

# The relationship between bruxism, occlusal factors and oral habits

Livia Patrícia Versiani Gonçalves\*, Orlando Ayrton de Toledo\*\*, Simone Auxiliadora Moraes Otero\*\*\*

## Abstract

**Objective:** Evaluating the relationship between bruxism, occlusal factors and oral habits in children and adolescent subjects, students from public schools in Brasília-Federal District city.

**Methods:** A group of 680 students, of both genders, average age 4 - 16 years, were randomly selected. Data was collected by clinical evaluation and questionnaires replied by the responsible for the students. The occlusion morphological aspects were evaluated according to Angle classification and following a criteria created for the deciduous dentition, according to Foster and Hamilton (1969). Uni or bilateral posterior and anterior crossbites were evaluated. The chi-square test, the Odds Ratio and the SPSS software were used for the statistic analysis.

**Results and Conclusion:** 592 questionnaires were fulfilled completely. Bruxism had a prevalence of 43%, whilst 57% presented malocclusion. Oral habits were observed in 53%. The prevalence of a malocclusion increased from 42.6% in the deciduous dentition to 74.4% in the permanent dentition. The evaluation of the results showed that there was no statistically significant relationship between bruxism and the studied occlusal factors ( $p > 0.05$ ). Differences were not found between genders in both variables. Onicofagy was the most frequent habit (35%), mainly in the female subjects. There was a statistically significant relationship between bruxism and oral habits. Evaluating the specific types of habits, just pacifier sucking showed to be related to the bruxism. Additional studies will be necessary for a better understanding of the local origin of bruxism.

**Keywords:** Bruxism. Sleep. Malocclusion. Oral habits.

## INTRODUCTION

Bruxism can be defined as a parafunctional activity of the masticatory system which includes tightening and teeth grinding (centric and

eccentric bruxism respectively). During sleep, it is presented in rhythmic muscular contractions with force higher than the natural, creating friction and heavy noise when the teeth grind.

\* PhD Student in Health Science, Brasília University. Specialized in Orthodontics, APCD, São José do Rio Preto, São Paulo.

\*\* PhD in Pediatric Orthodontics, Full Professor, School of Dentistry, Brasília University.

\*\*\* Assistant Professor, School of Dentistry, Brasília University. PhD in Health Science, Brasília University.

This can not be reproduced during awareness periods. According to the International Classification of Sleep Disorders (ICSD-2),<sup>1</sup> bruxism belongs to the group of movement disorders, being frequently associated to sleeping stimulation.<sup>1,20</sup> Bruxism, without a real cause, is called primary bruxism, while the secondary bruxism is the one that occurs in association to the use of psychoactive drugs, drugs and medical disorders.<sup>1</sup>

Studies on the etiology of bruxism are not concluded yet. Researchers have suggested that local factors, such as malocclusion, are losing importance, whereas behavioral cognitive factors such as stress, anxiety and personality traits are gaining more space.<sup>14,18</sup> The current focus is directed to the fact that bruxism is part of a waking reaction. This parafunctional activity seems to be modulated by several neurotransmitters in the central nervous system, however, it can not be affirmed that it has just a central control.<sup>19</sup>

In 2001, Sari and Sonmez<sup>25</sup> reported a statistically significant relationship between bruxism and some occlusal factors, whereas, in other research studies, this association can not be proved.<sup>5,6,20</sup>

Bruxism can be associated to craniomandibular disorders including headache, temporomandibular disorder (TMD), muscular pain, early tooth loss due to excessive attrition and mobility and sleep interruption from both the subject and the person with whom he shares the room.<sup>9,12,22,24</sup> Studies have shown the close relationship between bruxism and some pathologies such as breathing disorders and the Obstructive Sleep Apnea Syndrome (OSAS).<sup>22,30</sup>

Oral habits such as thumb sucking, onicofagy, object biting etc can be usual and happen temporarily. However, when they surpass a physical tolerance, the system may collapse and harm the person's health. According to Cheifetz et al,<sup>3</sup> the fact that children without any oral habits present a higher prevalence of bruxism suggests that this parafunction can also be an alternative method to relieve stress.

The lack of homogeneity and standardization of criteria to evaluate bruxism has resulted in a large variation of its prevalence: 6 to 88% in children and 5 to 15% in adults,<sup>2,3,17,27</sup> making it difficult to establish comparative parameters.

Frequently, clinicians who treat children and adolescents are questioned about the etiology, the prevalence and the effect of bruxism. It is important that clinicians are well informed on recent studies and on the variables related to this parafunctional activity.

This current study aimed at evaluating the relationship among bruxism, occlusal factors and oral habits by clinical examination and questionnaires fulfilled by the person responsible for the subject.

## MATERIAL AND METHODS

A transversal study was carried out in public schools, in Brasília-Federal District city, Brazil. The sample was statistically calculated by clumps, randomly. The study comprised 680 students, from both genders, with mean age of 4 to 16 years.

The study was approved by the Health Science Ethics Committee – University of Brasília. After the agreement letters were returned and signed by the parents or the responsible ones, the students were seen by the clinician. The excluding criteria was: (1) Mental disorders or other pathologies that could cause dento-osseous malformation and masticatory disorders, (2) Current or past orthopedic/orthodontic treatment and (3) Non-authorization by the parents or guardians.

Eccentric bruxism was the only one to be investigated as it is easier to be detected by patients and parents. This makes data analysis more reliable. The selection of students presenting and not presenting bruxism was based on the positive and the negative replies, respectively, to the questionnaire. The dentition stage of each child was also observed.

The occlusion was evaluated by only one examiner under direct view and good lighting, with the help of a disposable wooden spatula (Theoto S/A Ind. e Com. Jundiaí, SP, Brazil). The occlusion was considered to be a normal occlusion when the following criteria were observed: (1) No crowding; (2) No crossbite; (3) No anterior deep or open bite, and (4) No overjet. Angle classification was applied when evaluating the morphological aspects of the occlusion in both the mixed and permanent dentitions. In the deciduous dentition, the criteria followed were based on canine relationship, according to Foster and Hamilton.<sup>7</sup>

Questionnaires were based on the literature review and the clinical experience of the authors, seeking for information about eccentric bruxism and oral habits presented by the students.

### Statistic analysis

The maximum variance, the 95% reliability and the error below 5% were used to establish the sampling plan. Drawings, as well as the whole

analysis, were done using the SPSS Software, 14.0 version. The chi-square test and the calculation of the Odds Ratio were used when comparing the variables. The significance level was considered when  $p < 0.05$ .

The intraexaminer agreement ratio was verified using the Kappa index between the text and the re-test after one-month interval. Results for each one of the evaluations were 0.80 and 0.86.

### RESULTS

After applying the excluding criteria, a sample of 592 students was divided in two groups. The first group (G1) comprised 255 subjects with bruxism (127 male and 128 female subjects), whereas the second group (G2) comprised the 337 remaining subjects (153 male and 184 female subjects). The prevalence of bruxism, in the total sample, was 43%. Forty-five (45%) per cent of male students and 41% of female students presented bruxism. This difference was not statistically significant (Table 1).

TABLE 1 - Distribution of bruxism in relation to gender.

GENDER	BRUXISM G1 (n = 255)	NO BRUXISM G2 (n = 337)	TOTAL (n = 592)	P VALUE
	n (%)	n (%)	n	$\chi^2$
Male	127 (45)	153 (55)	280	ns
Female	128 (41)	184 (59)	312	ns

ns = non-significant ( $p > 0.05$ ).

TABLE 2 - Distribution of normal occlusion and malocclusion in relation to the type of dentition.

DENTITION	NORMAL OCCLUSION	MALOCCLUSION	TOTAL (n = 592)	P VALUE
	n (%)	n (%)	n	$\chi^2$
Deciduous	105 (57.4%)	78 (42.6%)	183	0.000*
Mixed	118 (41.5%)	166 (58.5%)	284	0.000*
Permanent	32 (25.6%)	93 (74.4%)	125	0.000*
TOTAL	255 (43%)	337 (57%)	592	0.000*

\*Statistically significant  $p < 0.05$ .

TABLE 3 - Prevalence of normal occlusion and malocclusion compared to bruxism.

OCCLUSAL FACTORS	BRUXISM G1 (N = 255)	NON-BRUXISM G2 (N = 337)	TOTAL (N = 592)	P VALUE
	n (%)	n (%)	n	$\chi^2$
Normal occlusion	118 (46.3)	137 (53.7)	255	
Class I malocclusion	49 (36.6)	85 (63.4)	134	ns
Class II malocclusion	81 (43.5)	105 (56.5)	186	
Class III malocclusion	7 (41.2)	10 (58.8)	17	

ns = non-significant ( $p > 0.05$ ).

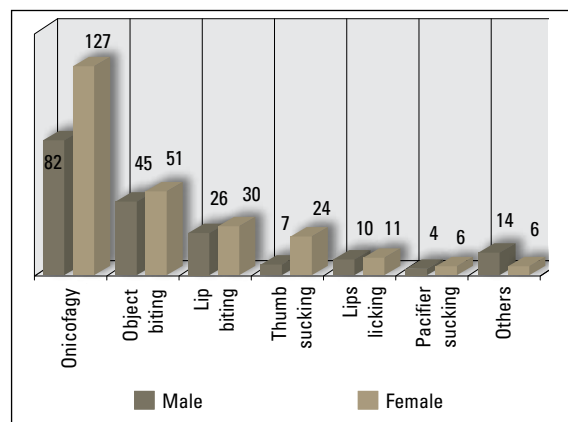
TABLE 4 - Prevalence of crossbite in relation to bruxism.

OCCLUSAL FACTORS	BRUXISM G1 (N = 255)	NON-BRUXISM G2 (N = 337)	TOTAL (N = 592)	P VALUE
	n (%)	n (%)	n	$\chi^2$
Without crossbite	221 (44.0)	281 (56.0)	502	
Anterior open bite	13 (48.0)	14 (52.0)	27	
Unilateral posterior crossbite	17 (34.7)	32 (65.3)	49	ns
Bilateral posterior crossbite	3 (30.0)	7 (70.0)	10	
Anterior and posterior crossbite	1 (25.0)	3 (75.0)	4	

ns = non-significant ( $p > 0.05$ ).

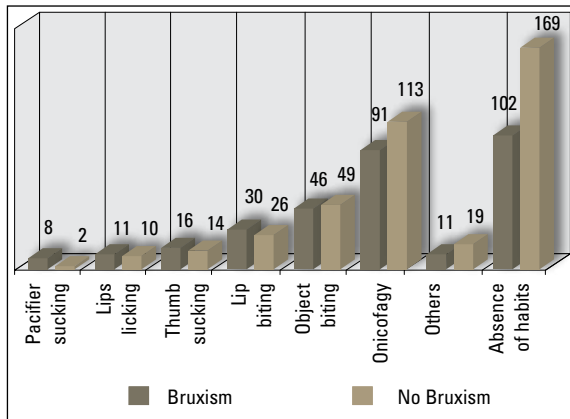
In the general sample, the prevalence of malocclusion was 57%, without statistically significant differences between genders. Table 2 shows the distribution of normal occlusion and malocclusion in relation to the type of dentition ( $p < 0.05$ ). Among the students with bruxism, 46.3% presented a normal occlusion and 53.7% presented malocclusion. The statistic analysis showed that there was no relation between the occlusal factors studied and the bruxism ( $p > 0.05$ ). The distribution of the different occlusal factors in relation to bruxism is presented on tables 3 and 4.

Fifty three percent (53%) of the sample presented one or more oral habit. Onicofagy was the most prevalent habit (35%), mainly in the female subjects. Table 1 shows the distribution of habits that presented differences between genders. There was a relationship between bruxism and oral habits ( $p < 0.05$ ). Evaluating the specific



GRAPH 1 - Distribution of oral habits in relation to the gender.

types of habits, just pacifier sucking presented a statistically significant relationship with bruxism ( $p < 0.05$  / OR = 5.4). Only 10 students showed



GRAPH 2 - Distribution of oral habits in relation to bruxism.

this habit and eight presented bruxism (Table 2). Considering the diversity of habits, there was no difference among the students who presented one or more habits and the presence of bruxism.

## DISCUSSION

### Bruxism and malocclusion

There are two theories that may explain the cause of bruxism. The first one is based on the idea that this parafunction has a central<sup>18</sup> root, and the second one is based on the fact that there is not enough evidence to deny its peripheral root as, for instance, the occlusal factors.<sup>19,25</sup> Studies on bruxism carried out in young people are a challenge to researchers, as its prevalence may be underestimated. Generally, data collection is obtained interviewing children and by questionnaires filled in by the parents, as well as by an evaluation of tooth wear caused by bruxism. When children are interviewed, some divergences may occur, as they can be shy or, simply, not be aware of their problem. Tooth wear sign during clinical evaluation can indicate a previous presence of bruxism that is not occurring at the time of the examination. But, on the other hand, the

recent development of the habit may not show a tooth wear yet. Thus, interviews with children's parents, although subjective, can be considered a reliable source to verify the prevalence of bruxism, as it reflects the occurrence of tooth noise produced by the children and that are effectively noted by the parents. Even though this prevalence can be underestimated, the occurrence of false-positive is virtually eliminated.<sup>27</sup>

In this research study, as in others,<sup>3,4,10,20,23,25</sup> parents have replied to the questionnaire considering the presence of bruxism in young subjects and the prevalence was very similar in all of them (around 38.4% and 43%). However, Demir et al<sup>6</sup> and Gavish et al<sup>11</sup> verified the prevalence of 12% and 13% respectively. In both studies, the methodology applied was interviews with children. In this study and in further ones,<sup>3,23,27</sup> just the eccentric bruxism was evaluated, whereas other authors<sup>6,10,20</sup> did not make any difference between tightening and teeth grinding. The methodological differences applied in each study makes results to show huge discrepancies, being a limitation to this type of study.

Among the students with bruxism, there were not statistically significant differences between the genders. This is in accordance with Cheifetz et al<sup>3</sup> and other authors<sup>4,6,22,27</sup> findings, which differs from the findings of Manfredini et al,<sup>20</sup> who have found a higher prevalence of bruxism in women subjects (57.8%).

The prevalence of a malocclusion was 57%. Results similar to this current study were reported by Tomita, Bijella and Franco,<sup>28</sup> who evaluated the occlusion of 2,139 children, from 3 to 5 years of age, verifying changes in 51.3% male subjects and in 56.9% female subjects. According to Frazão et al,<sup>8</sup> the prevalence of malocclusion increased from 49% in the deciduous dentition to 71.3% in the permanent dentition. These findings were similar to the ones of current study, in which the malocclusion increased from 42.6% in the deciduous dentition to 74.4% in the permanent dentition.

Sari and Sonmez<sup>25</sup> found a relationship between bruxism and some occlusal factors: Angle Class I malocclusion in the mixed dentition, anterior crossbite and posterior crossbite, etc. Henrikson et al<sup>13</sup> showed that tightening and teeth grinding was higher in the group with Angle Class II malocclusion than in the group with normal occlusion, which suggested a relationship between bruxism and malocclusion. Nilner,<sup>21</sup> studying this same relationship, in 7 – 14 year-old subjects, found a relationship between bruxism and Angle Class II and Class III malocclusions. In this current study, however, there was no statistically significant relationship between bruxism and any other occlusal factors studied ( $p > 0.05$ ). These findings were in accordance with the studies of Demir et al<sup>6</sup> and other authors.<sup>5,20,27</sup>

Regarding the type of malocclusion, the results of this current study show a prevalence of Angle Class II malocclusion in 55%, followed by Class I (45%) and Class III (5%). Even in the deciduous dentition, in which the criteria used was based on cuspid relation,<sup>7</sup> the prevalence of malocclusion was 42.6% and the higher number of cases was Class II malocclusions (25.7%). A similar percentage of children with Class II malocclusion (26%) was reported by Tschill et al.<sup>29</sup>

Analyzing transverse relationship of the dental arches of the students, the prevalence of a posterior crossbite was seen in 10% of the students, without significant differences in relation to genders. These findings corroborate with Kerosuo<sup>15</sup> studies, who found a frequency of 13%, analyzing the occlusion in both the deciduous and the early mixed dentitions in Finnish children. However, Santos et al<sup>24</sup> verified a higher prevalence of posterior crossbite (38.7%). In this study, the chi-square showed that there was no relation between bruxism and crossbites.

### **Bruxism and oral habits**

The prevalence of oral habits, found in here (53%), was higher than in the Kharbanda et al<sup>16</sup> studies (25.5%) and Shetty and Munshi<sup>26</sup>

(29.7%), and smaller than the 82.8% found out by Fujita et al.<sup>9</sup> This great variance in the prevalence of oral habits may occur due to the different methods applied as, for instance, the difference in habits included in each study. Santos et al,<sup>24</sup> studying the prevalence of parafunctional habits in 5 – 12 year-old children, reported that 47.5% presented onicofagy, being the most prevalent habit, as observed in this study (35%). However, other authors<sup>3,11,27</sup> found a smaller number, but, yet, with significant prevalence of onicofagy, which was around 25%. In Shetty and Munshi<sup>26</sup> study, as well as in this one, the onicofagy was found more prevalent in the female subjects. There was no relation between bruxism and oral habits in the Shinkai et al<sup>27</sup> studies. In this current study, there was a relationship between bruxism and oral habits, confirming the results reported by other authors.<sup>3,24</sup> Evaluating the specific types of habits, just the pacifier sucking presented a statistically significant relationship. Differing from the findings of this study, Cheifetz et al<sup>3</sup> reported that children with thumb sucking habits had a smaller chance of showing bruxism ( $p = 0.06$ ). Porto et al,<sup>23</sup> studying the variables associated to bruxism in children, found a relationship between bruxism and some oral habits. When the authors used a significance level of  $p < 0.05$ , just lip biting showed a relationship with bruxism.

This descriptive observational study aimed at contributing to the writing of new research studies on the etiology and the physiopathology of bruxism in the future. Additional studies may report significant results to assist with doubts that clinicians face when treating this kind of problem and, that, many times feel disappointed with the information available at the moment.

### **CONCLUSION**

Based on the methodology applied and the results achieved, the following can be concluded:

- There was no statistically significant relationship between bruxism and the occlusal

factors studied.

- There was a statistically significant relationship between bruxism and oral habits. Evaluating the specific types of habits, just pacifier sucking

showed a relationship with bruxism.

- Additional studies will be necessary for a better understanding of the local causal factors of bruxism.

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**Contact Address**

Lívia Patrícia Versiani Gonçalves  
SRTVS Q 701 Ed. Centro Empresarial Brasília BI A SI 722-724  
CEP: 7.0340-000 – Brasília / DF, Brazil  
E-mail: liviaversiani@hotmail.com