

# Probable Sleep Bruxism in Children and its Relationship with Harmful Oral Habits, Type of Crossbite and Oral Breathing

Lamenha Lins R M\*/ Cavalcanti Campêlo M C\*\*/ Mello Figueiredo L\*\*\*/ Vilela Heimer M\*\*\*\*/ dos Santos-Junior V E\*\*\*\*\*

**Objective:** To establish the prevalence of Probable Sleep Bruxism (PSB) and its association with gender, breast or bottle-feeding, posterior and anterior crossbite, oral habits and oral breathing. **Study Design:** Consists of a cross-sectional study in which 151 children were submitted to a clinical oral examination for the evaluation of tooth wear, muscle discomfort and the presence of anterior and/or posterior crossbite. Parents/caregivers were asked about the frequency of teeth grinding during the child's sleep and the occurrence of harmful oral habits, as well as the type of childbirth and breastfeeding. Data were statistically analyzed through Chi-square or Fisher's exact tests at a 5% level of significance to determine an association among variables. **Results:** The prevalence of PSB was of 27.8% among the examined children. Among the analyzed variables, only oral breathing was statistically associated to PSB ( $p < 0.001$ ), and it was verified that children with oral breathing are 2.71 times more likely to present sleep bruxism. **Conclusions:** The prevalence of PSB in schoolchildren was high and the disorder was associated with oral breathing. Thus, pediatric dentists have an important role in the diagnosis of sleep bruxism and in monitoring breathing-related disorders.

**Keywords:** Child; Epidemiology; Habits; Malocclusion; Sleep bruxism

## INTRODUCTION

Bruxism is a repetitive jaw-muscle activity characterized by clenching or grinding the teeth and/or by bracing or thrusting the mandible, with two distinct circadian manifestations. Moreover, the quality of life in bruxers, especially those in pain, is also affected<sup>1-3</sup>. In Brazil, several studies have analyzed the prevalence of sleep bruxism and the risk factors in children<sup>4-6</sup>. However, its association with oral habits, some malocclusion and the type of breastfeeding are not yet clear.

The frequency of harmful habits in childhood is high and most of the time neglected by parents and caregivers<sup>7</sup>. It is important to recognize the parafunctional alterations that may affect occlusal normality in the initial stages of occlusion, including its influence on the prevalence of Probable Sleep Bruxism (PSB)<sup>8</sup>. Schoolchildren with history of nail biting and biting objects have a higher prevalence of PSB<sup>9</sup>, but more evidence is needed to establish a relationship with deleterious habits, such as pacifier, bottle or finger sucking needs, in order to manage this disorder.

In this perspective, the presence of crossbite is associated with lower efficiency of the masticatory function, with less biting force and asymmetry of skeletal muscles; all of which can alter chewing<sup>8</sup>. However, according to a recent systematic review<sup>1</sup>, it was not possible to conclude that malocclusion has an influence on Sleep Bruxism (SB). Thus, this review suggested that methodologically well-designed and well-conducted studies are needed to further

\* Renata Matos Lamenha Lins, DDS. Graduate Student, Department of Pediatric Dentistry, Federal University of Alagoas, Brazil.

\*\* Maria Clara Cavalcanti Campêlo ,DDS. Postgraduate Student, Department of Public Health, Federal University of Pernambuco, Brazil.

\*\*\* Laura Mello Figueiredo, DDS. MSc. Department of Pediatric Dentistry, Federal University of Alagoas, Brazil.

\*\*\*\* Mônica Vilela Heimer, DDS. MSc. PhD. Department of Pediatric Dentistry, University of Pernambuco, Brazil.

\*\*\*\*\* Valdeci Elias dos Santos-Junior, DDS. MSc. PhD. Department of Pediatric Dentistry, Federal University of Alagoas, Brazil.

Send all correspondence to:

Renata Matos Lamenha Lins.

Department of Pediatric Dentistry,

Rua Dr. Antônio Cansanção, 835, Ponta Verde, Maceió, Alagoas – Brazil

Phone: +5582996144212

E-mail: renatamlamenha@gmail.com

analyze the relationship between crossbite and bruxism. To understand the causal network of SB, it is necessary to explore variables for the creation of a model based on a conceptual framework, using findings from cross-sectional studies. These are fundamental steps towards the implementation of effective SB prevention and treatment measures<sup>9</sup>. In addition to those local factors, early life events can be important determinants of the health status of the individual and populations<sup>10</sup>. Bottle-feeding has also been associated to a lower development of the body and craniofacial structure<sup>11, 12</sup>.

Therefore, this study aims to establish the prevalence of Probable Sleep Bruxism (PSB) and its association with posterior and anterior crossbite, oral habits, type of breastfeeding and oral breathing.

## MATERIALS AND METHOD

This study was approved by the Ethics Committee of the Federal University of Alagoas (Protocol No. 2.970.527 /18) and conducted in accordance with the Declaration of the World Medical Association of Helsinki. Consent for undertaking the research was obtained from the school's principals, with agreement to perform the examinations coming from the parents or guardians. Only the children whose parents or guardians returned the signed permission forms were included in the study.

A cross-sectional study was conducted involving schoolchildren aged 6-10 years in the city of Maceió, located in the state of Alagoas in Northeastern Brazil. The sample size was calculated using a 16.7% PSB prevalence rate of a pilot study with 90% confidence interval and a 5% standard error. The minimum sample size was defined as 151 schoolchildren. The inclusion criteria were the age between 6 and 10 years-old and being enrolled at a school. Only a parent/caregiver who accompanied the child's sleep answered the questionnaire. The exclusion criteria were as follows: currently undergoing orthodontic treatment, a complete permanent dentition, systemic diseases, such as cerebral palsy or Down syndrome, and schoolchildren that had a history of psychological treatment.

The examinations were performed in a knee-to-knee position, under natural light and using a dental mirror and a wooden spatula. The clinical examinations were conducted by only one dentist, who had undergone training and calibration exercises. The Kappa coefficients for an intra-examiner agreement was  $K=0.87$ .

Probable sleep bruxism was diagnosed based on an oral clinical evaluation and on the reports from parents/caregivers who lived with the children. If a parent/caregiver reported that a child had symptoms of tooth grinding or tooth clenching during sleep and the child presented sounds associated with bruxism, abnormal wear of the teeth or jaw muscle discomfort, he/she was considered as being likely to have bruxism<sup>13</sup>.

Posterior crossbite was recorded when one or more of the maxillary molars occluded palatal to the buccal cusp of the opposing mandibular teeth. When the maxillary incisors occluded behind the mandibular incisors, negative overjet, they were then recorded as an anterior crossbite<sup>14</sup>.

The examiners carried out a questionnaire with parents and guardians to obtain information regarding oral breathing, harmful oral habits (pacifier, bottle or finger sucking and nail biting) and breastfeeding (exclusive natural breastfeeding or bottle-feeding).

The data were statistically analyzed using the Statistical Package for Social Sciences Version 21.0 (SPSS Inc., Chicago, Illinois,

USA). Normal distribution of quantitative data was verified by the Kolmogorov-Smirnov test. Descriptive and inferential statistics were also performed, using Chi-square or Fisher's exact tests at a 5% level of significance.

## RESULTS

One hundred and fifty-one children were surveyed. The mean age was of 7.4 years old. The presence of PSB was recorded as yes / no, with the results showing that 27.8% of children had this type of condition.

Table 1 shows the results of the association of PSB with the following variables: gender, type of breastfeeding, pacifier use, bottle or finger sucking, nail biting and oral breathing. It was reported that only the oral breathing variable was statistically associated to PSB ( $p < 0.001$ ).

## DISCUSSION

The present study was conducted to evaluate the prevalence of probable sleep bruxism (PSB) and its association with gender, type of breastfeeding, harmful oral habits, oral breathing and posterior and anterior crossbite. Among the analyzed variables, only oral breathing was associated with probable sleep bruxism in childhood.

The prevalence of PSB was of 27.8%, thus, corroborating the results from previous studies<sup>4, 15</sup>. However, the literature seems to be controversial on the given variable, as the prevalence of bruxism in children was found to shift between 14% and 55.3%<sup>6, 9, 16, 17</sup>. The plurality in results may be accredited to the various diagnostic methods utilized, which highlight the necessity of establishing a pattern criteria to obtain greater progress in the study of sleep bruxism<sup>18</sup>. Parents may not notice the presence of the condition in their children, as they might not sleep near each other. Moreover, the signs of PSB in children are not severe, with the initial signs of tooth wear not being visible, defaulting its diagnosis<sup>4, 15</sup>.

Results obtained herein revealed no significant association regarding children's gender and bruxism ( $p = 0.453$ ), with this outcome being in accordance with other studies<sup>6, 17</sup>. Nevertheless, there are other papers showing a statistical relevance between PSB and the referred variable, demonstrating that the male gender is statistically more prone to present bruxism<sup>1, 9</sup> or the inverse<sup>19</sup>. The results possibly exhibit such inconsistencies due to the inequalities and discrepancies in the diagnostic method to identify bruxism, as well as due to the population and research methodologies used in the studies.

An analysis was also made to evaluate the influence of breast or bottle-feeding on the manifestation of the condition, with no statistical association ( $p = 0.572$ ) shown. Harmful oral habits (finger sucking, pacifier use and nail biting) are considered as the children's coping mechanism for psychological or emotional difficulties, used to unleash stress, anxiety and tension. Therefore, PSB can also be a way for the child release tension during the night. There is a logical assumption that both might be related<sup>16</sup>, with several studies having been able to find a correlation between them<sup>1, 9, 16, 17, 20</sup>. However, this study did not find such association, despite identifying a connection between the habits of finger sucking ( $p = 0.924$ ), nail biting ( $p = 0.894$ ), pacifier use ( $p = 0.483$ ) and PSB. This result may be justified by the possibility of caregivers having neglected to notice such habits, besides the absent investigation of their intensity and frequency.

**Table 1: Analysis of association between PSB and gender, type of breastfeeding, pacifier use, bottle or finger sucking, oral breathing, nail biting and anterior and posterior crossbite.**

Variables	Bruxism in Children						P value	PR (IC 95%)
	Yes	No	TOTAL		N	%		
TOTAL	42	27.8	109	72.2	151	100.0		
Gender								
Male	19	12.5	42	27.9	61	40.4	$p^{(1)} = 0.453$	1.21 (0.72 to 2.03)
Female	23	15.2	67	44.4	90	59.6		1.00
Type of breastfeeding								
Bottle breastfeeding	33	21.8	90	59.6	123	81.4	$p^{(1)} = 0.572$	0.83 (0.45 to 1.53)
Exclusive natural	9	6.1	19	12.5	28	18.6		1.00
Pacifier								
Yes	4	2.64	15	9.93	19	12.57	$p^{(1)} = 0.483$	0.73 (0.29 to 1.81)
No	38	25.1	94	62.33	132	87.43		1.00
Bottle or finger sucking								
Yes	12	7.94	32	21.19	44	29.13	$p^{(1)} = 0.924$	0.97 (0.55 to 1.72)
No	30	19.86	77	50.99	107	70.87		1.00
Oral breathing								
Yes	28	18.54	36	23.84	64	42.38	$p^{(1)} < 0.001^*$	2.71 (1.56 to 4.73)
No	14	9.28	73	48.34	87	57.62		1.00
Nail biting								
Yes	19	12.5	48	31.78	67	44.28	$p^{(1)} = 0.894$	1.03 (0.61 to 1.73)
No	23	15.31	61	40.39	84	55.71		1.00
Anterior Crossbite								
Yes	2	1.32	7	4.63	9	5.95	$p^{(2)} = 0.736$	0.78 (0.22 to 2.75)
No	40	26.5	102	67.54	142	94.05		1.00
Posterior Crossbite								
Yes	6	3.97	18	11.92	24	15.89	$p^{(1)} = 0.738$	0.88 (0.41 to 1.85)
No	36	23.84	91	60.26	127	84.11		1.00

(\*) Significant association at 5.0%. (1) By chi-square test. (2) By Fisher's exact test.

Within this study, it was observed that oral breathing has a significant association with probable sleep bruxism ( $p < 0.001$ ); thus, representing an exposed group to the occurrence of the disorder, as it is shown that children who breathe through the mouth were 2.71 times more likely to present PSB (PR = 2.71; 95%; CI = 1.56-4.73). Several authors have reported a significant association between PSB and mouth-breathing, sleeping with the mouth open, drooling on the pillow and snoring<sup>1, 6, 20, 21, 22, 23</sup> and a strong association with respiratory problems<sup>21</sup>.

It is known that pre-existing PSB induces aggravation of oral breathing. Therefore, there is a possible association between those factors, given that children who present respiratory disorders tend to move the mandible forward and downward, keeping their mouth open in order to enhance the air passage, stimulating superior airways receptors to fortify the airways tonus and contributing to

the occurrence of bruxism<sup>17, 24, 25</sup>. Other possible explanation may be that young children tend to grind their teeth as a physiological response to increase the airway patency<sup>18</sup>. Furthermore, oral breathing modifies the sleep cycle and affects cerebral oxygenation, possibly generating involuntary contractions of the facial muscles, developing sleep bruxism<sup>6</sup>.

However, this study has not found any association linking PSB with posterior ( $p = 0.738$ ) or anterior crossbite ( $p = 0.736$ ). Some authors have previously connected the existence of posterior crossbite in children as a risk factor for the presence of PSB in children, arguing that the modification of contact between teeth while fulfilling its physiological functions generate a larger propensity to mandibular deviation, favoring the occurrence of PSB (26). Nevertheless, the literature is controversial, with some studies indicating that posterior crossbite represents a protective factor, thus, showing

that children without posterior crossbite were 2.2 times more likely to have bruxism in comparison to those with posterior crossbite<sup>15</sup>. Therefore, more studies are needed to further establish an association between malocclusion and PSB<sup>1</sup>.

The relationship between sleep bruxism in children and psychological and emotional factors have been well-established in the literature. Nonetheless, there is still the need to further analyze the association between this condition and other local variables, such as malocclusion, oral breathing and harmful oral habits<sup>1</sup>, as it is known that PSB is favored by the presence of multiple etiological factors<sup>15</sup>.

This study presents limitations intrinsic to a cross-sectional delineation, such as being incapable of determining cause-effect correspondences. However, the present paper is representative of its population, and measures were taken to assure that the prevalence of bruxism was not underestimated. Considering the relevance of presenting an improved knowledge of factors influencing sleep bruxism in children, larger and multicentered clinical studies should be conducted to expand the understanding within this field, thus, contributing to clinical management and multidisciplinary treatment strategies.

## CONCLUSIONS

For the surveyed population, the prevalence of PSB revealed to be high and related to oral breathing. Thus, this variable is determinant for the status of oral health in children and it is essential to monitor its occurrence. The pediatric dentist plays an important role on the management of sleep bruxism and sleep-disordered breathing, conducting and collaborating on its diagnosis and treatment.

## REFERENCES

- Guo H, Wang T, Niu X, Wang H, Yang W, Qiu J, Yang L. The risk factors related to bruxism in children: A systematic review and meta-analysis. *Arch Oral Biol* 86: 18-34, 2018.
- Demjaha G, Kapusevska B, Pejkovska-Shahpaska B. Bruxism Unconscious Oral Habit in Everyday Life. *Open Access Maced J Med Sci* 7(5): 876-881, 2019.
- Manfredini D, Winocur E, Guarda-Nardini L, Paesani D, Lobbezoo F. Epidemiology of bruxism in adults. A systematic review of literature. *J Orofac Pain* 27: 99-110, 2013.
- Gomes MC, Neves ÉT, Perazzo MF, Souza EGC, Serra-Negra JM, Paiva SM, Granville-Garcia AF. Evaluation of the association of bruxism, psychosocial and sociodemographic factors in preschoolers. *Braz Oral Res* 32: 9-16, 2018.
- De Alencar NA, Leão CS, Leão ATT, Luiz RR, Fonseca-Gonçalves A, Maia LC. Sleep Bruxism and Anxiety Impacts in Quality of Life Related to Oral Health of Brazilian Children and their Families. *J Clin Pediatr Dent* 41(3): 179-185, 2017.
- Serra-Negra JM, Ribeiro MB, Prado IM, Paiva SM, Pordeus IA. Association between possible sleep bruxism and sleep characteristics in children. *Cranio* 35(5): 315-320, 2017.
- Campos MPMS, Valençap APM, Silva GMD, Lima MC, Jamelli SR, Góes PSA. Influence of head and linear growth on the development of malocclusion at six years of age: a cohort study. *Braz Oral Res* 32: 98-107, 2018.
- Bueno SB, Bittar TO, Vazquez Fde L, Meneghim MC, Pereira AC. Association of breastfeeding, pacifier use, breathing pattern and malocclusions in preschoolers. *Dent Press J Orthod* 18(1): 30.e1-6, 2013.
- Drumond CL, Ramos-Jorge J, Vieira-Andrade RG, Paiva SM, Serra-Negra JMC, Ramos-Jorge ML. Prevalence of probable sleep bruxism and associated factors in Brazilian schoolchildren. *Int J Paediatr Dent* 29(2): 221-227, 2018.
- Hertzman C, Boyce T. How experience gets under the skin to create gradients in developmental health. *Annu Rev Public Health* 31: 329-347, 2010.
- Ling HTB, Sum FHKMH, Zhang L, Yeung CPW, Li KY, Wong HM, Yang Y. The association between nutritive, non-nutritive sucking habits and primary dental occlusion. *BMC Oral Health* 18: 145-154, 2018.
- Zaidi I, Thayath MN, Singh S, Sinha A. Preterm Birth: A Primary Etiological Factor for Delayed Oral Growth and Development. *Int J Clin Pediatr Dent* 8(3): 215-219, 2015.
- Lobbezoo F, Ahlberg J, Glaros AG, Glaros AG, Kato T, Koyano K, Lavigne GJ, de Leeuw R, Manfredini D, Svensson P, Winocur E. Bruxism defined and graded: an international consensus. *J Oral Rehabil* 40: 2-4, 2013.
- Thilander B, Pena L, Infante C, Parada S, Mayorga C. Prevalence of malocclusion and orthodontic treatment need in children and adolescents in Bogota, Colombia. An epidemiological study related to different stages of dental development. *Eur J Orthod* 23: 153-168, 2001.
- Nahás-Scocate AC., Coelho FV., de Almeida VC. Bruxism in children and transverse plane of occlusion: Is there a relationship or not? *Dent Press J Orthod* 19(5): 67-73, 2014.
- Vieira-Andrade RG, Drumond CL, Martins-Júnior PA, Corrêa-Faria P, Gonzaga GC, Marques LS, Ramos-Jorge ML. Prevalence of sleep bruxism and associated factors in preschool children. *Pediatr Dent* 36: 46-50, 2014.
- Simões-Zenari M, Bitar ML. Factors associated to bruxism in children from 4-6 years. *Pró-Fono R Atual Cient* 22(4): 465-472, 2010.
- Fonseca CM, Santos MB, Consani RL, Santos JF, Marchini L. Incidence of sleep bruxism among children in Itanhandu, Brazil. *Sleep Breath* 15(2): 215-220, 2011.
- Clementino MA, Siqueira MB, Serra-Negra JM, Paiva SM, Granville-Garcia AF. The prevalence of sleep bruxism and associated factors in children: a report by parents. *Eur Arch Paediatr Dent* 18(6): 399-404, 2017.
- Castroflorio T, Bargellini A, Rossini G, Cugliari G, Rainoldi A, Deregiibus A. Risk factors related to sleep bruxism in children: A systematic literature review. *Arch Oral Biol* 60(11): 1618-1624, 2015.
- Motta LJ, Bortolotto CC, Marques AJ, Ferrari RM, Fernandes KS, Bussadori SK. Association between respiratory problems and dental caries in children with bruxism. *Indian J Dent Res* 25: 9-13, 2014.
- Tachibana M, Kato T, Kato-Nishimura K, Matsuzawa S, Mohri I, Taniike M. Associations of sleep bruxism with age, sleep apnea, and daytime problematic behaviors in children. *Oral Dis* 22(6): 557-565, 2016.
- Guo H, Wang T, Li X, Ma Q, Niu X, Qiu J. What sleep behaviors are associated with bruxism in children? A systematic review and meta analysis. *Sleep Breath* 21: 1013-1023, 2017.
- Drumond CL, Souza DS, Serra-Negra JM, Marques LS, Ramos-Jorge ML, Ramos-Jorge J. Respiratory disorders and the prevalence of sleep bruxism among schoolchildren aged 8 to 11 years. *Sleep Breath* 21(1): 203-208, 2017.
- Balasubramaniam R, Kiasser GD, Cistulli PA, Lavigne GJ. The link between sleep bruxism, sleep disordered breathing and temporomandibular disorders: An evidence-based review. *J Dent Sleep Med* 1: 27-37, 2014.
- Miamoto CB, Pereira LJ, Ramos-Jorge ML, Marques LS. Prevalence and predictive factors of sleep bruxism in children with and without cognitive impairment. *Braz Oral Res* 25(5): 439-445, 2011.





