

Prevalence and associated factors to sleep bruxism in adolescents from Teresina, Piauí

Prevalência e fatores associados ao bruxismo do sono em adolescentes de Teresina, Piauí

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ABSTRACT: *Introduction:* Sleep bruxism (SB) is defined as a repetitive jaw muscle activity whose epidemiology in adolescents has been little studied. This cross-sectional study aimed to determine the prevalence of sleep bruxism and associated factors in adolescents. *Methodology:* The sample consisted of 594 students aged 11 to 14 years old from Teresina, Piauí, Brazil. Self-administered questionnaire was answered by parents/caregivers and dental clinical examination was performed. Pearson's chi-squared test was used to assess the association between SB and independent variables. Poisson regression analysis with robust variance was applied, with results expressed in prevalence ratio (PR). *Results:* The prevalence of SB in adolescents was 22.2%. Multivariate analysis showed a higher prevalence of SB in male gender adolescents (PR = 1.41; 95%CI 1.04 – 1.89), presenting snoring (PR = 1.39; 95%CI 1.02 – 1.89) and difficulty falling asleep (PR = 1.92; 95%CI 1.38 – 2.66). *Conclusion:* SB is a frequent condition in adolescents, and the factors associated with its prevalence were: male sex, snoring and difficulty falling asleep.

Keywords: Sleep bruxism. Epidemiology. Prevalence. Risk factors. Adolescent.

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RESUMO: Introdução: Bruxismo do sono (BS) é uma atividade muscular repetitiva cuja epidemiologia em adolescentes tem sido pouco estudada. Este estudo observacional transversal objetivou determinar a prevalência e os fatores associados ao BS em adolescentes. **Metodologia:** A amostra foi constituída de 594 escolares na faixa etária de 11 a 14 anos de Teresina, Piauí, Brasil. Os instrumentos de coleta dos dados foram questionário direcionado aos pais/responsáveis e exame clínico dentário. Para se verificar associação entre BS e variáveis independentes, o teste qui-quadrado de Pearson foi aplicado, bem como análise de regressão de Poisson com variância robusta, com resultados expressos em razão de prevalência (RP). **Resultados:** A prevalência de BS foi de 22,2%. Na análise multivariada foi observada maior prevalência de BS em adolescentes do sexo masculino (RP = 1,41; intervalo de confiança de 95% – IC95% 1,04 – 1,89), com relato de ronco (RP = 1,39; IC95% 1,02 – 1,89) e dificuldades para dormir (RP = 1,92; IC95% 1,38 – 2,66). **Conclusão:** BS é uma condição frequente em adolescentes, e os fatores associados à sua prevalência foram: sexo masculino, ronco e dificuldades para dormir. **Palavras-chave:** Bruxismo do sono. Epidemiologia. Prevalência. Fatores de risco. Adolescente.

INTRODUCTION

Sleep bruxism (SB) is a repetitive activity of the mandibular musculature, characterized by supporting or pushing the jaw, tightening or grinding the teeth during sleep¹. The condition has been associated with injuries to orofacial structures and negative impact on the quality of life of schoolchildren²⁻⁴. The prevalence of SB presents variable percentages in the different age groups⁵ and there is little information about their epidemiology in adolescents⁶.

Most epidemiological studies on SB are performed with schoolchildren⁶⁻¹¹, and the diagnosis is based on reports from family members describing characteristic sounds generated by grinding teeth during sleep^{7-9,12}. Polysomnographic examinations are considered gold standard for diagnosis, but their use in population studies is still not feasible due to the high cost and the need for qualified professionals to perform the procedures^{1,11,13}.

The search for factors associated with SB has been guiding the knowledge of possible predictors of the condition in different age groups^{10,11,14,15}. Pathophysiological and genetic agents were suggested as possible factors associated with SB. However, psychosocial agents have received increasing attention¹⁶⁻¹⁸. Few factors associated with SB in adolescents are known; among them: temporomandibular joint sounds and stress⁶.

The objective of this study was to determine the prevalence of SB and associated factors in adolescents from Teresina, Piauí.

METHODOLOGY

ETHICAL ASPECTS

This is a cross-sectional observational study carried out after approval by the Research Ethics Committee, Protocol no. 508.040/CAAE 03362112.1.0000.5214, from Universidade

Federal do Piauí (UFPI), Teresina, Piauí, Brazil, conducted in accordance to Resolution 466/12 of the National Health Council.

SAMPLE

The study population was composed of adolescents aged between 11 and 14 years, enrolled in public and private schools in the city — which, according to data from the Municipal Education Department of Teresina, in 2011, accounted for 54,056 students.

The type of sampling adopted was complex conglomerates, with proportional allocation at each stage. The first stage consisted of areas of the city (20.8% north, 21.0% south, 17.0% southeast, 21.6% east and 19.6% downtown). The second stage, by the school models (25.9% private, 27.0% of the state public network and 47.1% of the municipal public network). The first sampling unit was defined by the schools; the second, by classes; and the third, by the students.

To calculate the sample size, a prevalence of 35.3% ($\sim 36.0\%$)⁸, with a 95% confidence interval (95%CI) and a 4% error margin, was considered. Because this is a multi-stage sample, the effect of the design was corrected by a factor of 1.5 (*deff*). For the sample calculation, the Epi Info™ (version 3.5.2; Centers for Disease Control and Prevention, Atlanta, GA, USA) was used. The calculation was obtained by the following Equation 1:

$$n = deff \frac{\partial^2 pq N}{\varepsilon^2 N + \partial^2 pq} \quad (1)$$

In which

n is the sample that was calculated,

∂ is the confidence level,

pq is the variance of the occurring phenomenon,

N is the population,

ε is the sample error.

From this formula, a sample size of 524 adolescents was obtained and 20% was added to compensate eventual losses, totaling 629 individuals asked to participate in the study.

A random sorting of the schools, classes and schoolchildren was carried out according to the city zones and the type of institution, as described in Table 1. The individuals that were present on the day of data collection were included in the study and, together with the parents/guardians, authorized the participation.

CALIBRATION

For the standardization of the diagnosis of tooth wear, clinical examiner training was carried out by teachers at the UFPI Children's Dental Clinic, who were experienced in epidemiological studies. Twenty adolescents who did not participate in the study were examined

for intra-examiner agreement, obtaining a kappa value of 0.9. To this end, the subjects were examined twice, with an interval of two weeks.

PILOT STUDY

Before data collection, a pilot study was conducted with 52 adolescents from schools that did not participate in the sample, in order to evaluate the methods. There was no need to make changes to the methodology initially proposed.

Table 1. Number of adolescents to be analyzed, distribution by school networks and location zone.

School network	Number of adolescents
State	
Downtown	23
East	24
North	43
Southeast	40
South	40
Total	170
Municipal	
Downtown	28
East	83
North	64
Southeast	51
South	70
Total	296
Private	
Downtown	72
East	29
North	24
Southeast	16
South	22
Total	163
Total	629

DATA COLLECTION

Data collection was carried out from September to November 2013. Prior authorization was requested from the directors of the school units selected for the research. The principals sent a letter to the adolescents' parents informing them that their children had been selected to participate in the study. The terms of consent and the parents' questionnaire were attached to the letters.

As there was no questionnaire validated on the subject studied, the questionnaire addressed to parents was prepared based on the literature^{1,5-12,19-22}. The questions addressed socioeconomic conditions, demographic data and possible factors associated with the presence of SB. The socioeconomic and demographic questions investigated included gender^{9,12}, age⁹, age, type of school (public or private), family income (categorized based on the Brazilian monthly minimum wage at the time of the interview, equivalent to BRL 678.00)⁸, maternal schooling (years of formal study) and marital status of the parents^{8,10}.

The diagnosis of bruxism was based on the affirmative report of the parents about the grinding of teeth during sleep^{1,6-9,12,19}. Information on the presence of snoring^{9-10,19}, headaches upon awakening¹⁹, deleterious oral habits (oncophagy, digital sucking, biting objects or other habits)^{11,20}, general health problems (gastrointestinal, neurological/psychological, cardiac, respiratory, parasitic or other)^{5,9,12,21}, difficulty sleeping⁹⁻¹⁰ and parents' perception of the presence of anxious behavior or not^{5,21-22}.

The adolescents were examined in the school under artificial light (Pelican Startec model table lamp, 127 V) by a single examiner, who used sterilized cotton rollers, flat mouth mirror (Golgran®, São Paulo, Brazil) and exploratory probe (Golgran®, São Paulo, Brazil) recommended by the World Health Organization (WHO)²³. The teenagers sat in a school chair, their heads positioned on the examiner's lap. In the clinical examination, dental abrasions were evaluated²⁴, in which the presence of bright and polished facets on permanent incisors and/or molars (palatal surface, incisal edges and functional cusps) was verified^{20,24}. The data were annotated in an individual form.

DATA ANALYSIS

The data were scanned and analyzed in the Statistical Package for the Social Sciences® (SPSS) software version 18.0 for Windows. Pearson's chi-squared test was applied to verify the association between the presence of SB and the independent variables. Poisson regression analysis with robust variance associated socioeconomic and clinical variables with a higher prevalence of SB. P-values ≤ 0.05 , with 95%CI were considered statistically significant. In the multivariate analysis, a Backward Stepwise process was used. Variables with $p \leq 0.20$ in the bivariate analysis were included in the model. The results were expressed in prevalence ratio (PR), measure of effect for prevalence studies.

RESULTS

A total of 594 (94.4%) of the 629 adolescents selected were included in the final sample. The prevalence of SB was 22.2%. The majority of the adolescents were females (63.1%), public school students (74.1%), with a family income below the current minimum wage (55.2%). Wear was observed in 579 teeth (76.6% in incisors and 9% in molars) of 80.64% of the adolescents examined.

The distribution of independent variables associated with SB is described in Table 2. Positive association was observed in the bivariate analysis between SB and gender, age, anxious behavior, morning headache, snoring and sleep quality ($p < 0.05$).

The PRs obtained in the multivariate analysis of the variables associated to SB are presented in Table 3. Males (PR = 1.41; 95%CI 1.04 – 1.89), snoring (PR = 1.39; 95%CI 1.02 – 1.89) and sleep difficulties (PR = 1.92; 95%CI 1.38 – 2.66) were associated with a higher prevalence of SB in the final model.

DISCUSSION

The present study contributes to the current state of knowledge by pointing out prevalence and factors associated with SB in an age group in which evidence is limited.

SB is a frequent condition in adolescents in Teresina, and the prevalence of SB found was higher than that reported for youngsters from another age group⁶ and for adults²⁵, still lower

Table 2. Distribution of independent variables associated with sleep bruxism (n = 594).

	With SB (n = 132)	Without SB (n = 462)	p-value*
	n (%)	n (%)	
Tooth wear			
Yes	107 (22.3)	372 (77.7)	0.890
No	25 (21.7)	90 (78.3)	
Gender			
Male	61 (27.9)	158 (72.1)	0.012
Female	71 (18.9)	304 (81.1)	
Age (years)			
11	37 (24.0)	117 (76.0)	0.031
12	41 (25.5)	120 (74.5)	
13	18 (13.0)	120 (87.0)	
14	36 (25.5)	105 (74.5)	

Continue...

Table 2. Continuation.

	With SB (n = 132)	Without SB (n = 462)	p-value*
	n (%)	n (%)	
Type of school			
Public	106 (24.1)	334 (75.9)	0.064
Private	26 (16.9)	128 (83.1)	
Maternal schooling (years)			
Up to 7	55 (23.9)	175 (76.1)	0.728
Between 8 and 11	58 (21.0)	218 (79.0)	
Over 12	19 (21.6)	69 (78.4)	
Marital status of the parents			
Separated	59 (25.2)	175 (74.8)	0.157
Live together	73 (20.3)	287 (79.7)	
Family income (MW)			
≤ 1	82 (25.0)	246 (75.0)	0.071
> 1	50 (18.8)	216 (81.2)	
Anxious behavior			
Yes	62 (30.1)	144 (69.9)	0.001
No	70 (18.0)	318 (82.0)	
General health condition			
Health problems	63 (25.1)	188 (74.9)	0.149
No health problems	69 (20.1)	274 (79.9)	
Habits			
Yes	71 (23.1)	237 (76.9)	0.614
No	61 (21.3)	225 (78.7)	
Headache upon waking up			
Yes	74 (27.8)	192 (72.2)	0.003
No	54 (17.6)	253 (82.4)	
Nocturnal snoring			
Yes	58 (31.0)	129 (69.0)	0.001
No	69 (18.2)	310 (81.8)	
Sleep quality			
Difficulty sleeping	46 (39.0)	72 (61.0)	< 0.001
Sleeps well	86 (18.1)	390 (81.9)	

*Pearson's chi-squared test. SB: sleep bruxism; MW: minimum wage.

Table 3. Crude and adjusted prevalence ratio of variables associated with sleep bruxism (n = 594).

	PR _{crude} (95%CI)	PR _{adjusted} (95%CI)
Gender		
Male	1.48 (1.08 – 2.01)	1.41 (1.04 – 1.89)
Female	1	1
Age (years)		
11	0.92 (0.60 – 1.41)	1.00 (0.67 – 1.49)
12	1.05 (0.70 – 1.56)	1.05 (0.72 – 1.54)
13	0.55 (0.33 – 0.93)	0.61 (0.37 – 1.01)
14	1	1
Type of school		
Private	1.37 (0.92 – 2.04)	–
Public	1	
Marital status of the parents		
Live together	1.28 (0.94 – 1.75)	–
Separated	1	
Family income (MW)		
≤ 1	1.37 (0.98 – 1.89)	–
> 1	1	
Anxious behavior		
Yes	1.76 (1.29 – 2.39)	1.33 (0.96 – 1.84)
No	1	1
Headache upon waking up		
Yes	1.56 (1.13 – 2.13)	1.31 (0.94 – 1.79)
No	1	1
Snoring		
Yes	1.70 (1.25 – 2.30)	1.39 (1.02 – 1.89)
No	1	1
Sleep quality		
Difficulty sleeping	2.36 (1.75 – 3.19)	1.92 (1.38 – 2.66)
Sleeps well	1	1

95%CI: 95% confidence interval; PR: prevalence ratio; MW: minimum wage.

than that reported for Brazilian children⁸, although the prevalence reported in children is variable^{5,26}. Studies have mentioned that the prevalence of SB decreases with age^{9,25,26}.

In population-based studies, it is possible that the prevalence is underestimated, because the diagnosis is made through the reports of parents, who do not always sleep in the same space as the individuals investigated¹¹. This is a limitation to be considered when interpreting the results. The comparison between prevalence studies is also hampered by the use of different ages within the age groups, diagnostic methods and non-specification of the form of bruxism — sleep or daytime^{1,11}.

The present study observed that boys present a higher prevalence of SB than girls, a result that corroborates those presented by Renner et al.¹², Lam et al.⁹ and Kato et al.²⁷. However, it disagrees with the observation of Serra Negra et al.⁸, who conducted a study with a different age group. The prevalence of SB in males may represent a characteristic of SB distribution in this age group, and may be related to the fact that boys are more agitated and, in general, motivated to contain their emotions, which would favor the occurrence of involuntary movements¹².

In the current study, SB was associated with the adolescent's age, as in another study²⁷. Investigations are still needed to explain the mechanism involved²⁷. Carra et al.¹⁹ verified a lower SB frequency in individuals older than 12 years, which was not verified in the present study. However, they mentioned that the observation may be related to the fact that the parents visit their children in their room less frequently after reaching that age, influencing the reports¹⁹.

Frequent psychosocial factors in adolescence, such as stress, anxiety, depression, neuroticism, hyperactivity, mental and emotional health problems have been associated with the presence of SB^{5,6,8,9}. In this and other studies, anxiety was associated^{7,21,22} and, as a clinical implication, this suggests that psychological treatment could be a positive factor for the control of the condition⁷.

Patients with SB generally have morning headaches^{19,20,28}, an association confirmed in the present study. Such a finding suggests that the presence of this symptom may contribute to the diagnostic hypothesis of SB. Carra et al.¹⁹ have mentioned that repetitive muscle contractions may be associated with tension headache or both conditions may share common risk factors with no causal relationship. Nevertheless, we recommend that studies with designs that allow the investigation of this hypothesis are conducted.

The presence of snoring was one of the factors associated with the higher prevalence of SB, corroborating the results presented by other authors^{9,19} and suggesting this respiratory disorder related to sleep as a predictor of the condition. It is possible that, in the event of an obstruction, SB favors the reestablishment of normal breathing^{10,19}. However, such an association needs to be better elucidated.

Problems related to sleep quality are common symptomatic consequences reported in individuals with bruxism²², a finding that was also confirmed in our results. Higher prevalence of SB was found in individuals with difficulty sleeping. One possible justification is that SB has been described as a complex nervous system excitation response, which can be accompanied by body movements, increased heart rate, and respiratory changes²².

CONCLUSION

Sleep bruxism is a frequent condition in adolescents, and the factors associated with their higher prevalence were: male sex, snoring and difficulty sleeping.

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