Clinical Article

CROSS-SECTIONAL

Prevalence of Sleep Bruxism and Associated Factors in Preschool Children

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Abstract: ***Purpose:*** *The purpose of this study was to evaluate the prevalence of sleep bruxism and associated factors in three- to five-year-olds.* ***Methods:*** *A representative cross-sectional study was conducted with a sample of 749 preschool children during immunization campaigns. Data acquisition involved an oral clinical exam, anthropometric measures, and a questionnaire administered in interview form. All data were analyzed using the chi-square test and Poisson regression with robust variance with the aid of SPSS software.* ***Results:*** *The prevalence of sleep bruxism among preschool children was approximately 14 percent. Statistically significant associations were found: between sleep bruxism and lower dental crowding (prevalence ratio=3.38; 95% confidence interval=1.9-5.7); for the habit of biting on objects (PR=2.49; 95% CI=1.4-4.4); for duration of breast-feeding for a period longer than 12 months (PR=1.98; 95% CI=1.2-3.2); and for bottle-feeding for more than 24 months (PR=1.93; 95% CI=1.2-3.1).* ***Conclusions:*** *Lower arch crowding, the habit of biting on objects, and prolonged breast-feeding and bottle-feeding were associated with sleep bruxism in the preschool children analyzed in the present study. (Pediatr Dent 2014;36:46-50) Received September 11, 2012 / Last Revision February 4, 2013 / Accepted February 6, 2013*

KEYWORDS: SLEEP BRUXISM, CHILD, PRESCHOOL, PREVALENCE, EPIDEMIOLOGY

Bruxism is an oral parafunctional activity involving rhythmic movements of the muscles of mastication and characterized by clenching and/or grinding of the teeth. This condition affects both children and adults.[1,2] Bruxism can occur during the day, but is more common at night (sleep bruxism).[3] According to epidemiological studies carried out in different countries, the prevalence of bruxism in children ranges from seven percent to 88 percent.[4] It is reported that approximately 55 percent of four- to six-year-old Brazilian children exhibit this habit.[5]

The etiology of bruxism in children is not yet defined.[6,7] However, a number of studies state that this condition may be associated with occlusal, psychosocial, and environmental factors as well as stress and anxiety in children.[3,5,7] Moreover, the following have been associated with bruxism: nutritional deficits; allergies; parasitosis; sleep disorders and parasomnia[8,9]; the duration of breast-feeding[10]; malocclusion; and harmful oral habits,[6] such as nail biting, biting on objects, and pacifier sucking.[5] A Brazilian study found no difference in the prevalence of sleep bruxism between children with and without cognitive impairment.[6]

Few studies have investigated the prevalence of sleep bruxism and associated factors in preschool children. The present study tested the hypothesis that factors such as gender, age, birth conditions, sociodemographics, malocclusion, presence of harmful oral habits, and nutritional status were associated with the occurrence of sleep bruxism in preschoolers.

Knowledge of the distribution and factors associated with the manifestation of sleep bruxism in children in the primary dentition is of considerable importance to be able to draft treatment strategies and public health policies directed at oral health in the pediatric population.

The purpose of the present study was to assess the prevalence of sleep bruxism in three- to five-year-olds and determine factors associated with the occurrence of this habit.

Methods

This study received approval from the Human Research Ethics Committee of the Federal University of the Valleys of Jequitinhonha and Mucuri, Diamantina, Minas Gerais, Brazil. Parents/guardians signed a statement of informed consent.

Study design and sample. A cross-sectional study was carried out in Diamantina. The study population was comprised of three- to five-year-olds who were treated at the 10 basic health care units in the city during immunization campaigns held in 2010. Diamantina has a 90 percent vaccine coverage rate.

To calculate sample size, a prevalence rate of bruxism in the primary dentition of approximately 55 percent,[5] 95 percent confidence interval, and five percent standard error were considered, which determined a minimum sample of 380 children. A 1.8 correction factor was applied to enhance the precision (n=684 children), and an additional 76 individuals were added to compensate for possible losses, totaling a sample of 760 children. Systematic sampling was adopted for the randomization. For such, the children were arranged in a line, with the first child examined, the second not examined, the third child examined, and so on. Children who did not cooperate during the exam and those whose parents/guardians reported not knowing whether the child exhibited bruxism were excluded.

Data acquisition. Data acquisition involved an oral clinical exam, anthropometric measures, and a questionnaire administered in interview form. One team made up of three researchers (one examiner and two assistants) was installed in each health care unit.

Prior to the field work, the examiners underwent a calibration and training exercise for the diagnosis of malocclusion

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(upper arch crowding, lower arch crowding, open bite, anterior crossbite, posterior crossbite, and distal relationship of right and left second molars) and facial type. The calibration process involved 20 children who exhibited different clinical situations examined on two separate occasions, with a one-week interval between examinations. Kappa values were calculated. Minimum intraexaminer agreement was 0.81 and minimum interexaminer agreement was 0.80.

The clinical exam was performed with the aid of disposable tongue depressors, gauze, gloves, caps, and masks. During the exam, the child remained seated in a chair in front of the examiner and a window to make maximal use of the natural light. For the assessment of malocclusion, the following anterior malocclusion traits were considered: anterior open bite; overjet greater than or equal to four mm; anterior crossoverbite[11]; anterior crowding (upper and lower); and posterior crossbite. Crowding was recorded when one or more teeth were out of their normal position in the arch due to a lack of space. The different types of malocclusion were categorized as 0=absent or 1=present for each child.

The presence or absence of sleep bruxism was determined through parents' reports.[12,13] No clinical examination for the clinical presence of the signs of bruxism, such as cuspal wear or loss of tooth structure, was performed. The diagnosis of sleep bruxism was supported by the classification criteria proposed by the American Academy of Sleep Medicine (**AASM**).[14] The AASM criteria are: parents indicating the occurrence of audible night teeth grinding; no other medical or mental disorders (eg, sleep-related epilepsy, accounts for abnormal movements during sleep); and no other sleep disorders (eg, obstructive sleep apnea syndrome).

Data were collected through interviews with parents/guardians. The questionnaire included a total of 10 questions, eliciting information on the child's history of audible night teeth grinding, oral habits, medical history, and sociodemographic information.[12,13] Information on the birth of each child was obtained from the vaccination card.

The children were classified based on birth weight using the criteria of the World Health Organization: very low birth weight (less than 1,500 grams); low birth weight (less than 2,500 grams); and normal birth weight (equal to or greater than 2,500 grams).[15] Information was gathered on the child (age, gender, main caregiver, duration of breast-feeding, bottle-feeding, nonnutritive sucking habits, and habit of biting on objects), parents, and sociodemographic factors (mother's schooling, father's schooling, monthly household income, number of children in the family, mother's marital status, and childbirth). Childbirth was classified as "full term" (equal to or greater than 37 weeks of gestation) and "premature birth" (less than 37 weeks of gestation).

Anthropometric measures (weight and height) were used for the assessment of the child's nutritional status. The children were weighed on a digital scale (Plenna, São Paulo, Brazil) for such, and food intake and the elimination of excrement were not taken into consideration. Height was determined on a stadiometer with a millimeter scale and two-meter capacity (Welmy, Porto Alegre, Brazil) placed on a flat surface. Nutritional status was determined through comparisons of the measurements with reference standards stipulated by the American National Center for Health Statistics.[16]

Statistical analysis. Data analysis was performed using the SPSS 17.0 software (SPSS Inc, Chicago, Ill., USA) and included frequency distribution and association tests. Associations between sleep bruxism and the independent variables were determined using the chi-square test. All independent variables associated with the presence/absence of sleep bruxism and with a *P*-value less than or equal to .20 in the chi-square test (lower arch crowding, open bite, biting on objects, facial type, duration of bottle-feeding, duration of breast-feeding, birth weight, childbirth, mother's marital status, nutritional status, and number of children) were incorporated into the Poisson regression with robust variance. The association magnitude of each factor with the presence of sleep bruxism was

Table 1. DISTRIBUTION OF BRUXISM IN 749 PRESCHOOL CHILDREN, ACCORDING TO ASPECTS RELATED TO CHILDREN, PARENTS, AND SOCIODEMOGRAPHIC FACTORS

Aspects related to children, parents, and sociodemographic factors	Bruxism		*P*-value*
	Absent n (%)	Present n (%)	
Age of child (mos)			<.83
24-48	321 (87)	50 (14)	
49-71	325 (86)	53 (14)	
Child's gender			>.43
Male	309 (87)	45 (13)	
Female	337 (85)	58 (15)	
Birthweight (g)			<.18
<2,500	62 (82)	14 (18)	
≥2,500	570 (87)	84 (13)	
Childbirth			<.07
Full-term	586 (87)	88 (13)	
Premature	52 (79)	14 (21)	
Duration of breast-feeding (mos)			>.05
≤12	326 (88)	44 (12)	
>12	267 (83)	55 (17)	
Duration of bottle-feeding (mos)			>.10
≤24	203 (90)	23 (10)	
>24	188 (85)	34 (15)	
Non-nutritive sucking habits			>.27
Absent	509 (86)	86 (15)	
Present	137 (89)	17 (11)	
Biting on objects			.007
Absent	551 (88)	77 (12)	
Present	95 (79)	26 (22)	
Nutritional status			>.14
Ideal	488 (86)	81 (14)	
Overweight/obesity	54 (79)	14 (21)	
Nutritional risk	50 (94)	4 (6)	
Underweight/very low weight	23 (85)	4 (15)	
Main caregiver			>.94
Mother	325 (86)	51 (14)	
Other	317 (87)	49 (13)	
No. of children			<.09
1 or 2	412 (85)	74 (15)	
3-6	233 (89)	28 (11)	
Mother's schooling (ys)			<.04
>8	317 (84)	61 (16)	
≤8	312 (89)	38 (11)	
Father's schooling (ys)			>.58
>8	232 (86)	38 (14)	
≤8	333 (87)	48 (13)	
Mother's marital status			<.18
With partner	311 (85)	57 (16)	
Without partner	334 (88)	46 (12)	

* Chi-square test.

assessed using nonadjusted and adjusted prevalence ratios (**PR**), respective confidence intervals (**95% CI**), and *P*-values (Wald test). Explanatory variables with a *P*-value less than or equal to .20 in the bivariate analysis and those with theoretical relevance (regardless of the *P*-value) were incorporated into the model.

Results

A total of 749 children were examined, corresponding to a response rate of approximately 99 percent. Losses were due to incomplete data and difficulties during the clinical examination. A total of approximately 53 percent (N=395) of the children were female, approximately 10 percent (N=76) had a history of low birth weight, and approximately 49 percent (N=370) were breast-fed for 12 months or less. Mean age was 48.7 months old (±12.6 months standard deviation). Approximately half of the mothers had fewer than eight years of schooling (48 percent, N=378). Monthly household income was equal to two times the minimum salary in approximately 82 percent (N=610) of the families.

The prevalence of sleep bruxism was approximately 14 percent (N=103). A total of 258 children (~34 percent) had some type of malocclusion. The mesofacial type was predominant (~86 percent; N=643).

Table 2. DISTRIBUTION OF BRUXISM IN 749 PRESCHOOL CHILDREN ACCORDING TO ASPECTS RELATED TO MALOCCLUSION

Aspects related to malocclusion	Bruxism		*P*-value*
	Absent N (%)	Present N (%)	
Upper arch crowding			>.63
Absent	620 (86)	100 (14)	
Present	25 (89)	3 (11)	
Lower arch crowding			<.001
Absent	598 (88)	84 (12)	
Present	47 (71)	19 (29)	
Open bite			.12
Absent	558 (86)	95 (15)	
Present	85 (91)	8 (9)	
Anterior crossbite			<.65
Absent	586 (86)	95 (14)	
Present	59 (88)	8 (12)	
Posterior crossbite			<.36
Absent	573 (86)	95 (14)	
Unilateral	61 (91)	6 (9)	
Bilateral	4 (100)	0 (0)	
Distal relationship of right second molars			>.46
Flush	312 (87)	45 (13)	
Mesial step	274 (84)	51 (16)	
Distal step	24 (89)	3 (11)	
Distal relationship of left second molars			>.55
Flush	288 (87)	43 (13)	
Mesial step	282 (84)	52 (16)	
Distal step	25 (89)	3 (11)	
Facial type of child			>.04
Brachyfacial	45 (76)	14 (24)	
Mesofacial	558 (88)	80 (13)	
Dolichofacial	38 (83)	8 (17)	

* Chi-square test.

Tables 1 and 2 display the results of the associations between sleep bruxism and factors related to the child and birth as well as socio-demographic, nutritional and dental variables. The habit of biting on objects (*P*=.007), mother's schooling greater than eight years (*P*=.040), lower arch crowding (*P*<.001) and the brachyfacial type (*P*=.040) were significantly associated with sleep bruxism.

In the adjusted multivariate regression, lower arch crowding (PR=3.38; 95% CI=1.9-5.7), habit of biting on objects (PR=2.49; 95% CI=1.4-4.4), duration of breast-feeding longer than 12 months (PR=1.98; 95% CI=1.2-3.2), and bottle-feeding for longer than 24 months (PR=1.93; 95% CI=1.2-3.1) remained associated with a greater prevalence rate of sleep bruxism in the primary dentition. These variables were controlled for all variables that remained in the model as well as for the child's gender and age and mother's schooling (Table 3).

Table 3. PREVALENCE RATIO (PR) AND CONFIDENCE INTERVAL (CI) FOR MAGNITUDE OF ASSOCIATIONS BETWEEN BRUXISM AND VARIABLES ANALYZED

Variables	PR unadjusted (95% CI)	*P*-value	PR adjusted (95% CI)	*P*-value*
Lower arch crowding		<.001		<.001
Absent	1.00		1.00	
Present	3.19 (1.9-5.5)		3.38 (1.9-5.7)	
Open bite		<.16		
Absent	1.00			
Present	0.61 (0.3-1.2)			
Biting on objects		.006		.001
Absent	1.00		1.00	
Present	1.74 (1.2-2.6)		2.49 (1.4-4.4)	
Facial type				
Brachyfacial	1.00			
Mesofacial	0.72 (0.4-1.4)	>.33		
Dolichofacial	1.36 (0.6-2.9)	<.43		
Duration of bottle-feeding (mos)		<.07		.008
≤24	1.00		1.00	
>24	1.64 (0.9-2.8)		1.93 (1.2-3.1)	
Duration of breast-feeding (mos)		<.06		.005
≤12	1.00		1.00	
>12	1.65 (0.9-2.7)		1.98 (1.2-3.2)	
Birthweight (g)		<.14		
<2,500	1.00			
≥2,500	1.71 (0.8-3.5)			
Childbirth		.007		
Full-term	1.00			
Premature	2.42 (1.3-4.6)			
Mother's marital status		<.93		
With partner	1.00			
Without partner	0.98 (0.6-1.6)			
Nutritional status				
Ideal	1.00			
Overweight/obesity	1.79 (0.9-3.4)	>.07		
Nutritional risk	0.46 (0.1-1.8)	.27		
Under weight/ Very low weight	1.05 (0.3-3.9)	<.94		
No. of children		<.39		
1 or 2	1.00			
3-6	0.77 (0.4-1.4)			

* Adjusted for child's gender and age and mother's schooling.

Discussion

The present study assessed the prevalence of sleep bruxism and associated factors in three- to five-year-olds. Few investigations have been carried out involving children in the primary dentition phase, as most studies on the pediatric population have addressed bruxism in children in the mixed or permanent dentition phases.[17-20]

The prevalence of bruxism in the present study (~14 percent) may have been underestimated due to the fact that the diagnosis was performed based on interviews with parents. Polysomnography combined with an electromyographic evaluation of the muscles of mastication and audiovisual recording carried out in a sleep laboratory is currently the gold standard for the diagnosis of sleep bruxism.[21] However, this method is unviable in epidemiological studies with a large sample due to costs and logistic issues.[22] Thus, as done in the present study, a number of studies have employed interviews with parents/guardians for the diagnosis of sleep bruxism in children.[19,23,24]

Sounds generated by teeth grinding during sleep are audible and easily detected by those who cohabitate with a child.[13,25] Moreover, parents' reports of the presence of characteristic noises of teeth clenching and/or grinding are recommended by the International Classification of Sleep Disorders.[9,14,26] The clinical assessment of tooth wear constitutes another method for the evaluation of bruxism. However, this method is questionable in small children due to the fact that the primary dentition undergoes physiological wear[27] and is directly influenced by acidic food and beverages as well as endogenous factors.[28]

In the present study, the prevalence of sleep bruxism was associated with crowding in the lower arch. The vector force in the vestibular direction caused by bruxism can affect the periodontal tissue, rotating the anterior teeth.[29] Moreover, hyperactivity of the oral, perioral, and mastication musculature can exert pressure on the dentoskeletal structure, causing alterations in the positioning of the teeth.[30] Studies on the association between malocclusion and bruxism offer conflicting results and have been carried out on children in the mixed and permanent dentition phases or on the adult population.[27,31-33]

The habit of biting on objects was also associated with sleep bruxism in the present study. Psychological and emotional aspects, such as stress, anxiety, aggressiveness, and hyperactivity, have been associated with the development of bruxism.[7,34-37] The habit of biting on objects is often used as a way to relieve emotional and psychological tension in children. Previous studies also report a high prevalence rate of children with bruxism who exhibit the habit of biting on objects.[5,38] Thus, parents and pediatric dentists should be aware of the harmful habits and emotional well-being of children, which may exacerbate sleep bruxism and can even serve as a means to help diagnosis this condition.

Children who were breast-fed for more than 12 months and who were bottle-fed for more than 24 months had a greater frequency of sleep bruxism than those who were breast-fed and bottle-fed for shorter periods of time. Recent studies have found that breast-fed children had a significant increase in the number and duration of arousals from sleep as well as less consolidated sleep.[39] Other studies also state that prolonged breast-feeding affects the normal development of sleep.[40] One should also consider that children who breast-feed for a longer period of time sleep beside their parents with greater frequency,[41] which may facilitate the observation of sleep bruxism.[42] However, Fonseca et al.[10] found no association between the duration of breast-feeding and bruxism in children with a mean age of 4.37±1.69 years old.

No significant association was found between sleep bruxism and sociodemographic variables in the present study. Serra-Negra et al.[2] also detected no significant association between social vulnerability and sleep bruxism, but found that most children without this parafunctional activity belonged to more privileged social classes.

As sleep bruxism is not a normal habit inherent to children in the primary and mixed dentition and its prevalence is high among children,[5,19,23] pediatric dentists and orthodontists should be attentive to the detection of this parafunctional activity to avoid possible harm to the stomatognathic system. Sleep disorders and alterations, including myofascial pain, hypertrophy of the orofacial musculature, temporomandibular disorder, dental hypersensitivity, and hypermobility and harm to the periodontal ligament and periodontium, are possible consequences of bruxism[43] that can affect quality of life. Longitudinal studies are needed to clarify the findings of the present investigation and gain a better understanding of the impact of sleep bruxism on the quality of life of preschoolers.

The present study has limitations that should be addressed. The cross-sectional nature of the design allows the demonstration of associations but not causality, and the results should, therefore, be interpreted with caution. Moreover, some information was obtained from the questionnaires administered to parents/caregivers, and there is the possibility of memory bias, especially regarding birth conditions and the duration of bottle-feeding and breast-feeding. Longitudinal studies should be carried out to gain a better understanding of the factors that influence the occurrence of bruxism in children.

Conclusions

Based on this study's results, the following conclusions can be made:

1. The prevalence of sleep bruxism in the preschool children analyzed was approximately 14 percent.
2. Lower arch crowding, the habit of biting on objects, breast-feeding for more than 12 months, and bottle-feeding for more than 24 months were associated with the occurrence of sleep bruxism.

Acknowledgments

This study was supported by the Brazilian fostering agencies National Council for Scientific and Technological Development and State of Minas Gerais Research Foundation.

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