

Association of self-reported bruxism and academic performance in Jazan University dental students: A cross-sectional study

ABSTRACT

Aims: The purpose of this cross-sectional descriptive study was to investigate the association between self-reported bruxism and academic performance among dental students at Jazan University.

Material and Methods: One hundred sixty-eight students (73 males and 95 females) were evaluated in this study, between the age groups of 18 years and above. Self-reported bruxism was measured by utilizing a customized questionnaire. Academic performance was analyzed using participants' grade point average (GPA) for the year. Independent t-tests and one-way analysis of variance (ANOVA) were utilized to find the association between the self-reported bruxism and the covariate-adjusted analysis (CI 95%). The Spearman correlation coefficient was utilized to find the correlation between the variables.

Results: The reported prevalence of self-reported bruxism was 66.25% between both genders. Males (mean = 36.86) have lower bruxism scores compared to females (mean = 42.14), suggesting a potential gender-based difference in bruxism severity. A moderate positive correlation is observed between self-reported stress levels and bruxism scores ($r = 0.268^{**}$, $P < 0.01$), indicating that as stress levels increase, there is a tendency for bruxism scores to also increase. A weak negative correlation is observed between academic performance and bruxism scores ($r = -0.034$, $P > 0.05$), suggesting a minimal association between academic performance and bruxism severity. However, bruxism score was higher among females with higher GPA.

Conclusions: This study demonstrated a weak negative association between self-reported bruxism and academic performance. It was noteworthy that females with higher GPA and low socioeconomic status had higher bruxism scores compared to males.

Keywords: Academic performance, anxiety, questionnaire, self-reported bruxism, stress, students

INTRODUCTION

Bruxism is defined as parafunctional muscular activity characterized by clenching, thrusting, or bracing of the lower jaw and grinding of teeth. There are two primary types of bruxism: awake bruxism and sleep bruxism.^[1] Awake bruxism refers to non-functional behaviors in which individuals repeatedly grind or clench their teeth during wakefulness. In contrast, sleep bruxism is sleep-related disorder characterized by the grinding or clenching of teeth during sleep.^[2] While bruxism itself is not considered a disorder, it should be analyzed as a potential risk factor, particularly when levels of muscular activity increase. This increased muscle activity can lead to dental issues, such as tooth fractures and

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Received: 21 March 2024, **Revised:** 20 April 2024, **Accepted:** 14 May 2024, **Published:** 16 November 2024

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How to cite this article: Bakri MM, Aljabri MY, Hezam AAA, Abiri ZA, Mubarak LM, Alhamidhi AA, *et al.* Association of self-reported bruxism and academic performance in Jazan University dental students: A cross-sectional study. *Natl J Maxillofac Surg* 2024;15:379-86.

Access this article online

Website:

www.njms.in

DOI:

10.4103/njms.njms_47_24

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attrition, temporomandibular joint pain, and headaches.^[3] Various factors have been associated with bruxism habits, including smoking, heavy alcohol consumption, and coffee consumption. Psychological factors, such as stress, anxiety, sleep apnea, and depression, are also linked to bruxism.^[3]

A recent study has shown a coherent association between self-reported bruxism and psychological disorders (stress and anxiety). This study concluded that bruxism could be an indicator of intrapersonal and interpersonal reactivity in an individual with a dissatisfactory condition.^[4] Furthermore, stress related to academic performance was found to be associated with bruxism and jaw pain, suggesting a link between these factors. A study that measured stress levels with the amount of salivary chromogranin A suggested a positive association between stress, anxiety, and bruxism.^[5] Moreover, the participants who reported self-bruxism scored higher in the Perceived Stress Scale 10 (PSS-10) and Beck Anxiety Inventory (BAI) scale questionnaires.^[6]

Various studies on the prevalence of bruxism among university students have been reported.^[4,6-10] A study in 2016 on European university students reported a prevalence rate of bruxism of around 37.9%, respectively.^[11] Similarly, bruxism was reported at 57.9% among university students in Lithuania.^[12] Among American students in 2014, bruxism was reported at around 31.5%, and in similar cohort of participants, the prevalence was recorded at 63% in 2016.^[13] In the study conducted on the northern students of Saudi Arabia, the prevalence of bruxism was reported at 70%, along with the disruption of sleep patterns.^[14] A systematic review reported that 75% of bruxers have some type of stress/anxiety.^[15]

Researchers have found a high prevalence of dental issues associated with bruxism among dental and medical students. Around 90.7% of university students complaining of jaw pain suffer from bruxism.^[6] Additionally, 84.4% of students with TMDs and 81% with dental attrition exhibit awake or sleep bruxism.^[16] Overall, the prevalence of bruxism and related conditions is high among the young generation, and this disorder should not be considered an infrequent behavior.

Academic performance is a crucial measure that enables students to assess their overall progress and helps them to focus on their prospects. Numerous studies have explored the association between anxiety, stress, and academic performance, consistently reporting that students with lower academic achievements tend to experience higher levels of anxiety and stress.^[9,16-18] This could be due to a lack of concentration, difficulty retrieving information, and psychological factors. In addition, academic performance could

also be influenced by various factors, such as sleep disruption, stress of performance, and lack of motivation.^[19] However, despite the demonstrated association between bruxism and anxiety/stress, there is not enough evidence of their association with the academic performance of students. A study in the northern region of Saudi Arabia has demonstrated the association between sleep and awake bruxism on sleeping quality among university students.^[14] Various studies have been performed on the Jazan University cohort regarding parafunctional habits and psychological distress.^[20,21] In research on bruxism and Khat chewing habits, strong positive correlation was observed among the variables.^[21] Similarly, a study on cohort of Jazan dental students evaluated the association of stress and anxiety on performance during the coronavirus disease 2019 (COVID-19) pandemic.^[20] However, none of the studies have evaluated the association between self-reported bruxism and academic performance in the Jazan region. Moreover, no study in Saudi Arabia has focused on self-reported bruxism and clinical performance of university students. Hence, this study aims to investigate the association between self-reported bruxism and academic performance among dental students at Jazan University.

MATERIALS AND METHODS

This cross-sectional descriptive study was conducted on undergraduate dental students from the College of Dentistry, Jazan University, between November 2022 and January 2023. The students who volunteered to participate were included, and the sample size was determined by the proportion comparison formula (95% confidence interval; 85% power and ratio of 1:4 <https://riskcalc.org/samplesize/>). This sampling method was utilized in two previous studies that calculated the self-reported bruxism and academic performance of students.^[11,22] Following these data, a final sample of 150 participants was calculated, and in this study, the researcher decided to recruit 177 participants. The convenience sampling technique was used to recruit the participants. The students in the age group of 18 years and above were included. Students with a history of cardiac or pulmonary disease, those using psychiatric medication, or those who have sleep apnea were excluded. Students were screened for the excluding factors, and those willing to participate were recruited. Although 177 participants initially agreed to participate, nine participants did not respond even after continuous reminders. The objective of this research was explained to the students, and signed informed consent was obtained before the commencement of the study. The study followed the guidelines of the Declaration of Helsinki 1975, revised in 2013, and the data of participants were completely anonymous. Ethical clearance was obtained from the internal

ethical committee of the College of Dentistry, Jazan University with Ref No. CODJU-22091 dated on November 16, 2022.

Data collection

A Google Form questionnaire was developed for this study, and participants were given clear instructions about the study's objectives. On the first page of the questionnaire, information about the study and a consent form were provided. Participants were informed that they could contact the researcher at any point if they faced difficulties in filling out the questionnaire. The main variables, including awake bruxism, academic performance, age, gender, and ethnic background, were evaluated using a questionnaire. This questionnaire was compiled by adapting questions from the questionnaire created by Serra-Negra *et al.*^[9] and the Depression Anxiety and Stress Scale 21 (DASS-21).^[23]

The structured questionnaire was six-point and divided into three parts. The first part collected information about the participants, including their age, gender, sociodemographic details, and socioeconomic status. In the second part (divided into four sections), the questionnaire delved into participants' understanding of bruxism (its etiology, diagnosis, and treatment) and inquired about signs and symptoms of bruxism over the past month, such as orofacial pain and dysfunctional symptoms, as well as jaw pain or clicking noises during jaw movement, among others. The third part consists of the seven items of DASS-21.

To ensure accuracy, the questionnaire was initially developed in English by investigators with the help of experts in oral and maxillofacial surgery. The designed questionnaire was tested among 20 students to assess its reliability and validity. Based on the feedback received, the questionnaire was modified by the evaluator, who subsequently conducted the study.

Data collection was conducted using Google Forms, and the questionnaire link was emailed to participants. Participants were requested to complete the questionnaire during their leisure time to avoid disrupting their studies.

Self-reported bruxism

The self-reported bruxism questionnaire reported the presence of bruxism. The diagnostic criteria followed were those of the American Academy of Sleep Medicine (2005).^[24] This is a valid method utilized in previous studies to identify awake and sleep bruxism.^[24] The researcher developed the questionnaire, and English versions of the questionnaire were used in this study. Bruxism was assessed by the questions about signs and symptoms of bruxism over the past month, such as "Do you have any orofacial pain and dysfunctional symptoms since the past few months," "Do you experience

any jaw pain or clicking noises during jaw movement," and "Are you aware of clenching or grinding of teeth during morning." The closed-ended answers, such as "yes" and "no," were given by the participants, where "yes" indicated a positive response and the presence of bruxism.

The basic characteristics of bruxism were explained to participants with the help of an information sheet written and validated by a maxillofacial expert in dentistry.

Academic performance

The academic performance of the included students was evaluated by their overall grade point average (GPA) scores in semesters. The GPA scoring system was identified by Yale University in 1785 and is utilized in various studies to calculate the academic performance of university students.^[4,6] The students provided overall five-point GPA scores for the academic year 2022. The final scores were calculated as: 4.5–5.0 for high performers; 4.4–4.0 for above-average performers; 3.9–3.5 for average performers; 3.4–3.0 for below-average performers; and 2.9 and less for poor performers.

Anxiety and Stress Scale

The DASS-21 questionnaire in English version was adapted. This is a reliable and validated scale used in various studies (Cronbach's coefficient ≥ 0.72) to check stress and anxiety levels.^[23] This scale has seven questions each for stress and anxiety on which the respondent is analyzed. The scoring system of this scale is from 0 to 3. The results were measured according to the total score, classifying into two categories: presence and absence. Regarding stress, a score below 13 was considered absence and above was considered presence.

Socioeconomic status

The modified version of the Kuppuswamy scale utilized for measuring socioeconomic status in rural and urban areas was used in this study. This scale consists of scores from 3 to 29, including the education levels and occupation of the head of the family. This version has a reliability of 0.907 for each item in the questionnaire.^[25] This scale consists of five domains, and the result is calculated as high economic status (25–29), upper middle economic status (15–24), middle economic status (10–15), and low economic status (below 10).^[25]

Statistical analysis

The data were analyzed and recorded in the Statistical Package for the Social Sciences (SPSS) version 25.0 (SPSS, Chicago, IL). The normality of the data was analyzed by mean and standard deviation. Categorical data were expressed in terms of frequency and percentage. Independent t-tests and one-way analysis of variance (ANOVA) were utilized

to find the association between the self-reported bruxism and the covariate-adjusted analysis (CI 95%). The Spearman correlation coefficient was utilized to find the correlation between the variables. The *P* value for the level of significance was set at ≤ 0.05 .

RESULTS

A total of 168 participants (95 (56.5%) females and 73 (43.5%) males) participated in this study. Most participants in the study were in the age group of 21–23 years, constituting 39.9% of the total sample. Females constituted the majority in all age groups, with the highest percentage (62.4%) observed in the 24 years [Figure 1]. The prevalence of self-reported bruxism was reported high in females (42.11%) and males (36.86%) with cumulative prevalence of 66.35%, respectively.

One-way ANOVA reported [Table 1] the mean bruxism scores for different GPA ranges (2.9 and less, 3.4–3.0, 3.9–3.5, 4.4–4.0, and 5.0–4.5). However, no statistical significance was reported between these two variables (*P* value < 0.05), suggesting that GPA scores are not associated with bruxism. A significant difference is observed in mean bruxism scores between genders (*P* value = 0.005). Males (mean = 36.86) have lower bruxism scores compared to females (mean = 42.14), suggesting a potential gender-based difference in bruxism severity [Table 1 and Figure 2].

Table 2 indicates a weak negative correlation between GPA and self-reported stress levels ($r = -0.135$, $P > 0.05$), suggesting that as GPA decreases, there is a slight tendency for reported stress levels to increase. However, the correlation is not statistically significant. A moderate positive correlation is observed between self-reported stress levels and bruxism scores ($r = 0.268^{**}$, $P < 0.01$), indicating that as stress levels increase, there is a tendency for bruxism scores to also increase. The correlation is statistically significant at the 0.01 level. A very weak negative correlation is observed between GPA and bruxism scores ($r = -0.034$, $P > 0.05$), suggesting a minimal association between academic performance and bruxism severity. However, the association is not statistically significant.

Figure 3 indicates a moderate correlation between self-reported bruxism and stress scores ($r = 0.268^{**}$, $P < 0.01$), indicating that as stress levels increase, there is a tendency for bruxism scores to increase. The correlation is statistically significant at the 0.01 level.

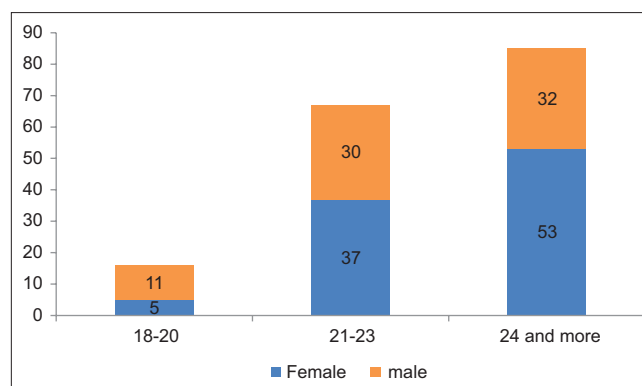


Figure 1: Distribution of males and females according to age group (years)

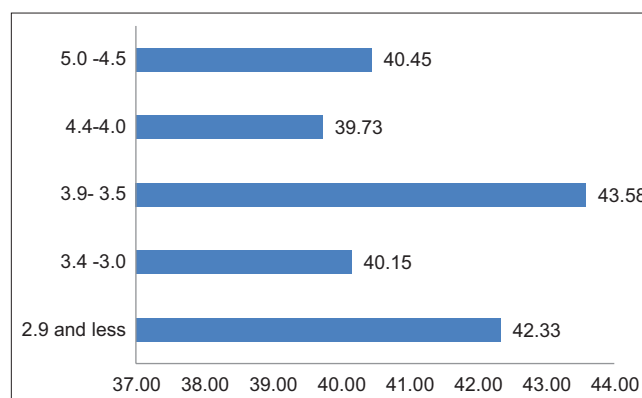


Figure 2: Mean bruxism scores according to GPA

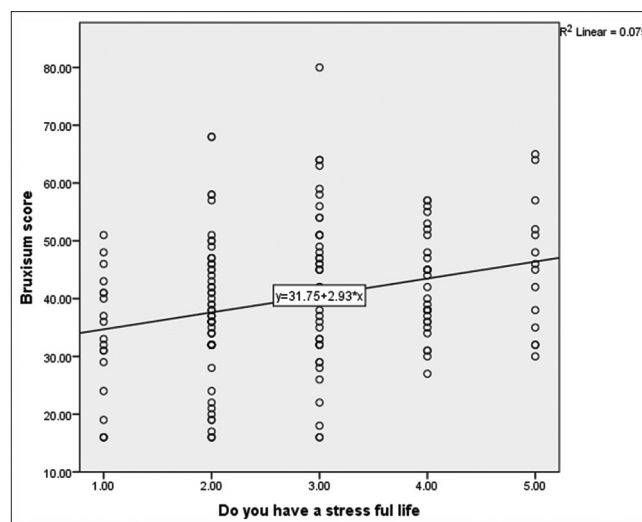


Figure 3: Correlation between stress and bruxism

The result of Table 3 indicates that the symptom “Are you ever aware of grinding your teeth during the day” ($P = 0.009$) is a significant predictor of GPA, with an odds ratio of 0.57. This suggests that individuals who are aware of grinding their teeth during the day are more likely to have a higher GPA. However, all the other factors showed minimal or no association between the symptoms of bruxism and GPA scores. Additionally, weak

association was observed between the symptoms, such as grinding teeth at night, clenching teeth during daytime, pain in face and jaw region, and hypersensitivity in the teeth. All these indicate no or minimal association between symptoms related to bruxism and overall GPA scores.

Table 4 illustrates the relationship between socioeconomic status, stress, and bruxism among the genders. Notably, most of the participants are under the GPA of 4.0 to 4.5 and are

Table 1: Comparing the mean bruxism scores based on GPA and gender

	No. of participants	Mean bruxism score	Std. deviation	P
GPA				
2.9 and less	3	42.33	9.29	0.781
3.0–3.4	13	40.15	9.35	
3.5–3.9	24	43.58	12.22	
4.0–4.4	48	39.73	11.94	
4.5–5.0	56	40.45	12.97	
Gender				
Male	73	36.86	11.45	0.005
Female	95	42.14	12.11	

Table 2: Correlation between stress, GPA, and bruxism among the study subjects

	GPA	Do you have a stressful life	Bruxism score
GPA	-	-0.135	-0.034
Do you have a stressful life	-0.135	-	0.268**
Bruxism score	-0.034	0.268**	-

**Significant association

Table 3: Relationship between individual symptoms related to bruxism and GPA

	Odds ratio	Wald	95% confidence interval		P
			Lower bound	Upper bound	
Has anyone heard you grinding your teeth at night	-0.29	1.62	-0.74	0.16	0.20
Is your jaw ever fatigue or sore on awakening in the morning	0.01	0.00	-0.44	0.45	0.98
Do you experience soreness of gum on awakening in the morning	0.02	0.01	-0.38	0.43	0.91
Do you ever experience temporal headache on awakening in the morning	-0.19	0.95	-0.56	0.19	0.33
Are you ever aware of grinding your teeth during the day	0.57	6.81	0.14	0.99	0.009*
Are you ever aware of clenching your teeth during the day	-0.40	3.03	-0.84	0.05	0.08
Have you had pain in your ear, face, jaw, or temporal area	-0.32	2.65	-0.71	0.07	0.10
Do you get pain or a tight feeling in your jaw when you first wake up in the morning	0.34	2.34	-0.10	0.79	0.13
Do your jaw symptoms lead you to miss classes	0.15	0.46	-0.28	0.58	0.50
While you open or close your mouth or when you eat, does your jaw make a clicking or popping noise	-0.17	0.72	-0.55	0.22	0.40
When you open or close your mouth or during eating, does your jaw generate a scraping or grating sound	0.09	0.17	-0.32	0.49	0.68
Have you noticed masseter muscle hypertrophy	0.16	0.37	-0.36	0.68	0.54
Have you noticed tongue and cheek indentation	0.08	0.18	-0.28	0.43	0.67
Have you noticed tooth or teeth hypersensitive to cold air or liquid	-0.13	0.62	-0.45	0.19	0.43
Have you noticed wearing in your teeth	0.34	3.33	-0.03	0.72	0.07
Have you ever experienced generalized teeth mobility in the early morning	-0.23	1.39	-0.62	0.15	0.24

*P<0.05

considered a high academic achiever. A total of 10 participants were from a low economic background and were substantially under some stress. Bruxism, defined dichotomously, is observed in four participants, with a higher occurrence among females (3 of 4) with low socioeconomic status and high achievers.

DISCUSSION

In this cross-sectional descriptive study, the self-reported bruxism was analyzed by utilizing the validated questionnaire developed by the combination of questionnaire developed by Serra-Negra *et al.*^[9] and the DASS-21 questionnaire.^[26] A systematic review demonstrated the utilization of self-reported questionnaire for reporting bruxism and found it a valid measure. Anxiety and stress were demonstrated by DASS-21 which was validated in various studies.^[23] The GPA was the chosen instrument for evaluating academic performance. This instrument has been utilized in the studies by Awadalla *et al.*^[27] and Dawood *et al.*^[22] in their studies to evaluate university students' academic performance.

When evaluating self-reported bruxism, it was observed that 66.35% (42.5% females and 36.3% males) of surveyed students had this habit. This finding is like one that was conducted in Peru, where 53.3% of university students demonstrated the presence of self-reported bruxism.^[6] Similarly, a study among the students in Saudi Arabia reported that 85.25% of participants had a presence of awake bruxism.^[14] Conversely, a prevalence of only 37.7% of bruxism was reported among dental students in Brazil

Table 4: Relationship between GPA, socioeconomic status, stress, and bruxism

GPA	Female			Male		
	Low socioeconomic status	Stress	Bruxism	Low socioeconomic status	Stress	Bruxism
2.9 and less	0	0	0	0	1	0
3.4–3.0	3	2	1	0	2	1
3.9–3.5	5	5	5	1	3	0
4.4–4.0	1	15	1	1	2	1
5.0–4.5	3	6	3	0	3	1
Total	12	28	10	2	11	3

and Portugal.^[28] The difference in prevalence of bruxism could be related to the multifactorial origin of bruxism and the lifestyle associated with individuals of various cultures.

Another interesting finding of this study was the association of self-reported bruxism among the genders. It was found that bruxism, in general, was higher in females compared to males with statistical significance (P value = 0.05) among the variables. This finding coincides with the findings of studies by Serra-Negra *et al.*,^[18] Huañec-Paucar *et al.*,^[7] and Winocur *et al.*^[29] However, in all the studies, no statistical significance was recorded among the genders. Additionally, literature suggests that females are more sensitive to anxiety and stress than males and overcome stressful situations in varied ways.^[30] Moreover, females use the middle prefrontal cortex to respond to stress, while in males, there is a decrease in the response of this system.^[31]

In this study, self-reported bruxism was found to be statistically associated with anxiety and stress. This finding coincides with a Brazilian study in which awake and sleep bruxism were directly related to anxiety.^[18] Furthermore, research conducted in Lima revealed that 67% of the students reported experiencing bruxism in response to stress.^[12] A study in Saudi Arabia also supported these results by indicating that individuals with awake bruxism exhibited higher levels of stress and anxiety.^[14] These results suggested that bruxism can be a coping mechanism for individuals suffering from anxiety and stress.

A population-based Finnish study revealed a positive association between both awake and sleep bruxism and stress.^[32] This led to the conclusion that stress and anxiety are among the risk factors associated with bruxism. Psychological studies on this behavior suggest that it may be linked to circadian cycles and neural pathways, which can be influenced by factors, such as anxiety and stress.^[5,31,33] These influences can disrupt the normal sleep pattern and increase micro-awakening.^[13] This micro-awakening phenomenon can occur a minimum of 5 to 10 times per hour during the sleep phase.^[13] Essentially, this suggests that sleep and awake bruxism might be considered normal behaviors of an individual, which helps prepare the brain for sudden awakenings.

Another interesting finding of this study was the correlation of bruxism with socioeconomic status. However, no significant difference was reported between either of the variables. Similar findings were reported in a population-based Dutch study: The prevalence of bruxism was higher among the participants with lower economic status, but the result was not significant.^[32] In this study, researchers have utilized one scale to evaluate the socioeconomic status, while in the Dutch study, authors utilized two different methods to analyze the status.^[32]

One of the unique findings of this study is the significant association between bruxism and academic performance ($OR = 0.57$). Similarly, in the study by Huañec-Paucar *et al.*^[7] a significant association was reported between self-reported bruxism and academic performance. Students with both high and poor academic performance were more likely to experience self-reported bruxism compared to those with average academic performance. The stressors typically associated with dental education include examinations, patient management, and understanding complex concepts. Students often perceive these stressors as both challenges and threats. When students face the pressures of academic performance, a series of psychosomatic changes can occur, leading to increased hyperactivity of the orofacial muscles.^[4,6] Based on the data presented in this study, it can be concluded that students, especially females, who achieve higher academic performance are constantly under pressure to obtain top grades, leading to increased stress and anxiety compared to their peers with average academic achievement. Similarly, students with poor academic performance and the fear of failing also experience increased stress levels. This association suggests that students with high or low academic performance may have a higher prevalence of bruxism, resulting from systemic imbalances and psychological, physiological, or behavioral symptoms in “stressful” academic situations. These situations can lead to poor health outcomes for students and increased parafunctional muscular activity.

One of the limitations of this study is related to the assessment of students’ actual academic performance data. Although it was anticipated that participants would truthfully provide

their academic grades, self-reported instruments inherently lack the stringent control necessary to ensure complete accuracy. Consequently, there exists the potential for bias, which could introduce variations in the results. To address this issue, it is advisable that future research endeavors consider collecting academic data directly from university records, thereby augmenting the information obtained through self-reported forms. Another limitation was the absence of information regarding students' attempts to pass semesters. To mitigate this limitation, it is recommended that researchers incorporate an instrument within their study design that enables the direct collection and documentation of academic performance, facilitating more effective comparisons. Notably, previous studies have employed different methodologies to evaluate students' academic performance. For instance, a Brazilian study utilized the Passing Rate Scale (PRS),^[34] an Australian study relied on university admission test scores and interviews,^[35] while an Iranian study considered final examination grades to assess overall performance.^[29] As a result, variations in study outcomes have been observed. To enhance the comprehensiveness of data related to bruxism, it is further suggested that interviews and clinical evaluations be conducted to gather additional information regarding the signs and symptoms of bruxism. However, it is worth noting that previous research indicates a strong correlation between self-reported diagnoses and clinical diagnoses in cases of bruxism ($\alpha = 0.932$).^[36] Finally, it is essential to underscore the limited research on the association between academic performance and self-reported bruxism. This knowledge gap is significant, as academic performance may potentially serve as a risk factor associated with anxiety and stress-related bruxism.

CONCLUSION

Within the limitations of this study, the result suggested a weak negative association between academic performance and self-reported bruxism among dental students. It was noteworthy that females with higher GPA and low socioeconomic status had higher bruxism scores compared to males. However, a strong positive correlation was reported between stress levels and bruxism scores among the genders. Students with high and low academic performance had some type of anxiety/stress associated with bruxism compared to average students. Students who suffered from stress reported a high level of bruxism with severe muscular pain. However, longitudinal research with a large sample size should be conducted among various universities to support the findings of this research.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Lobbezoo F, Ahlberg J, Raphael KG, Wetselaar P, Glaros AG, Kato T. *et al.* International consensus on the assessment of bruxism: Report of a work in progress. *J Oral Rehabil* 2018;45:837-44.
2. Raphael KG, Santiago V, Lobbezoo F. Bruxism is a continuously distributed behaviour, but disorder decisions are dichotomous (Response to letter by Manfredini, De Laat, Winocur, and Ahlberg (2016)). *J Oral Rehabil* 2016;43:802-3.
3. Garrett AR, Hawley JS. SSRI-associated bruxism: A systematic review of published case reports. *Neurol Clin Pract* 2018;8:135-41.
4. Balaji NK, Murthy PS, Kumar DN, Chaudhury S. Perceived stress, anxiety, and coping states in medical and engineering students during examinations. *Ind Psychiatry J* 2019;28:86-97.
5. Abekura H, Tsuboi M, Okura T, Kagawa K, Sadamori S, Akagawa Y. Association between sleep bruxism and stress sensitivity in an experimental psychological stress task. *Biomed Res* 2011;32:395-9.
6. Cavallo P, Carpinelli L, Savarese G. Perceived stress and bruxism in university students. *BMC Res Notes* 2016;9:514.
7. Huañec-Paucar C, Ayma-León V, Caballero-García S. Association between self-reported bruxism and academic performance in university students. *Journal of Oral Research* 2021;10:1-11.
8. Machado NAG, Costa YM, Quevedo HM, Stuginski-Barbosa J, Valle CM, Bonjardim LR, *et al.* The association of self-reported awake bruxism with anxiety, depression, pain threshold at pressure, pain vigilance, and quality of life in patients undergoing orthodontic treatment. *J Appl Oral Sci* 2020;28:e20190407.
9. Serra-Negra JM, Dias RB, Rodrigues MJ, Aguiar SO, Auad SM, Pordeus IA, *et al.* Self-reported awake bruxism and chronotype profile: A multicenter study on Brazilian, Portuguese and Italian dental students. *Cranio* 2021;39:113-8.
10. Wetselaar P, Vermaire EJH, Lobbezoo F, Schuller AA. The prevalence of awake bruxism and sleep bruxism in the Dutch adult population. *J Oral Rehabil* 2019;46:617-23.
11. Winocur E, Uziel N, Lisha T, Goldsmith C, Eli I. Self-reported bruxism - associations with perceived stress, motivation for control, dental anxiety and gagging. *J Oral Rehabil* 2011;38:3-11.
12. Sousa HCS, Lima MDM, Dantas Neta NB, Tobias RQ, Moura MS, Moura LFAD. Prevalence and associated factors to sleep bruxism in adolescents from Teresina, Piauí. *Rev Bras Epidemiol* 2018;21:e180002.
13. Jokubauskas L, Baltrušaitytė A, Pileičikienė G, Žekonis G. Interrelationships between distinct circadian manifestations of possible bruxism, perceived stress, chronotype and social jetlag in a population of undergraduate students. *Chronobiol Int* 2019;36:1558-69.
14. Shokry SM, El Wakeel EE, Al-Maflehi N, RasRas Z, Fataftah N, Abdul Kareem E. Association between self-reported bruxism and sleeping patterns among dental students in Saudi Arabia: A cross-sectional study. *Int J Dent* 2016;2016:4327081.
15. Jiménez-Silva A, Peña-Durán C, Tobar-Reyes J, Frugone-Zambra R. Sleep and awake bruxism in adults and its relationship with temporomandibular disorders: A systematic review from 2003 to 2014. *Acta Odontol Scand* 2017;75:36-58.
16. Seraj B, Shahrabi M, Ghadimi S, Ahmadi R, Nikfarjam J, Zayeri F, *et al.* The prevalence of bruxism and correlated factors in children referred to dental schools of Tehran, based on parent's report. *Iran J Pediatr* 2010;20:174-80.
17. Phuong NTT, Ngoc VTN, Linh LM, Duc NM, Tra NT, Anh LQ. Bruxism, related factors and oral health-related quality of life among vietnamese medical students. *Int J Environ Res Public Health* 2020;17:7408.

18. Serra-Negra JM, Scarpelli AC, Tirsá-Costa D, Guimarães FH, Pordeus IA, Paiva SM. Sleep bruxism, awake bruxism and sleep quality among Brazilian dental students: A cross-sectional study. *Braz Dent J* 2014;25:241-7.
19. Wijekoon CN, Amaratunge H, de Silva Y, Senanayake S, Jayawardane P, Senarath U. Emotional intelligence and academic performance of medical undergraduates: A cross-sectional study in a selected university in Sri Lanka. *BMC Med Educ* 2017;17:176.
20. Nandalur KR, Porwal A, Masmali SM, Mokli NK, Madkhli HY, Nandalur RR, *et al.* Assessment of mental health in medical and dental college students in Jazan province to see the delayed psychological impact of COVID-19 pandemic: An online survey. *World J Dent* 2023;14:36-40.
21. Quadri MF, Mahnashi A, Al Almutahir A, Tubayqi H, Hakami A, Arishi M, *et al.* Association of awake bruxism with khat, coffee, tobacco, and stress among Jazan University Students. *Int J Dent* 2015;2015:842096.
22. Dawood AB, Marti M, Tanner S. "Peri-implantitis and the prosthodontist." *British Dental Journal* 2017;223:325-32.
23. Gloster AT, Rhoades HM, Novy D, Klotzsch J, Senior A, Kunik M, *et al.* Psychometric properties of the depression anxiety and stress scale-21 in older primary care patients. *J Affect Disord* 2008;110:248-59.
24. Labaron I, Himawan LS, Dewi RS, Tanti I, Maxwell D. Validation of sleep bruxism questionnaire based on the diagnostic criteria of the American Academy of Sleep Medicine. *J Int Dent Med Res* 2017;10:559-63.
25. Wani RT. Socioeconomic status scales-modified Kuppuswamy and Udai Pareekh's scale updated for 2019. *J Family Med Prim Care* 2019;8:1846-9.
26. Oh H, Park K, Yoon S, Kim Y, Lee SH, Choi YY, *et al.* Clinical utility of beck anxiety inventory in clinical and nonclinical Korean samples. *Front Psychiatry* 2018;9:666.
27. Awadalla S, Davies EB, Glazebrook C. A longitudinal cohort study to explore the relationship between depression, anxiety and academic performance among Emirati university students. *BMC Psychiatry* 2020;20:448.
28. Nogueira Coutinho E MPH, Pereira Rodrigues Dos Santos K MPH, Henrique Barros Ferreira E MPH, Graílea Silva Pinto R BHS, de Oliveira Sanchez M DPH. Association between self-reported sleep bruxism and temporomandibular disorder in undergraduate students from Brazil. *Cranio* 2020;38:91-8.
29. Winocur E, Messer T, Eli I, Emodi-Perlman A, Kedem R, Reiter S, *et al.* Awake and sleep bruxism among Israeli adolescents. *Front Neurol* 2019;10:443.
30. Tavares LM, da Silva Parente Macedo LC, Duarte CM, de Goffredo Filho GS, de Souza Tesch R. Cross-sectional study of anxiety symptoms and self-report of awake and sleep bruxism in female TMD patients. *Cranio* 2016;34:378-81.
31. Soto-Goñi XA, Alen F, Buiza-González L, Marcolino-Cruz D, Sánchez-Sánchez T, Ardizzone-García I, *et al.* Adaptive stress coping in awake bruxism. *Front Neurol* 2020;11:564431.
32. Ahlberg J, Rantala M, Savolainen A, Suvinen T, Nissinen M, Sarna S, *et al.* Reported bruxism and stress experience. *Community Dent Oral Epidemiol* 2002;30:405-8.
33. Wieckiewicz M, Paradowska-Stolarz A, Wieckiewicz W. Psychosocial aspects of bruxism: the most paramount factor influencing teeth grinding. *Biomed Res Int* 2014;2014:469187.
34. Manfredini D, Ahlberg J, Aarab G, Bender S, Bracci A, Cistulli PA, *et al.* Standardised tool for the assessment of bruxism. *J Oral Rehabil* 2024;51:29-58.
35. Puddey IB, Mercer A, Carr SE. Relative progress and academic performance of graduate vs undergraduate entrants to an Australian medical school. *BMC Med Educ* 2019;19:1-14.
36. Alkhatatbeh MJ, Hmoud ZL, Abdul-Razzak KK, Alem EM. Self-reported sleep bruxism is associated with vitamin D deficiency and low dietary calcium intake: A case-control study. *BMC Oral Health* 2021;21:21.