more rarely.^{2,18,23}

In this study, there were associations of both frequencies of reported sleep bruxism (moderate and severe) with sex, lip biting habit, and children's sleep quality. Earache and age were associated with possible moderate sleep bruxism, and object biting habit and headache were associated with possible severe sleep bruxism. So, our focus will be on discussing the results of possible severe sleep bruxism, as this is the worst condition. Sex was associated with possible severe and moderate sleep bruxism. These findings are in line with the findings of previous studies, which show that males can be more susceptible to possible sleep bruxism.^{6,11} This result concurs with that of a systematic review that included several studies and showed that being male was a risk factor for bruxism.^{11,24}

Lip biting is an oral habit that may result from emotional and psychological tensions, as it is regulated by the nervous system.²⁵ Besides, lip biting and object biting habit are habits occur throughout the day and, therefore, the mind also associates this habit during nighttime sleep.²⁶ Other studies found that habits associated with possible sleep bruxism may be due to the excessive loading of the masticatory system from oral habits.^{12,27} This association can result in temporomandibular disorders and pain, and this can be verified by longitudinal studies.²⁸

This is a very important finding, as studies have found that lip and object biting habits may be related to possible sleep bruxism in children aged between 8 and 10 years. It also shows that in the adjusted regression with variables such as nail biting habit, object biting habit, and the presence of headaches, nail biting habit loses significance, whereas lip and object biting habits and headaches remain significant.

This demonstrates that the presence of repeated oral habits during the day, either consciously or unconsciously, stimulates the child to keep the mandibular movement at night.²⁵

Headache was associated with possible severe sleep bruxism, and this finding is consistent with other studies, despite the fact that it is reported by parents.^{11,29,30} This association can be explained by the fact that the muscles are stimulated practically all day long during grinding, which could be related to having a poor sleep and feeling bad.^{11,30} Parents' perception of their children's behavior was not associated with possible sleep bruxism. Some studies have evaluate children's behavior and demonstrated that psychological and emotional aspects, such as anxiety, aggressiveness, and hyperactivity, have been associated with possible sleep bruxism.^{31,32,33} Recently, this theory has been challenged, since bruxism originates from the central nervous system, so this association would be more related to awake bruxism. Therefore, these results are consistent with those of other studies carried out with adults and children.³⁴

Children's sleep quality is strongly related to possible moderate and severe sleep bruxism. These results are in agreement with those of other studies.^{13,17,19} Parents consider sleep quality to be poor due to teeth grinding, nightmares, and restless sleep. Parents must observe the frequency of their children's inadequate sleep, as small awakenings result in sleep fragmentation, resulting in poor and restless sleep.³⁵ Also, children may experience fatigue the next day, leading to poor school performance.³⁶

The questionnaire used in this study, following the recommendation of the consensus for large samples, is a positive aspect of this study regarding the diagnosis of possible sleep bruxism.²² Another positive aspect was the frequency of sleep bruxism (mild, moderate, or severe), preventing memory bias. However, there are some limitations in this cross-sectional design – association instead of causality, and so the results should be interpreted with caution. Some information was obtained from the questionnaires answered by the parents and, in this case, there is possibility of memory bias.³⁷ Also, children's behavior was evaluated

by parents' reports, without a specific scale, or by a psychologist. Future studies should consider this methodology based on the results found. In addition, sleep quality was not determined based a numerical scale, but based on the questionnaires answered by the parents.

This study is clinically relevant for drawing attention to the fact that certain factors of an individual's sleep may be associated with possible sleep bruxism. Therefore, dental professionals are urged to investigate the intensity and frequency of bruxism. Parents should be questioned about all possible oral habits their children may exhibit, such as biting objects, nails, or lips. Even if these are not specifically related to sleep bruxism, they may be related to awake bruxism. Parents may not be aware of these factors until questioned.^{10,28} It is also important for parents to know the routine of

their children, such as sleeping hours, sleep quality, lighting in the room, and other factors that may interfere with sleep quality.

Conclusion

In conclusion, parents reported that boys who had lip biting and object biting habits, headaches, and poor sleep quality were more likely to experience possible severe sleep bruxism.

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