

# ASSESSMENT OF AWAKE BRUXISM AND STRESS IN UNIVERSITY STUDENTS DURING THE COVID-19 PANDEMIC

## AVALIAÇÃO DO BRUXISMO EM VIGÍLIA E DO ESTRESSE EM ESTUDANTES UNIVERSITÁRIOS, DURANTE A PANDEMIA DA COVID-19

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### ABSTRACT

**Introduction:** Awake bruxism (AB) may be correlated to stress, anxiety, and negatively influence the oral health and quality of life of its carrier. **Objective:** The aim of this study was to assess the frequency of awake bruxism (AB) and the level of stress during the COVID-19 pandemic. **Materials and Methods:** The sample consisted of 52 university students, mean age of 21.21 ( $\pm 2.06$ ) years. AB was assessed by Ecological Momentary Assessment method, through the Desencoste Seus Dentes® application, and stress by the EPS-10 questionnaire. Statistical analysis was performed ( $p < 0.05$ ). **Results:** The mean frequency of AB was 25.34% ( $\pm 21.94$ ), with no difference between genders ( $p > 0.05$ ). A low level of stress was observed, higher in females ( $p < 0.05$ ). There was no correlation between age, stress, and frequency of AB ( $p > 0.05$ ). **Conclusion:** The pandemic does not seem to have deeply affected university students.

**Keywords:** Bruxism; Momentary Ecological Assessment; Emotional Stress.

### RESUMO

**Introdução:** O bruxismo em vigília (BV) pode estar correlacionado ao estresse, ansiedade e influenciar negativamente a saúde bucal e a qualidade de vida do seu portador. **Objetivo:** O objetivo deste estudo foi avaliar a frequência do BV e o nível de estresse de adultos, durante a pandemia da COVID-19. **Materiais e Métodos:** Para isso, 52 estudantes universitários, com idade média de 21,21 ( $\pm 2,06$ ) anos compuseram a amostra. O BV foi avaliado pelo método Avaliação Momentânea Ecológica, por meio do aplicativo Desencoste Seus Dentes®, e o estresse pelo questionário EPS-10. Foi realizada análise estatística ( $p < 0,05$ ). **Resultado:** A frequência média de BV foi de 25,34% ( $\pm 21,94$ ), sem diferença entre os sexos ( $p > 0,05$ ). Foi observado baixo nível de stress, maior no sexo feminino ( $p < 0,05$ ). Não houve correlação entre idade, estresse e frequência de BV ( $p > 0,05$ ). **Conclusão:** A pandemia não parece ter afetado profundamente os estudantes universitários.

**Palavras-Chave:** Bruxismo; Avaliação Momentânea Ecológica; Estresse Emocional.

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## INTRODUCTION

Awake bruxism (AB) is defined as an activity of the masticatory muscles during wakefulness, in which the teeth are in contact several times a day or for a prolonged time and/or due to masticatory muscle tension.<sup>1</sup> Such behaviors can have three consequences: the first results in damage to health; the second, in protection; and, finally, the third, in none of the previous possibilities, resulting in harmless behavior.<sup>2</sup> However, some individuals can live with this type of bruxism without any clinical consequences.<sup>3</sup> In turn, when harmful, it can result in temporomandibular disorders, tooth wear, muscle, and headaches.<sup>4,5</sup>

AB may be correlated with emotional factors.<sup>6</sup> In this sense, the COVID-19 pandemic brought significant consequences to global mental health with increased levels of stress<sup>7</sup> and anxiety.<sup>8,9</sup> The state of intense alertness and attention present in the pandemic may have led, among other damages to health, to an increase in AB, with its characteristic muscle contraction.<sup>10</sup>

A study of adults conducted in Italy found that 46.8% of individuals reported increased teeth clenching behavior, and 49.0% reported increased muscle tension during wakefulness. Additionally, more than half of the subjects reported a worsening in their psychological state during the pandemic, which was correlated with bruxism activities.<sup>9</sup> Similarly, a higher prevalence of AB was also observed in adult women in Israel during this period.<sup>11</sup> However, it should be noted that these surveys used questionnaires, which only allowed for a single response from the subjects and did not assess the daily frequency of AB behaviors.

The Momentary Ecological Assessment (EMA) allows for real-time reports from individuals, collecting various data throughout the day. Desencoste Seus Dentes®, a mobile application launched in 2012, was the first to be developed with the aim of controlling AB, as well as allowing for the evaluation of its frequency using the EMA methodology. Before the pandemic, EMA was used to assess AB through smartphone apps.<sup>1,6,12-14</sup> However, during the COVID-19 pandemic, this method was not used.

In this way, the present research evaluated the frequency of awake bruxism

using the EMA methodology, through the Desencoste Seus Dentes® app, and the level of stress in university students, during the COVID-19 pandemic.

## MATERIAL AND METHODS

An observational longitudinal study was carried out. The research project was approved by the local Ethics Committee (no. 2.002.107), and all procedures were carried out following the Declaration of Helsinki and subsequent revisions. The survey was carried out remotely by telephone, during the COVID-19 pandemic, with all stages being developed by a single operator, a dental surgeon.

A sample calculation was performed, assuming an infinite population of students, with a prevalence of 20% of awake bruxism in adults. The proportional sampling method for an infinite population with 95% confidence, and a maximum margin of error of 11.10%, indicated a sample size of N=50.

The recruitment of subjects was conducted remotely, considering undergraduate students, from a higher education institution. Through the WhatsApp® application, a document was sent to students that presented the project in detail and invited them to participate in the research, if they met the following inclusion criteria: adults (between 18 years and 29 years and 11 months) of both sex; university students of the Dentistry course and courses other than Dentistry. Exclusion criteria were individuals undergoing active orthodontic or dental treatment, with facial and joint pain; and making use of psychotropic drugs or muscle relaxants.

Subjects who agreed to take part in the survey and met the eligibility criteria received a link to access an electronic Google Forms® form (Google Form service, Google, USA), for signing the Free and Informed Consent Form, entering personal data, and completing the questionnaire.

## ASSESSMENT OF AWAKE BRUXISM

To assess the frequency of AB, the EMA method was used, through the Desencoste Seus Dentes® application, thus collecting data from the subjects in real-time. Subjects were instructed to install the application and set up

the application to receive hourly alerts and answer YES or NO, at each of these moments, to the question “Did you have clenched teeth?”, in the application itself. If they could not answer immediately or within 10 minutes, they were instructed to answer the next question only.

Subjects were instructed to answer YES if they experience one of the four AB behaviors (teeth contact, teeth clenching, teeth grinding, and mandible bracing, without teeth contact),<sup>1</sup> and the answer should be NO if they had relaxed jaw muscles at that moment.<sup>1</sup> They were also advised not to respond to the alert if they were chewing. Guidance on the methodology for assessing AB, including the definition of the 5 oral behaviors to facilitate their recognition, and improve the reliability of the results<sup>15</sup> was sent in a document via WhatsApp®. If the subject had any questions, the researcher was available for clarification via message or video call through the same application.

The survey was conducted over a period of one week, starting on a Monday and ending on Sunday. Alerts were only received during twelve hours, from 9:00 am to 9:00 pm. After seven days of using the Desencoste Seus Dentes® app, the subjects selected the “Charts” option in the app to generate a chart, which recorded all responses for the period. Subjects were instructed to take a screenshot of the chart on their phone and forward it via WhatsApp® to the researcher. Messages were sent once a day encouraging subjects to respond as frequently as possible to the questions received.

The frequency of Possible AB (self-report) was calculated<sup>[2]</sup> as the percentage of positive responses (YES) for the AB behaviors in relation to the messages answered (YES and NO), excluding the moments without an answer.

## STRESS ASSESSMENT

The researchers used the Stress Perception Scale (EPS-10) questionnaire,<sup>16</sup> which measures the degree to which a situation is perceived as stressful over a period of one month. The questionnaire has been considered valid,<sup>16,17</sup> reliable,<sup>19</sup> and contains 10 questions and items that are scored on a five-point scale, with values from 0 to 4, in which 0 represents never, 1 almost never, 2 sometimes,

3 fairly often, and 4 very often. Inverted scores are considered for items 4, 5, 7, and 8 since they are positive questions. The sum of all items is performed, resulting in a final score, used as a measure of stress.

The final score ranges from 0 to 40, with higher scores indicating greater levels of perceived stress. In this research, stress scores were used as continuous variables, and the following scale was considered for interpretation: 0 to 13 – low; 14 to 26 – medium; 27 to 40 – high level of stress.<sup>19</sup>

## STATISTICAL ANALYSIS

Statistical analysis was performed using the SPSS IBM Statistics version 25.0 program. The significance level adopted in all statistical tests was 0.05.

The Shapiro-Wilk normality test was performed in assessing normality for continuous variables. If data followed a normal distribution, comparisons between sex and courses were performed using the parametric Student's t-test for independent samples. However, if data did not follow a normal distribution, the Mann-Whitney U non-parametric test was used.

Pearson's chi-square test was used to assess the dependence between two dichotomous or polytomous nominal variables, followed by the Z-test for differences between two proportions with Bonferroni correction.

Spearman's non-parametric correlation coefficient was used to correlate two ordinal variables or when one was continuous and the other ordinal or both were continuous and did not present a normal distribution. For correlating continuous variables that presented normal distribution, Pearson's parametric correlation coefficient was used.

## RESULTS

Initially, 58 students agreed to participate in the research, but 4 could not be included because they did not meet the eligibility criteria. Of the 54 who participated, 2 were removed due to the extremely small number of responses in the AB assessment. Thus, the final sample included 52 students, with a maximum margin of error of 10.90%, with a mean age of 21.21 years old ( $\pm 2.06$ ), 15 of whom were male (21.80 years old  $\pm 2.11$ ) and 37 females

(20.97 years old  $\pm$  2.02). The mean age was significantly lower for Dentistry students (20.71  $\pm$  2.13) when compared to students from other courses (22.01  $\pm$  1.70) ( $p < 0.05$ ). Of the total number of students, 32 (61.54%) attended the Dentistry course, while 20 (38.46%) attended other courses (Table 1).

The average frequency of AB was 25.34% ( $\pm$  21.94) and there was no difference between sexes and between courses for this variable ( $P > 0.05$ ) (Table 1).

The data showed a low level of stress in the total sample, with a mean of 0.90 ( $\pm$  0.60). Females had a higher mean score (1.05  $\pm$  0.57) compared to males (0.53  $\pm$  0.52) ( $P < 0.05$ ) (Table 2). The primary reason for this difference was the Low-stress category, which included 46.7% of male students and 13.5% of female students ( $P < 0.05$ ) (Table 3). There was no difference in stress between students of the Dentistry course and those of other courses ( $P > 0.05$ ) (Table 2).

There was no correlation between age, stress, and percentage of AB ( $P > 0.05$ ) (Table 4).

**Table 1: Means, standard deviations (SD) and p-values of Age (years) and Awake Bruxism (%), according to Sex and Course (n=52)**

Sex / Course	Variable	Sex/Course	n	Mean $\pm$ SD	p
Sex	Age	Female	37	20.97 $\pm$ 2.02	0.221
		Male	15	21.80 $\pm$ 2.11	
	Awake Bruxism	Female	37	27.57 $\pm$ 23.35	0.297
		Male	15	19.82 $\pm$ 17.48	
Course	Age	Dentistry	32	20.71 $\pm$ 2.13	0.004*
		Other Courses	20	22.01 $\pm$ 1.70	
	Awake Bruxism	Dentistry	32	23.75 $\pm$ 18.93	0.917
		Other Courses	20	27.88 $\pm$ 26.38	

Mann-Whitney U non-parametric test

\* $p < 0.05$  indicates statistically significant difference in Age between Courses

**Table 2: Means, standard deviations (SD) and p-values of Perceived Stress, according to Sex and Course**

Variable	Sex/Course	n	Mean $\pm$ SD	p
Perceived stress	Total	-	0.90 $\pm$ 0.60	-
	Sex	Female	1.05 $\pm$ 0.57	0.005*
		Male	0.53 $\pm$ 0.52	
	Course	Dentistry	0.94 $\pm$ 0.62	0.620
		Other Courses	0.85 $\pm$ 0.59	

Mann-Whitney U non-parametric test

\* $p < 0.05$  indicates statistically significant difference between sexes

**Table 3: Crossover frequencies according to Sex, Course and p-values**

Stress Category	Sex		Total	p
	Female	Male		
Low	5 <sub>a</sub>	7 <sub>b</sub>	12	0.016*
	13.5%	46.7%	23.1%	
Medium	25 <sub>a</sub>	8 <sub>a</sub>	33	
	67.6%	53.3%	63.5%	
High	7 <sub>a</sub>	0 <sub>a</sub>	7	
	18.9%	0.0%	13.5%	
Total	37	15	52	
	100%	100%	100%	
Stress Category	Course		Total	p
	Dentistry	Other Courses		
Low	7 <sub>a</sub>	5 <sub>a</sub>	12	0.838
	21.9%	25.0%	23.1%	
Medium	20 <sub>a</sub>	13 <sub>a</sub>	33	
	62.5%	65.0%	63.5%	
High	5 <sub>a</sub>	2 <sub>a</sub>	7	
	15.6%	10.0%	13.5%	
Total	32	20	52	
	100%	100%	100%	

Pearson's chi-square test

\* $p < 0.05$  indicates dependence between the variables in the line, according to sex

Different subscript letters in the row indicate statistically significant difference between sexes ( $p < 0.05$ )

**Table 4: Correlations between Age, Awake Bruxism and Perceived Stress (n=52)**

Variable	Spearman's correlation coefficient	Age	Awake Bruxism	Perceived Stress
Age	Correlation coefficient	1.000	0.129	-0.103
	p-value	-	0.362	0.466
Awake Bruxism	Correlation coefficient	0.129	1.000	0.061
	p-value	0.362	-	0.670
Perceived Stress	Correlation coefficient	-0.103	0.061	1.000
	p-value	0.466	0.670	-

Spearman's non-parametric correlation coefficient

$p > 0.05$  indicates no statistically significant correlation



## DISCUSSION

The objective of this study was to assess awake bruxism and investigate its correlation with the degree of stress during the COVID-19 pandemic in university students. The result showed a frequency of 25.34% of BV and a low level of stress. However, no significant correlation between these variables was found in the studied period.

The Desencoste seus dentes® application is indicated to help control AB through awareness since the user receives periodic alerts throughout the day. The perception of AB and the need to control it by the carrier is important to reduce the negative effects that this behavior can generate.<sup>9</sup> Furthermore, Desencoste seus dentes® enables dentists to monitor the daily frequency of their patients' AB behaviors through the graphs generated. Due to its popularity, ease of use, and the possibility of real-time AB assessment (EMA) and analysis resulting from the generation of graphs, this application was selected for AB assessment in this research. It is important to highlight that this application specifically asks about teeth clenching, however, in this study all subjects were instructed to answer YES when they exhibited any of the four existing AB behaviors.

Studies have reported that the COVID-19 pandemic has had significant adverse effects on the psycho-emotional state of the population,<sup>20</sup> which may increase the risk of developing, aggravating, and maintaining temporomandibular disorders and bruxism.<sup>10</sup> However, the frequency of AB observed in the sample of this study was 25.34%, which is similar to the frequency of 28.3%, found in a study at an Italian university with Dentistry students, using EMA methodology, through smartphone application BruxApp® for seven days.<sup>13</sup> An approximate frequency of 30% of AB episodes during the week is considered normal behavior in healthy young adults,<sup>13</sup> this in conjunction with the low level of stress observed in the students in the present research, suggests that they were not significantly affected psychologically by the pandemic.

Higher frequencies of AB were observed in university students from different courses in Italy (38.0%)<sup>1</sup> and in college preparatory students in Brazil (38.4%),<sup>6</sup> both of which were

also evaluated using the EMA methodology. The higher frequency observed in students of preparatory courses for college may be related to the greater propensity to psychological pressure in the pre-university entrance exam, leading to higher levels of stress and AB.<sup>6</sup> Studies have also shown that the pre-college entrance phase is more prone to stress than the university period.<sup>21,22</sup>

In this study, no difference was found in the frequency of AB between Dentistry students and students of other courses. As most of the Dentistry students in the sample were in the 3rd year, who knew the normal functions of the masticatory system, it was expected that they would be more aware of bruxism and present a lower frequency of this activity than the group of students from other courses. However, the similarity in the results may be due to the explanation present in the opening screens of Desencoste Seus dentes® about what bruxism is and its possible deleterious consequences, to which all students had access.

Although AB has been associated with stress<sup>23</sup> and women are more susceptible to this condition,<sup>24</sup> there is controversy regarding the occurrence of AB between sex. In the present study, there was no difference between the sex in the frequency of AB, which is consistent with studies in adults.<sup>1,13,25</sup> However, other studies have reported a higher frequency of AB in females in students taking a preparatory course for university entrance exams<sup>6</sup> and in Brazilian, Italian, and Portuguese university students studying Dentistry.<sup>5</sup>

There are reports of an increase in the level of anxiety in Chinese people<sup>8</sup> and greater anxiety and stress in health professionals during the Covid-19 pandemic.<sup>8,26</sup> University students are also known to experience stress due to the environment academic and its charges, making them a high-risk group for developing it.<sup>27</sup> Although the present study was carried out during this pandemic, the stress level of university students was low and similar for the two groups of students evaluated. This may be since students are attending classes remotely, due to the pandemic, minimizing the risks of contagion between them and their peers, teachers, and patients. The fact that the research was not carried out during an exam period and that most of the subjects are from a privileged social class

may also have contributed, as the university they attend is private. Additionally, there is a hypothesis that AB exerts stress reduction in a cognitive adaptive way. Individuals who have AB perform muscle contractions to relieve the tension caused by stress, leading to a decrease in this psychosocial factor. Patients with AB have higher levels of stress-coping strategies compared to TMD patients.<sup>28</sup> This could probably justify why this sample did not correlate AB with stress.

In the present study, a higher level of stress was observed in females. Similarly, a higher prevalence of stress symptoms was found in female undergraduates (56.20%) compared to males (38.80%), resulting in a total of 50% of subjects with stress, greater symptoms were predominant in the resistance phase (41.20%), as opposed to the alert and exhaustion phases.<sup>20</sup> Research evaluating stress in medical students found a prevalence of 49.7%, at different levels throughout the course and observed a higher percentage in females (66.7%) than in males (35.8%).<sup>22</sup> Likewise, a study on vulnerability and psychological well-being of university students found a prevalence of 52.88% of stress in the total sample and a higher prevalence in females (65.52%).<sup>29</sup> The greater presence of stress in females may be related to several possibilities, among them, including societal overload and constant pressure on women to perform multiple tasks simultaneously.<sup>6</sup>

No correlation was found between AB and stress in this study, supporting the results of a study that showed there is no direct link between fear of COVID-19 and potential AB in dental students.<sup>30</sup> Conversely, research investigating the connection between adaptive stress and AB used psychological and self-report questionnaires for AB and showed a correlation between these two factors.<sup>28</sup> Similarly, stress was associated with AB in a sample of Israeli students, 60% of whom reported different levels of anxiety and stress;<sup>31</sup> pre-college students also showed this correlation.<sup>9</sup>

Based on the observation that the evaluated university students displayed AB behaviors and that a portion of the population is unaware of having this functional disorder,<sup>1</sup> it is crucial for dental practitioners to encourage the use of instruments that raise awareness of oral behaviors. Periodical alerts work as a

Momentary Ecological Intervention, inducing individuals to reduce improper behavior and promote greater self-control, empowering them to take responsibility for this therapeutic strategy.<sup>2</sup>

One of the limitations of this study was the small sample size, possibly due to the social distance imposed by the COVID-19 pandemic that made it difficult to invite students in person, which would have been more engaging. In addition, some subjects gave up due to being asked to report their AB behaviors several times a day, despite the ease of using the application. Furthermore, the diagnosis of Definitive AB could not be obtained due to the impossibility of performing physical and electromyographic examinations on the subjects.

New studies should be carried out, with larger samples, using ecological methods, clinical inspection, and electromyography to assess the frequency of AB, in addition to investigating the factors associated with it, bringing more evidence on the subject, and contributing to the development of preventive actions to combat its adverse consequences for oral health.

## CONCLUSIONS:

University students had a frequency of 25.34% of AB and a low level of stress during the COVID-19 pandemic. It is important to diagnose and guide actions to control this muscle activity, thus avoiding its negative consequences on oral health.

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