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| ORIGINAL

Sleep bruxism in children and its association with clinical and sleep characteristics: cross-sectional study

Bruxismo do sono em crianças e sua relação com características clínicas e do sono: estudo transversal

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ABSTRACT

Objective: The aim of the present study was to evaluate the prevalence of bruxism in children and its association with clinical and sleep characteristics. **Methods**: The study sample composed of 239 children aged 7 to 10 years enrolled in a public and a private school in the city of São Luís (MA). Bruxism was investigated based on parental reports of teeth grinding at night, sleep quality, and both intraoral and extraoral clinical aspects related to the condition. Data analysis involved descriptive statistics, Pearson's chi-squared (χ^2) test, the linear trend χ^2 test, and Fisher's exact test with a 5% significance level. **Results**: The prevalence of bruxism was 19.7%. Among the children with bruxism, 17% had poor sleep quality, 44.1% slept up to nine hours per night, 82.2% had daytime sleepiness, and 17.9% felt tiredness or pain in the facial muscles upon waking. **Conclusion**: Based on the present findings, the prevalence of sleep bruxism was significant. No significant associations were observed with the factors investigated, although daytime sleepiness was found to be the most prevalent characteristic of bruxism.

Indexing terms: Child. Prevalence. Sleep bruxism.

RESUMO

***Objetivo**: Este estudo avaliou a prevalência do bruxismo em crianças e sua associação a características clínicas e do sono. **Métodos**: A amostra foi constituída por 239 crianças, de 7 a 10 anos de idade, provenientes de uma escola pública e uma privada de São Luís (MA). O bruxismo foi investigado por meio do relato dos pais quanto a sons de ranger de dentes durante o sono, qualidade do sono e aspectos clínicos intra e extrabucais relacionados ao agravo. Foi realizada análise descritiva e aplicado os testes χ^2 de Pearson, χ^2 de Tendência Linear e Exato de Fisher, ao nível de significância de 5%. **Resultados**: A prevalência de bruxismo foi de 19,7%. Das crianças que apresentaram bruxismo, 17% tinham qualidade do sono ruim, 44,1% dormiam até 9 horas por noite, 82,2% tinham sonolência diurna e 17,9% se sentiam cansadas ou com dor nos músculos da face ao acordar. **Conclusão**: Com base nos achados, a prevalência de bruxismo do sono foi significativa. Não foi observada associação com os fatores investigados, embora a sonolência diurna tenha sido a característica mais prevalente.*

***Termos de indexação**: Crianças. Prevalência. Bruxismo do sono.*

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INTRODUCTION

The stomatognathic system is composed of a set of structures responsible for functions, such as chewing, swallowing, and speech. Para-functional activities, such as bruxism, can damage the balance of this system [1]. Bruxism is the activity of the masticatory muscles that can occur during sleep (characterized as rhythmic/phasic or non-rythmic/tonic) or in wakefulness (characterized by repetitive or sustained contact of the teeth and/or by bracing or thrusting of the mandible) [2].

The literature shows a large variation in the prevalence of sleep bruxism, ranging from 3.5% to 49.6% [3,4]. This may be due to the age range under study [4], the different sample sizes, and the type of bruxism evaluated [3], among others. This parafunction is more common in childhood and shows a reduction with increasing age [5].

Bruxism has a multifactorial etiology, involving peripheral (morphological) and central (physiopathological and psychological) factors [6,7]. Until recently, peripheral factors (malocclusion, occlusal interferences, temporomandibular joint (TMJ) anomalies, and the anatomy of bone structures in the orofacial region) were considered the main causal factors of bruxism. However, studies have shown that the central factors, especially psychological factors (stress, anxiety, and personality traits) are more directly related to bruxism in children [6,8].

Pathophysiological factors, represented by the central and autonomic nervous system, have demonstrated a preponderant role in the genesis of sleep bruxism. Polysomnographic records show a sequence of physiological events in these systems (increased cardiac sympathetic activity in the autonomic system and increased electrical activity in the central nervous system) prior to the muscle activity associated with tooth grinding [7,9].

In otherwise healthy individuals, sleep bruxism should not be considered a disorder, but rather as a behavior that can be a risk and/or protective factor for certain clinical conditions, such as sleep apnea or gastroesophageal reflux [2]. In addition to respiratory sleep disorders (snoring and obstructive apnea) [10], chronic respiratory diseases such as rhinitis and sinusitis have also been associated with sleep bruxism [11].

The diagnosis of bruxism can be established from symptoms, such as noise emitted during sleep (reported by people living with the individual who presents the symptoms) and signs, such as tooth wear, masseter muscle hypertrophy, and teeth marks on the tongue and cheeks, in addition to reports of headache, pain in the masticatory muscles, and in the TMJ [12].

Early diagnosis is of fundamental importance in treatment and management of bruxism through a multidisciplinary team aimed at alleviating the damage resulting from the alteration [12].

Sleep bruxism can affect different aspects of the child's life, which can invariably have repercussions on his/her health. Thus, the objective of this study was to evaluate the prevalence of bruxism in children and its association with clinical and sleep characteristics.

METHODS

This study was approved by the Research Ethics Committee of Ceuma University (#041,503) and complied with the ethical principles of the Declaration of Helsinki (2000). Parents/guardians of the children signed the Free and Informed Consent Term (TCLE) and the children signed the Free and Informed Consent Term (TALE).

The study design was transversal, with a sample of students enrolled in a public and private school in São Luís (MA). The study was conducted from January to April 2015. Children of both sexes, aged between 7 and 10 years, without any physical or mental impediment were included in the study, with prior permission from parents/guardians. The exclusion criteria were as follows: children with neurological (e.g., epilepsy, polio, cerebral palsy) and genetic (e.g., Down's syndrome, leukodystrophy) diseases, abnormal amount of movement during sleep, obstructive sleep apnea syndrome, and those who did not cooperate during physical examination.

A sample calculation was performed considering the prevalence of bruxism of 35.3% [13], an estimation error of 5, a confidence level of 95%, and a test power of 80%. An initial sample "n" of 716 children was obtained. An adjustment was made for a finite population (378 children), obtaining a final sample of 247 children. Simple random sampling was done considering the school children present in the classes equivalent to the age group under study. All the school children in the classes were listed, and a draw was made until the necessary sample "n" was reached.

Data was collected through a clinical examination (extra and intraoral) and a questionnaire containing demographic and socioeconomic factors, child's sleep characteristics, and questions related to bruxism. The questionnaire was answered by the parents.

The diagnosis of sleep bruxism followed the classification criteria proposed by the American Academy of Sleep Medicine based on parents' report of frequent noises of teeth grinding at night, without the use of medication, and in absence of any other medical or mental disorders or other sleep disorders [14].

Signs and symptoms of sleep bruxism were also investigated. Initially, a clinical examination was conducted in the classroom, by a single calibrated assessor with the child seated facing the assessor. A head lantern (Peltz, Tikka XP, Crolles, France), mouth mirror (PRISMA®, São Paulo, SP, Brazil) and a wooden spatula to retract the tongue, and gauze to clean and dry the teeth were used as aids. Individual protection equipment was used.

In extraoral examination, the presence of pain in the TMJ as well as pain on palpation of the masseter and temporal muscles were evaluated. Muscle palpation was performed by simultaneous digital pressure on the muscle bundles of both the sides. In case of weekly reports of headache, children were asked to use their hands to show the exact location of the pain.

Attrition on deciduous teeth was evaluated by means of the Tooth Wear Index with the following diagnostic criteria and respective scores: 0 = no dentin wear; 1 = dentin only visible (including concavity) or exposed dentin in less than one-third of the surface; 2 = exposed dentin in more than one-third of the surface; 3 = secondary dentin or pulp exposure [15]. The presence of at least two antagonist teeth with sharp margins that adjust to the excursive mandibular movement was considered as attrition due to bruxism.

The mucosa of the cheeks along the occlusal line and the lateral edges of the tongue were evaluated to determine the presence of linea alba and crenation, respectively [16].

A pilot study was conducted with 10 children in order to test the study methodology and calibrate the evaluator for clinical examination (kappa [k] ranged from 0.72 to 1.0 for the different conditions evaluated). An interval of seven days was maintained between the evaluations.

The Statistical Package for the Social Sciences (SPSS for Windows, version 21.0; SPSS Inc., Chicago, IL, USA) was used for data analysis that included descriptive and inferential statistics (Pearson's chi-squared (χ^2), Linear Trend χ^2, and Fisher's Exact tests), at a 5% significance level.

RESULTS

In this study, 239 children were evaluated, corresponding to a response rate of 96.76%. Table 1 shows the demographic and socioeconomic aspects related to the child and family, with 51.9% (n = 124) belonging to the brown race and 43.9% (n = 105) having a family income below 2 minimum wages.

Table 2 presents aspects related to the child's sleep. Regarding the quality of the children's sleep, 9.6% (n = 23) of the parents/guardians reported that their child did not sleep well and 35.6% (n = 85) reported total sleep time to be less than or equal to nine hours per night. Daytime sleepiness was reported in 77.8% (n = 186) of the samples.

Table 1. Demographic and socioeconomic characteristics of the sample (n = 239) (São Luís, MA, 2015). Table 1. Demographic and socioeconomic characteristics of the sample (n = 239) (São Luís, MA, 2015).

	n	(%)
Type of school		
Public	150	(62.8)
Private	89	(37.2)
Sex		
Male	120	(50.2)
Female	119	(49.8)
Age*		
6 years	6	(2.5)
7 years	43	(18.0)
8 years	72	(30.1)
9 years	69	(28.9)
10 years	48	(20.1)
Breed*		
White	79	(33.1)
Black	19	(7.9)
Brown	124	(51.9)
Yellow	2	(0.8)
No answer	15	(6.3)
Family's monthly income*		
Less than 1 MW	51	(21.3)
From 1 to less than 2 MW	54	(22.6)
From 2 to less than 5 MW	41	(17.2)
From 5 to less than 10 MW	32	(13.4)
Above 15 MW	19	(7.9)
I don't know	20	(8.4)

Note: *Data lost. MW = Minimum wage

Table 2. Evaluation of Child's sleep (n = 239) (São Luís, MA, 2015).

	n	(%)
Quality of sleep*		
Good	212	(88.7)
Bad	23	(9.6)
Hours Overnight*		
≤ 9 hours	85	(35.6)
> 9 hours	99	(41.4)
Child sleeps with the light on*		
No	166	(69.5)
Yes	62	(25.9)
Room with radio/TV noise on*		
No	165	(69.0)
Yes	61	(25.5)

Table 2. Evaluation of Child's sleep (n = 239) (São Luís, MA, 2015).

	n	(%)
Child is sleepy during the day*		
Yes	186	(77.8)
No	34	(14.2)

Note: *Data lost.

The prevalence of bruxism was found to be 19.7% (n = 47). Of the total number of children evaluated, 6.7% (n = 16) had fatigue or pain in the facial muscles and 5.9% (n = 14) felt soreness or discomfort in teeth and gums on waking up. Among the other parafunctional habits investigated, onychophagia (compulsive nail-biting behavior) was the most prevalent (42.3%, n = 101) (table 3).

The most prevalent clinical characteristics of bruxism were pain on palpation of the masseter muscle (18.4%, n = 44), weekly headache (12.6%, n = 30), presence of linea alba (14.2%, n = 34), and attrition (12.1%, n = 29) (table 4).

Table 3. Diagnosis of sleep bruxism and related symptoms, and presence of other parafunctional habits (n = 239) (São Luís, MA, 2015).

	n	(%)
Child grits teeth during sleep*		
No	169	(70.7)
Yes	47	(19.7)
Child feels tiredness or pain in the facial muscles when waking up*		
No	201	(84.1)
Yes	16	(6.7)
Child feels discomfort (sensitivity) in his teeth on waking up*		
No	199	(83.3)
Yes	14	(5.9)
Child has earache or near earache at any time of the day*		
No	176	(73.6)
Yes	44	(18.4)
Child has a habit of biting nails*		
No	74	(31.0)
Yes	101	(42.3)
Child has a habit of biting objects*		
No	107	(44.8)
Yes	47	(19.7)
Child has a cheek biting habit*		
No	131	(54.8)
Yes	16	(6.7)
Child has habit of biting lips*		
No	127	(53.1)
Yes	25	(10.5)

Note: *Data lost.

Table 4. Clinical characteristics of sleep bruxism (n = 239) (São Luís, MA, 2015).

	n	(%)
Pain on palpation of the temporal muscle		
No	214	(89.5)
Yes	25	(10.5)
Pain on palpation of the masseter muscle		
No	195	(81.6)
Yes	44	(18.4)
Pain in the TMJ		
No	221	(92.5)
Yes	18	(7.5)
Weekly headache		
No	209	(87.4)
Yes	30	(12.6)
Linea alba		
No	205	(85.8)
Yes	34	(14.2)
Tongue indentation,		
No	238	(99.6)
Yes	1	(0.4)
Attrition		
Absent	189	(79.1)
Present	29	(12.1)

Note: TMJ = temporomandibular joint.

The male gender presented a higher prevalence of bruxism. Of the children who presented bruxism, 37 (82.2%) reported daytime sleepiness. Sleep bruxism was associated with the type of school and quality of sleep (p = 0.039; p = 0.033) (table 5). Fifty-one percent of the children slept in the same room with their parent, and 41.4% of those responsible said they visited the child's room one to two times each night.

Sleep bruxism was associated with fatigue or pain in the facial muscles upon waking (p = 0.019) (Table 6).

Table 5. Association between bruxism and demographic, social and sleep variables (n = 239) (São Luís, MA, 2015).

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	BRUXISM				p†
	NO		YES		
	n	(%)	n	(%)	
Type of school*					
Public	114	(67.5)	24	(51.1)	0.039
Private	55	(32.5)	23	(48.9)	
Sex*					
Male	79	(46.7)	29	(61.7)	0.070
Female	90	(53.3)	18	(38.3)	

Table 5. Association between bruxism and demographic, social and sleep variables (n = 239) (São Luís, MA, 2015).

	BRUXISM				p†
	NO		YES		
	n	(%)	n	(%)	
Quality of sleep*					
Good	155	(93.9)	39	(83.0)	0.033‡
Bad	10	(6.1)	8	(17.0)	
Hours of sleep at night*					
≤ 9 hours	59	(43.7)	15	(44.1)	0.965
> 9 hours	76	(56.3)	19	(55.9)	
Child is sleepy during the day*					
Yes	139	(85.8)	37	(82.2)	0.552
No	23	(14.2)	8	(17.8)	

Note: *Data Lost; †Pearson's chi-squared test; ‡Fisher's exact test.

Table 6. Association between sleep bruxism and variables related to the diagnosis of the condition (n = 239) (São Luís, MA, 2015).

	BRUXISM		p†
	NO	YES	
	n (%)	n (%)	
Child feels tiredness or pain in the facial muscles when waking up*			
No	152 (94.4)	32 (82.1)	0.019‡
Yes	9 (5.6)	7 (17.9)	
Child feels discomfort in his teeth on waking up*			
No	151 (95.0)	35 (89.7)	0.258‡
Yes	8 (5.0)	4 (10.3)	
Child has earache or near-earache pain*			
No	129 (80.1)	32 (80.0	0.986
Yes	32 (19.9)	8 (20.0)	
Pain on palpation of the temporal muscle*			
Painless	154 (91.1)	40 (85.1)	0.274‡
With pain	15 (8.9)	7 (14.9)	
Pain on palpation of the masseter muscle*			
Painless	137 (81.1)	37 (78.7)	0.720
With pain	32 (18.9)	10 (21.3)	
Pain in the TMJ*			
Painless	160 (94.7)	43 (91.5)	0.487‡
With pain	9 (5.3)	4 (8.5)	
Headache every week*			
No	149 (88.2)	40 (85,1)	0.575
Yes	20 (11.8)	7 (14.9)	

Note: *Data Lost; †Pearson's chi-squared test; ‡Fisher's exact test.TMJ = temporomandibular joint.

DISCUSSION

Bruxism has been a much discussed subject in the literature, and there is still a lot of controversy about the factors associated with it. The prevalence of bruxism in the present study was 19.7%, which is in accordance with the findings in the literature, ranging from 3.5% to 49.6% [3, 4]. The wide range of variation can be attributed to the age under study [4], different sample sizes, and the type of bruxism evaluated [3], among others.

According to a systematic review published in 2014, divergences between studies were observed for the prevalence of sleeping bruxism in relation to gender [3]. In this study, bruxism was more prevalent in males, corroborating other studies which included child participants [17,18].

In the literature, childhood bruxism has been related to other parafunctional habits such as object biting, nail biting, awake bruxism (teeth clenching), and mouth breathing [19,20]. In this study, 42.3% of children had the habit of biting nails, however, this habit showed no association with bruxism, in contrast to a study by Serra-Negra et al. [19], which demonstrated a greater predisposition to bruxism in children with habit of biting objects and awake bruxism. Regarding the association between bruxism and other oral habits, Lavigne et al. [21] highlighted the need for attention to the presence of anxiety and stress that can exacerbate oral parafunctional habits, such as biting nails and biting objects.

The presence of behavioral problems and emotional stress may have an important role in the development or aggravation of bruxism [8,21,22]. Hence, the medical history of the patient, besides investigating neurological and systemic alterations and parafunctional habits, must inquire about the lifestyle, social, and family relations of individuals. A thorough clinical examination along with a good anamnesis is required for an effective contribution of the therapies in the treatment and management of bruxism [22].

Regarding the number of hours that the child sleeps at night, it was found that 55.9% of those who presented bruxism slept for more than nine hours in the night, which characterizes a good quality of night's sleep. In the present study, there was a significant association between bruxism and the quality of sleep in children. Of the 47 children who presented with bruxism, 39 (83%) parents reported that they sleep well at night, which corroborates the findings of Macaluso et al. [23], who affirmed that bruxism does not interfere with the quality of sleep. This study was conducted on patients recruited from a University Dental Clinic, and none of the bruxists complained of daytime sleepiness. According to the authors of the research, bruxism does not cause changes in conventional sleep parameters, and does not significantly affect its stability during the night [23].

However, in the present study, out of the 45 children who presented with bruxism, 37 (82.2%) reported daytime sleepiness. Although no association between sleep bruxism and daytime sleepiness has been found, some studies have suggested that this association may be due to sleep fragmentation as a result of bruxism. These studies report sleep disorders as a cause of daytime sleepiness, which interferes with school performance (learning) and other daily activities [24,25].

Although, in the present study, an association between sleep bruxism and other factors, such as type of school, sleep quality, and tiredness or pain in the facial muscles on waking up was found, these findings should be interpreted with caution, since data were lost for both the dependent variable (sleep bruxism) and the independent variables studied. The data lost in the survey refer to the questions not answered by some participants. In addition to self-reporting, sending the questionnaire to be answered at home may have contributed to the incomplete answers, which tends to compromise the validity of the findings. However, it does not invalidate them completely, since the significant findings tend to represent a propensity in the population of children with sleep bruxism.

Of the children with bruxism, only 7 (14.9%) reported having headache, which contrasts with a case-control study finding, in which 65.9% of the children with bruxism presented with this symptom [18]. According to Lobbezzo et al. [26], headache is one of the most common consequences of bruxism, and its evaluation should be a part of the anamnesis in the search for the diagnosis of grievance.

Of the 47 cases of bruxism detected, for 25 (54.3%), the parents slept in the same room as the child. A higher number of cases of bruxism (n = 18, 42.9%) was also found when the doors of the parents' and children' s rooms remained open during the night. Regarding the number of visits to the child's room, for 23 cases of bruxism, the visit occurred 1 to 2 times each night. These findings refer to diagnostic reliability, corroborating studies by Serra-Negra et al. [19] and Cheifetz et al. [22]. Serra-Negra et al. [19] propose that keeping the doors of both the rooms open as well as visiting the children's room guarantees the veracity of the information.

This study presents as limitation the transversal design that prevents the establishment of a cause-and-effect relationship. Since the sample was a convenience sample, the research findings cannot be extrapolated beyond the study universe.

CONCLUSION

Based on these findings, it can be concluded that the prevalence of sleep bruxism was considerable; however, no significant association with the factors investigated was observed, although daytime sleepiness was the most prevalent characteristic in children with sleep bruxism.

Collaborators

EG Alves, investigation, writing - original draft. DM Fagundes, writing - original draft, writing - review & editing. MC Ferreira, conceptualization, methodology, project administration and writing - review & editing.

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