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Variables associated with bruxism in children and adolescents

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Abstract

The aim of the study was to assess the variables associated with bruxism and its prevalence in school children and adolescents. A group of 680 school children of both genders aged 4 -16 years old was randomly selected. Data were gathered by clinical exam and questionnaires filled out by guardians. Statistical analyses were performed by Chi-square test, Odds Ratio and SPSS package. Some factors like heredity, respiratory problems, headaches, difficulty with falling asleep, sleep talking and the schoolchild's disquiet temperament were associated with bruxism occurrence. Bruxism prevalence was 43%. No gender differences were found. It could be concluded that bruxism seems to play a significant role in the schoolchildren's quality of life, and thus deserves proper identification. However, additional studies should be conducted by multidisciplinary teams involving sleep medicine, dentistry and psychology, in order to best understand its etiology.

Key words: Bruxism; Prevalence; Sleep.

Introduction

Bruxism is defined as a parafunctional activity of the masticatory system that includes tooth clenching and grinding. An important distinction must be made between these two types of movement. During sleep, bruxism may occur in both ways, while consciously, it is not possible to reproduce the eccentric movement characterized by tooth grinding. In accordance with the International Classification of Sleep Disorders (ICSD), bruxism belongs to the group of movement disturbances, such as the Restless Legs Syndrome. It is considered an oral activity frequently associated with stimulation during sleep[1,2].

A distinction between primary (idiopathic) and secondary (iatrogenic) bruxism is made by some authors. The former occurs without clear cause, whereas the secondary form may be associated with medical conditions, such as neurological and psychiatric disturbances; or related to the use or suppression of some substances or drugs, such as cocaine and some antidepressives[1,3].

Bruxism is considered a risk factor for Temporomandibular Disorders (TMD)[2,4,5]. When parafunctional activity of the masticatory system increases, several structures may enter into collapse, causing signs and symptoms, such as: pulpitis, tooth wear, mobility and fracture, pain in the masticatory muscles, pain in the Temporomandibular Joint (TMJ), earache, tinnitus and headache[6,7] .

In spite of its clinical importance, recent studies on the etiology of bruxism are inconclusive. It has been related to systemic factors (intestinal parasitoses, allergies, endocrinal disorders, nutritional deficiencies[8], respiratory problems[9]); local factors, especially malocclusion[10] and psychological, occupational and hereditary factors[11,12]. For some authors, local factors are loosing their importance, nevertheless, cognitive, behavioral factors, such as stress, anxiety and personality traits are now being emphasized[2,13-15]. However, for Lobbezoo and Naeije[13], bruxism appears to be centrally and not peripherally regulated. The role of local and psychological factors would be smaller than has been assumed.

Bruxism has been associated with other sleep disturbances, such as the obstructive sleep apnea syndrome[16,17]. In 2004, a group of researchers suggested that this rhythmic masticatory muscular activity is strongly associated with salivary swallowing, occurring more frequently in the supine position[18].

Epidemiologic studies have shown great variation in the prevalence of bruxism: 6 to 88% in children and 5 to 15% in adults[11,12,19,20]. Probably this occurs due to the lack of standardization in the methodologies of the studies[11,20]. The majority of studies split the population investigated by age, which makes it difficult to investigate the relation of bruxism with the type of dentition. Reding et al.[21] found a prevalence of bruxism of 14.4% in a group of children from 3 to 7 years of age. Liu et al.[19], in 2005, found a higher prevalence of bruxism in mixed dentition, explained by the changes that occur during tooth replacement and the onset of premature temporary contacts, until occlusion is completely established.

Studies have validated the theory that children with bruxism respond in a more negative way to the events of life, and present traces of anxiety and stress[2,8,11,12,15,17,20,22,23].

The aim of this study was to assess the variables associated with bruxism and its prevalence in Brazilian children and adolescents, by means of clinical exam and questionnaires filled out by guardians.

Materials and methods

Participants

A cross sectional and descriptive study was conducted in 19 schools of the public system in Brasilia (Distrito Federal, Brazil). The sample was statistically calculated by conglomerates, in a random manner (table of random digits). Six hundred and eighty schoolchildren

of both genders were selected, ranging between 4 to 16 years of age. The study was approved by the Ethical Committee of Health Science Center of the University of Brasilia (UnB), and the informed consent was obtained. Questionnaires were sent to the children's parents before they were examined. The exclusion criteria consisted of the following: (1) mental disturbances or others pathologies that could cause bone-dental malformations and masticatory disturbances, and (2) orthodontic/orthopedic treatment in the present or past.

Data collection

The questionnaire used here was based on a literature review and on the clinical experience of the authors. For its validation, a pilot study was carried out in a group of parents. The final questionnaire contained questions concerning the bruxism family history, general health status, particularities about the child's sleep and behavior. The parents were also questioned about if the child used to grind his/her teeth during sleep. Depending on their responses – yes or no – the schoolchildren were divided into 2 groups: bruxers and non-bruxers. Each child was then submitted to a clinical examination in order to verify the presence of bruxofacets, but not to classify he/she in bruxers and non-bruxers.

Clinical examination

The presence of bruxofacets was verified by a single examiner (L.P.V.G.) under natural light and visual inspection, with the aid of a disposable wooden spatula, according to the literature[20,22]. Atypical dental wear caused by bruxism – recognized as non-physiological – which could occur on the cusp tips of deciduous molars, permanent molars and canines, as well as the incisal edge of deciduous and permanent incisors[12,24], was recorded. Child's stage of dentition was used to sub-divide the sample as follows: deciduous, mixed and permanent dentition.

Statistical Analysis

Maximum variation, confidence level of 95%, and error not exceeding 5% were used to determine the sample plan. The draws as well as all the analyses were done with SPSS Software, version 14.0. Comparison among variables was calculated by the Chi-square, Exact Fisher tests, and the Odds Ratio. The level of significance was considered when $p<0.05$.

The proportion of intra-examiner agreement was verified using the Kappa index between the test and retest after an interval of one month. The results for each exposure were from 0.60 and 0.89.

Results

Of the 680 questionnaires sent, 593 were returned (sample lost = 12.7%). The mean age of the schoolchildren examined was 8.27, ranging from 4 to 16 years (median = 9 years). As regard genders, the sample was similar with 53% girls and 47% boys. The prevalence of bruxism (43%). The prevalence according to gender was 50.2% for girls and 49.8% for boys.

Of the schoolchildren with bruxism, only 23.5% presented atypical dental wear. In addition, 11% of the schoolchildren with negative replies regarding bruxism, according to the questionnaires, showed bruxofacets (Table 1).

Table 1: Association between bruxofacets and bruxism

Bruxofacets	Bruxers* N (%)	Non Bruxers N (%)	Total N (%)
With bruxofacets*	60 (23,5)	38 (11,3)	98 (16,6)
Without bruxofacets	195 (76,5)	299 (88,7)	494 (83,4)
Total	255 (100.0)	337 (100.0)	592 (100.0)

*Level of significance $p < 0.05$.

Table 2 shows the prevalence of bruxism in relation to the stage of dentition. It can be noticed that bruxism prevalence diminishes as occlusion develops.

Table 2: Distribution of prevalence of bruxism, according to dentition

Dentition	Bruxers N (%)	Non Bruxers N (%)	Total 100%
Deciduous	90 (49.2)	93 (50.8)	183
Mixed	125 (43.9)	160 (56.1)	285
Permanent	40 (32.0)	85 (68.0)	125
Total	255 (43.0)	338 (57.0)	593

Only 247 parents responded about the frequency of bruxism and the data are presented in percentages as follows: 19% every night, 15% three times a week or more, 7% once a week and 55.5% in isolated episodes.

Table 3 presents the studied variables that showed to be statistically significant different considering boys and girls.

According with the schoolchildren's parents responses, 44.6% of the cases studied had a member of the family who ground his/her teeth. From these specific cases, 56.1% of the children were classified as bruxists during dental examination (Table 4).

Respiratory problems afflicted 48.2% of the entire sample. Of the schoolchildren with respiratory problems 46.9% had bruxism and of those who did not present respiratory problems, 38.5% engaged in this parafunctional activity. The difference between the proportions was statistically significant with $p<0.05$. 15% of the sample complained of frequent headaches, with predilection for girls in 63.5% (Table 3). This variable was correlated with bruxism ($p<0.05$) (Table 4).

Of the schoolchildren that presented difficulty with falling asleep (16.6%), 71.1% were bruxists. The Odds Ratio calculation showed that the schoolchildren that presented difficulty with falling asleep had 4 times more chance of being bruxers. Among those that spoke in their sleep (61% of the sample), 53.1% had bruxism. When the children's behavior was analyzed, the majority was considered, by their parents, not calm (57.8%). From these children, 50% were defined as anxious. The type of behavior was associated with bruxism ($p<0.05$) (Table 4).

The variables: daytime sleepiness, nocturnal enuresis, sleeping position, hand under the face or pillow, type of birth and frequent sport practice were not related to bruxism in this sample ($p>0.05$).

Discussion

The results presented here suggest that bruxism is very prevalent in young children, which is in agreement with the findings of other authors [2, 11, 20, 22, 24]. However, the differences in methodologies used in each study results in great discrepancy among the prevalence data. Some authors assessed the bruxism prevalence by means of interviews with the children. Others, by means of questionnaires filled out by

Table 3: Distribution of the studied variables with statistically significant differences between the genders

Variables	Gender		Total N(100%)	p
	Male N(%)	Female N(%)		
Headaches	31 (36.5)	54 (63.5)	85	0.03**
Daytime sleepiness	45 (37.5)	75 (62.5)	120	0.02*
Nocturnal enuresis	47 (66.2)	24 (33.8)	71	0.00*
Frequent sport practice	122 (55.0)	100 (45.0)	222	0.00*
Supine position	62 (57.4)	46 (42.6)	108	0.01*
Prone position	97 (53.3)	85 (46.7)	182	0.04*
Anxiety	68 (39.8)	103 (60.2)	171	0.02**

* Statistically significant $p < 0.05$.

** Variables associated with bruxism $p < 0.05$.

Table 4: Factors related to bruxism and simultaneously significant by the Odds Ratio calculation

Variables	Bruxers	Non Bruxers	N/ (100%)	P	OR (95% IC)
	N (%)	N(%)			
Hereditariness	142 (56.1)	111 (43.9)	253	0.00*	2.68 (1.90- 3.78)
Respiratory problems	129 (46.9)	146 (53.1)	275	0.04*	1.41 (1.01 – 1.96)
Headaches	52 (62.7)	31 (37.3)	83	0.00*	2.60 (1.60- 4.20)
Difficulty with falling asleep	69 (71.1)	28 (28.9)	97	0.00*	4.09 (2.54- 6.59)
Sleep talking	190 (53.1)	168 (46.9)	358	0.00*	2.99 (2.09 – 4.28)
Disquiet temperament	159 (47.5)	174 (52.5)	335	0.00*	1.60 (1.14 – 2.24)

*Level of significance $p < 0.05$. Odds Ratio OR> 1.

the guardians, and yet others used both methods. To assess this parafunctional activity, it is important to make a distinction between tooth grinding and the centric movement of tooth clenching, which makes the data analysis more reliable. Patients or even parents find the former more difficult to perceive. According to Shinkai et al.[20], the method of interviewing children's parents, although subjective, can be considered reliable. The occurrence of false-positives is eliminated, considering that parents effectively relate the presence of bruxism. However, it is still possible for the results to be underestimated, because bruxism can occur in a certain period, at an initial stage, without showing signs of wear, or even occur at a time during sleep when the guardians are unable to perceive it.

The high prevalence of children and adolescents that grind their teeth, found in this study (43%), was similar to the findings of Cheifetz et al.[11] (38%), and Porto[22] et al. (40%), who used similar methodological designs. Shinkai et al.[20] found a prevalence of nocturnal bruxism in 29% of the children investigated. Garcia et al.[24] and Manfredini et al.[2] found percentages of 40%. However, in their samples they both included patients that had centric bruxism, and the mean age of subjects in the latter study was higher than that of the others previously mentioned. Reding et al.[21] and other authors[19, 23, 25] found a lower prevalence of bruxism, ranging between 6 to 15% of the child population. Kuch et al.[26] used the same bruxism assessment criteria as used in our study (clinical assessment and questionnaires filled out by parents). They obtained 15% of bruxism prevalence by assessing the questionnaires, but after dental examination an additional 15% of children presented bruxofacets without their parents' awareness. Similar discrepancies between the results of interviews and exams were also found in this research. Eleven percent of the schoolchildren with negative replies as regards bruxism showed atypical signs of wear (Table 1).

Among the schoolchildren that presented bruxism, there was no statistically significant difference between the genders, in agreement with the findings of Cheifetz[11] and others[17, 20, 23, 27].

In the Porto et al.[22] study, there was no relation between the stage of dentition and bruxism. Bruxism being more prevalent in the mixed dentition stage due to occlusal interference, as Liu et al.[19] affirmed, was not observed in this study. Here, the prevalence of bruxism was higher among schoolchildren in the deciduous dentition stage, and decreased with the development of occlusion (Table 2), which is consistent with the hypothesis that this activity diminishes with age[17, 20, 23, 28].

Shinkai[20] related that in the majority of bruxist children, the episodes occurred predominantly at the frequency of over three times a week (56%), while in the present investigation, the frequency in isolated episodes (55.5%) was more predominant than in three times a week or every night (34%).

As reported by others authors[11, 16, 21, 28], the schoolchildren with a family history of bruxism had 2.68 times more chance of also presenting this activity (Table 4).

Grechi et al.[9], Porto et al.[22] and Difrancesco et al.[29] suggested that bruxism can be related to obstruction of the upper airways, similar to our findings, which showed high prevalence of bruxism in schoolchildren with respiratory problems. Marks[8] and Ohayon[17] also affirmed that children that suffered from respiratory disturbances had a greater propensity for bruxism. However, these results differ from those of Cheifetz[11], in which bruxists and non-bruxists had equivalent risk of being healthy children or having health problems. For Weideman[16], patients with bruxism tend to be healthier than those who do not present this activity.

For Miller et al.[30], children that suffer from headaches have high prevalence of sleep disturbances, including bruxism, although this relationship is still unknown. The relation between headache and bruxism has been suggested both in children and adults[7, 12], which could be effectively proved in this study.

According to the results of the present study, bruxism is associated with other sleep disturbances. For Ohayon[17], it rarely occurs alone, being associated with excessive daytime sleepiness and sleep talking. Of these two disturbances, only sleep talking was associated with bruxism in this study, corroborating the findings of Cheifetz[11] and Weidemann[16]. Here, as in the study of Laberge[23], nocturnal enuresis had predilection for boys. However, there was no association of bruxism with this sleep disturbance.

The variable difficulty with falling asleep was the one that demonstrated the greatest relation with bruxism among all the studied variables. However, this subject does not seem to have been approached previously. The scarcity of similar studies makes comparison among the results' difficulty. Miller et al.[30] found a high prevalence of children with sleep restriction (42%), but did not specifically assess difficulty with falling asleep. Differently from the findings of Miyawaki[18]and Porto[22], in which the sleeping position influenced the occurrence of bruxism, in this study, this relation could not be proved.

The role of psychological factors in the etiology of bruxism has been widely discussed. According to the results of this study, the disquiet temperament of the schoolchildren was shown to be associated with the occurrence of this parafunctional activity, in agreement with other authors[2, 5, 8, 11, 12, 15, 17, 20, 22, 23]. Among these factors, Manfredini et al.[2] found strong association of bruxism with anxiety, depression and maniac symptoms. As in this study, Cheifetz et al.[11] and Porto et al.[22] observed that anxiety is related to a greater probability of bruxism. Vanderas et al.[15] noted an increased level of urinary catecholamines in children with bruxism, suggesting a strong association between bruxism, epinephrine and dopamine.

Data obtained through this cross-sectional study serve as a basis for conducting further studies for more in-depth research on the subject. However, the importance of standardizing the methods is emphasized, so that data can be comparable.

Conclusions

Based on the results obtained, it could be concluded that the prevalence of bruxism in children and adolescents was high and thus deserves proper identification. Bruxism seems to play a significant role in the schoolchildren's quality of life, which lays even greater emphasis on the importance of early diagnosis by professionals that deal with the young population. However, additional studies should be conducted by multidisciplinary teams involving sleep medicine, dentistry and psychology, in order to best understand bruxism etiology.

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