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Prevalence of bruxism among college students: what are the associated factors? A cross-sectional study

Layla Beatriz Barroso de Alencar[1*], Ismael Lima Silva[1], Samara Crislâny Araújo de Sousa[1], Vitória Freitas de Araújo[1], William Harvey Machado de Sousa Lacerda Oliveira[1], Cristiano Moura[1]

[1] Federal University of Campina Grande, Patos, Paraíba, Brazil.

Aim: Evaluate the prevalence of bruxism and to analyze what are the possible associated factors with this condition in students of a Brazilian university. **Methods:** This was a cross-sectional study, with a sample of 230 students randomly selected among undergraduate courses at a university center. The dependent variable was the presence of awake bruxism and sleep bruxism. The independent variables were sociodemographic factors, smoking, alcohol consumption, oral habits and stress perception (Perceived Stress Scale- PSS 14). Descriptive statistics and bivariate analysis were used. **Results:** The prevalence of awake bruxism was 28.7% and was associated with the independent variables: course (degree program), gum chewing habits, chin hand placing, facedown sleeping and one-side biting. Sleep bruxism had a 7.0% prevalence and displayed association with gum chewing, pens/pencils/objects biting, tongue/lips/cheeks biting, nails biting and one-side biting. Perceived stress was not associated with either type of bruxism. **Conclusion:** Bruxism has an important prevalence among university students, especially when distinguishing between awake bruxism and sleep bruxism.

Keywords: Oral health. Oral hygiene. Bruxism. Students.

Corresponding author:
Layla Beatriz Barroso de Alencar
Av. Universitária, s/n, Santa Cecília
58708-110, Patos, Paraíba, Brazil
+55 (85) 98781-4693
laylabeatriz249@gmail.com

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Introduction

Teeth grinding is described since antiquity in the Old and New Testament of the Bible (Job 16:9, Matthew 13:42, and Luke 13:28) in situations of anger, pain, and fear. Such behavior was later termed bruxism and originated from the Greek word *brygmos*. However, it was only scientifically described in the early 20th century and is currently defined by the American Academy of Sleep Medicine as a "repetitive muscle activity of the jaw, characterized by teeth clenching or grinding and/or jaw clenching or pushing"[1,2,3].

Bruxism has two circadian manifestations, which can occur during sleep (sleep bruxism) and during wakefulness (awake bruxism)[2]. Although there is a distinction in the classification of these entities, both have similar consequences, such as temporomandibular dysfunctions (TMD), dental wear, craniofacial pain, induction of temporal headache and periodontal and endodontic damage, in addition to restorations and implants failures[4-7].

The etiology of this parafunctionality is still unknown. Initially, it was believed that its cause involved occlusal interferences and malocclusion, but this theory was not supported, since occlusal therapies did not present positive effects in the bruxism treatment[1,3]. Nowadays, many authors believe that bruxism has a multifactorial origin, involving stress, anxiety and depression[3]. Moreover, studies show that some habits are also related to bruxism, such as drug consumption, coffee and alcoholic drinks, besides poor sleep quality and oral habits[3,7].

Under this perspective, it is valid to say that college students are part of a group likely to develop the habit of grinding and/or clenching teeth, since they are routinely exposed to several stressful situations, such as accumulation of curricular activities, negative academic results, apart from irregular sleep patterns and financial struggles[8]. Therefore, the aim of this study is to evaluate the prevalence of bruxism and to analyze the associated factors with this condition among students from a Brazilian university.

Material and Methods

This was a quantitative, descriptive and analytical study with a cross-sectional design. The study's target population was composed of college students from the courses (degree programs) of Dentistry, Biological Sciences, Forest Engineering and Veterinary Medicine regularly enrolled in a Federal University. Students that for some reason refused to participate in the interview, as well as those who did not sign the Informed Consent Form (ICF), were excluded from the sample. This study was approved by the Research Ethics Committee under protocol number 3.480.524.

The study sample was non-probabilistic by convenience, which means it consisted in allocating college students to conduct the interview, between September 2019 and March 2020. The study sample consisted of 230 college students of both genders. Sample losses were considered to be students who refused to participate in the study.

A calibration phase was performed to ensure a uniform interpretation, understanding and application of the questionnaire during the interview. The evaluation

of the internal consistency and inter and intraexaminer reliability was performed using the Kappa Coefficient (K), as well as the inter and intraexaminer reliability percentage agreement. The Kappa interexaminer was 0.95 and the intraexaminer was 0.98. The interexaminer and intraexaminer percentage agreement were 97% and 100%, respectively.

A pilot study was carried out prior to the data collection itself with the following objectives: to evaluate the quality of the data collection tool, more precisely regarding the understanding of the questionnaire; to assess the methods of fieldwork (interview time and minimum number of interviews per shift); and to make adjustments for the data collection stage. This study was conducted with 20 college students who did not enter the final sample.

The quality control of the present study was carried out based on the reapplication of the interview with specific questions to a random sample of 10.0% of the students. The *Kappa Coefficient (K)* was used for this control, which was 0.95.

The dependent variable (outcome of the study) was the presence or absence of bruxism. *Awake bruxism* or *briquism* was evaluated by the self-reported presence of the habit of grinding or clenching teeth during the day, through the following question: *In the last 30 days, have you noticed that you were grinding or clenching your teeth during the day while you were not eating?* (0) Never / (1) Rarely / (2) Sometimes / (3) Often / (9) Do not know.

Sleep bruxism was assessed in a self-reported manner based on the diagnostic criteria of the International Classification of Sleep Disorders, published by the American Academy of Sleep Medicine. According to these criteria, the presence of sleep bruxism is defined when the habit of teeth grinding at night exists and is associated with at least one of the following signs and symptoms: excessive tooth wear, jaw muscles pain, pain in the temples and/or difficulty during the opening of the mouth when waking up. The questions for the evaluation of sleep bruxism were: 1. *Have you been griding your teeth or has anyone ever told you that you grind your teeth during sleep?* (0) Never / (1) Rarely / (2) Sometimes / (3) Often / (9) Do not know; 2. *Have you ever had the impression that your teeth are more worn than they should be?* (Yes / No) 3. *Have you experienced fatigue or pain in your jaw or mouth muscles when you wake up?* (Yes / No) 4. *Have you felt pain in the temples (side of the head, above the ears) when you wake up?* (Yes / No); 5. *Have you had trouble opening your mouth when you wake up?* (Yes / No). The presence of the teeth grinding habit at night was defined when the answer to the first question was "sometimes" or "often". The presence of sleep bruxism was defined when the habit of teeth grinding at night existed and was associated with at least one "yes" in one of the four remaining questions[9].

The independent variables were: gender (male / female), color (white / black / yellow / brown / indigenous), oral habits (gum chewing / pen or pencil or other objects biting / chin hand placing / tongue or lip or cheek biting / nails biting), the habit of smoking (yes/no), the consumption of alcoholic beverages (yes/no), the course and stress, which was evaluated through the Perceived Stress Scale (PSS-14), translated and validated for Brazil[10].

The PSS-14 measures the degree to which individuals perceive situations as stressful. This scale consists of 14 questions with answer options ranging from zero to four being: zero = never; one = almost never; two = sometimes; three = almost always; four = always. The questions with positive sense (4, 5, 6, 7, 9, 10, 13) had the score added in reverse. The other questions were added directly. The total PSS score is the sum of the individual scores of each question, ranging from zero to fifty-six. The ideal cut-off point equals 50% of the total score, so the sample is classified with low or high stress level[9].

Descriptive statistics were used through absolute and relative frequencies to characterize the sample. Bivariate analysis was performed in the inferential statistics by using the Chi-Square test of heterogeneity and linear trend. The significance level adopted was 5% (P<0.05) and 95% of confidence interval (CI95%). The IBM SPSS Statistics 21.0 software (IBM Corp., Armonk, NY, USA) was used to analyze the data.

Results

The final sample consisted of 230 college students, with a mean age of 21 years. The majority of the students were female (56.1%), self-referred as white (47.8%) and attended Dentistry (49.1%) (Table 1).

The sleep bruxism prevalence among college students in this study was 7.0%. Regarding the independent variables, there was no difference in frequency in relation to gender, however, sleep bruxism was more common among college students who self-referred as brown and who attended Dentistry (Table 1).

The prevalence of awake bruxism was 28.7%. This type of bruxism was more common among women, among students who self-referred as white or brown and those who were attending Dentistry or Veterinary Medicine. However, only the independent variable "course" was statistically associated with awake bruxism (P<0.05) (Table 1).

The stress level, assessed by the Perceived Stress Scale, was not associated with either awake bruxism or sleep bruxism.

Table 1. Distribution of independent variables associated with Awake Bruxism and Sleep Bruxism. Patos, Paraíba, Brazil, 2020 (n = 230).

Variables	n (%)	Awake Bruxism				p*	Sleep Bruxism				p*
		Yes		No			Yes		No		
		n	%	n	%		N	%	N	%	
Gender						0.560					0.611
Female	129 (56.1)	39	30.2	90	69.8		08	6.2	121	93.8	
Male	101 (43.9)	27	26.7	74	73.3		08	7.9	93	92.1	
Skin color/Race						0.718					0.805
White	110 (47.8)	34	30.9	76	69.1		06	5.5	104	94.5	

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Continuation											
Black	11 (4.8)	03	27.3	08	72.7		01	9.1	10	90.9	
Brown	101 (43.9)	28	27.7	73	72.3		08	7.9	93	92.1	
Yellow / Indigenous	08 (3.5)	01	12.5	07	87.5		01	12.5	07	87.5	
Course						0.029					0.956
Dentistry	113 (49.1)	36	31.8	77	68.2		08	7.1	105	92.9	
Biological Sciences	38 (16.5)	09	23.7	29	76.3		03	7.9	35	92.1	
Forest Engineering	40 (17.4)	05	12.5	35	87.5		02	5.0	38	95.0	
Veterinary Medicine	39 (17.0)	16	41.0	23	59.0		03	7.7	36	92.3	
Perceived Stress						0.104					0.484
Low Level	120 (52.2)	40	33.3	80	66.4		07	5.8	113	94.2	
High Level	110 (47.8)	26	23.6	84	76.4		09	8.2	101	91.8	

*Chi-square test (Significance level P<0.05)
Source: Authors

In the present study, there was an association between awake bruxism and gum chewing, chin hand placing, facedown sleeping and one-side biting habits. And in regards to sleep bruxism, the habits of gum chewing, pen, pencil or other objects biting, tongue, lips and cheeks biting, nails biting and one-side biting showed a statistically significant association (Table 2).

Table 2. Distribution of habits associated with Awake Bruxism and Sleep Bruxism. Patos, Paraíba, Brazil, 2020 (n = 230).

Variables	Awake Bruxism				p*	Sleep Bruxism				p*
	Yes		No			Yes		No		
	n	%	n	%		N	%	n	%	
Gum Chewing					0.019					0.001
Yes	22	41.5	31	58.5		09	17.0	44	83.0	
No	44	24.8	133	75.2		07	3.9	170	96.1	
Pen/Pencil/Objects Biting					0.370					0.001
Yes	30	31.9	64	68.1		13	13.8	81	86.2	
No	36	26.5	100	73.5		03	2.2	133	97.8	
Chin Hand Placing					0.040					0.114
Yes	44	34.1	85	65.9		12	9.3	117	90.7	
No	22	21.8	79	78.2		04	3.9	97	96.1	

Continue

Continuation										
Tongue/Lips/Cheeks Biting					0.107					0.005
Yes	33	34.4	63	65.6		12	12.5	84	87.5	
No	33	24.6	101	75.4		04	3.0	130	97.0	
Nails Biting					0.238					0.025
Yes	28	33.3	56	66.7		10	11.9	74	88.1	
No	38	26.0	108	74.0		06	4.1	140	95.9	
Facedown Sleeping					0.008					0.885
Yes	41	36.9	70	63.1		08	7.2	103	92.7	
No	25	21.0	94	79.0		08	6.7	111	93.3	
One-Side Sleeping					0.274					0.637
Yes	33	32.3	69	67.7		08	7.8	94	92.1	
No	33	25.8	95	74.2		08	6.2	120	93.8	
One-Side Biting					0.015					0.035
Yes	37	37.0	63	63.0		11	11.0	89	89.0	
No	29	22.3	101	77.7		05	3.8	125	96.2	
Smoking Habits					0.095					0.174
Yes	06	50.0	06	50.0		02	16.7	10	83.3	
No	60	27.5	158	72.5		14	6.4	204	93.6	
Alcoholic Beverages Consumption					0.114					0.655
Yes	39	33.3	78	66.7		09	7.7	108	92.3	
No	27	23.9	86	76.1		07	6.2	106	93.8	

*Chi-square test (Significance level P<0.05)
Source: Authors

Regarding perception, 9.6% of the interviewed college students reported that they grind their teeth during sleep. All signs and symptoms showed a statistically significant association with this habit. Dental wear was the most prevalent sign among college students, which corresponded to 27.0% of the sample. It is noteworthy that 83.9% of the students who reported that they do not grind their teeth during sleep also reported dental wear.

Among the signs and symptoms in those who reported teeth grinding at night, the most common was “jaw and mouth muscles pain/fatigue”, followed by “dental wear”, “temples pain” and “difficulty in mouth opening when waking up” (Table 3).

Table 3. Frequency of signs and symptoms of the International Classification of Sleep Disorders regarding the teeth grinding habit during sleep. Patos, Paraíba, Brazil, 2020 (n = 230).

Signs and Symptoms	n (%)	Teeth Grinding During Sleep n (%)	No Teeth Grinding During Sleep n (%)	p*
Dental Wear				0.04
Yes	62 (26.9)	10 (16.1)	52 (83.9)	
No	168 (73.1)	12 (7.1)	156 (92.9)	
Jaw/Mouth Muscles Pain/Fatigue				<0.001
Yes	44 (19.1)	11 (25.0)	33 (75.0)	
No	186 (80.9)	11 (5.9)	175 (94.1)	
Temples Pain				0.001
Yes	38 (16.5)	09 (23.7)	29 (76.3)	
No	192 (83.5)	13 (6.8)	179 (93.2)	
Difficulty in Mouth Opening When Waking Up				0.001
Yes	24 (10.4)	07 (29.1)	17 (70.9)	
No	206 (89.6)	15 (7.3)	191 (92.3)	

*Chi-square test (Significance level P<0.05)
Source: Authors

Discussion

Bruxism may involve two distinct states of consciousness: during wakefulness (awake bruxism), which is related to the environment, as well as external psychosocial stimuli, occurring in a semi-voluntary manner; and during sleep (sleep bruxism), which is related to the neuromotor center dysfunction, occurring unconsciously[11]. Although they both present common predisposing factors, it is extremely important to differentiate bruxism and analyze them separately, considering that their development and presentation are different.

In this research, the prevalence of awake bruxism was 28.7%, being more common among women, corroborating a study conducted with college students from the Federal University of Minas Gerais, in Belo Horizonte, Brazil, where a prevalence of 36.5% was found[12], as well as one research with students from the University of Salerno, Italy, which found a prevalence of 37.9%, being more prevalent in women, similarly to our study[8].

Regarding sleep bruxism, the prevalence of this condition among college students in the present study was 7.0%, similar to what was found in a population-based study with adults from the city of Rio Grande, Rio Grande do Sul, which was 8.1%[10]. Studies show that in young people the frequency of this dysfunction can vary between 4.4 and 31.8%[8,12-14].

In fact, the prevalence of bruxism varies greatly between studies due to the lack of distinction between awake bruxism and sleep bruxism, the methodologies used to

perform probable and definitive diagnoses, as well as the data collection tools. However, most studies show a lower prevalence of sleep bruxism, which may be related to the difficulty of the individuals' perception of this behavior, since the awareness of this condition relies in relatives or partners reports of having heard sounds or an unusual oromandibular movement during sleep[14,15].

In regard to gender, several studies do not point out statistically significant difference in the prevalence of sleep and awake bruxism[8,11,13] similar to what is found in our research, although many point to higher prevalence among females, which is also a common finding in literature[4,8,16,17].

Regarding the statistical association of awake bruxism self-report with the individual's undergraduate course, the applied methodology in our research did not allow to be found justifications that substantiate the finding as evidenced in another study with similar methodology[18]. Although the type of research and the way it was conducted did not have the means to explain this fact, it is known that the accumulation of academic tasks and responsibilities create psychosocial disorders and may adversely affect the student's health[18].

Regarding the relationship between bruxism and oral habits, in our study we found that awake bruxism was associated with the habit of chewing gum, chin hand placing and one-side biting, similarly to sleep bruxism that had statistical association with the habits of chewing gum, pen, pencil or other objects biting as well as tongue, lips and cheeks biting, nails biting and one-side biting.

In this sense, Soares et al.[19] and Costa et al.[20] evaluated the presence of oral habits in university students with bruxism and there were no associations. In contrast, Gonçalves et al.[21] agreed with the results found in this study, showing a positive association between oral habits and bruxism, but this research was performed in children and adolescents between 4 and 16 years of age. Thus, it is important that more studies are performed to confirm this association and the cause-and-effect relationship between these variables.

It is worth noting that, in the present study, it was observed the frequency of signs and symptoms proposed by the International Classification of Sleep Disorders in relation to the teeth grinding habit during sleep, the most prevalent sign being dental wear, corresponding to 27% of the sample. In fact, dental wear is one of the most immediate consequences of the teeth grinding habit. However, it is necessary to emphasize that different factors can explain this occurrence, such as occlusal problems, tooth loss and others[21].

Moreover, regarding perception, 9.6% of the interviewed college students declared grinding their teeth during sleep, similar to the study proposed by Pontes and Prietsch[11]. Among students who reported not grinding their teeth during sleep, 83.9% reported wear to their teeth, a fact that may be due to the absence of perception by individuals of the nocturnal parafunctional habit, however, when it comes to dental wear, the perception becomes more evident and subject to observation.

Still, the level of stress, although high in the sample studied (47.8%), did not show association to any type of bruxism, contrary to other studies[11,22,23]. There is consid-

erable evidence of the relationship between stress levels and bruxism, even though the mechanisms that explain this association need to be better elucidated, whereas some studies also demonstrate the statistical non-association between these factors in college students[8,24].

Among some limitations found in this study, it can be mentioned the sampling, as well as the sample size, which due to the covid-19 pandemic had to be readjusted and suffered a decrease, owing to the suspension of the university activities, as well as it can be verified that although assured and validated in the literature, bruxism perception can be difficult, so it is important the clinical confirmation of this condition. Furthermore, it is necessary the development of other studies, both with a larger sample and with physical exams, seeking to more reliably elucidate the prevalence and the associated factors with this common condition in college students, in order to contribute with preventive and mitigating measures to this parafunction.

Conclusion

Bruxism has an important prevalence among university students, especially when distinguishing between awake bruxism and sleep bruxism. In addition, it has been demonstrated that oral habits are statistically associated with this parafunctionality.

Data availability

Datasets related to this article will be available upon request to the corresponding author.

Conflicts of interest

None.

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