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The Relationship Between Self-Reported Sleep/Awake Bruxism and Chronotype Profiles of Dental Students

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ABSTRACT

Objectives: The aim of this study is to evaluate the possible relationship between the presence/absence of the self-reported sleep and/or awake bruxism and the chronotype profiles of dental students.

Materials and Methods: The dental students of Istanbul Medipol University and Istanbul Medeniyet University participated in this study in the fall semester of the 2020-2021 academic year. Along with a form requiring students 'demographic data, an 11-item questionnaire evaluating sleep quality and self-reported sleep and awake bruxism, and a 19-item Morningness-Eveningness Questionnaire (MEQ) determining the chronotypes were applied. The significance level was set at p≤ 0.05 for statistical analysis.

Results: 171 students (female:128, 74.9%; male:43, 25.1%) participated in the study. The mean age was 22.3±2.2. There was no statistical difference between the presence or absence of the bruxism types and the chronotype profiles of the students. The sleep quality in the students with sleep bruxism was statistically lower than in other types of bruxism. The participants with sleep bruxism were statistically more likely to have difficulty concentrating on their daily activities than the participants with other types of bruxism.

Conclusions: There is no relationship between the presence or absence of the bruxism types and the chronotype profiles. However, sleep bruxism negatively affects both sleep quality and focusing on the daily activities.

Keywords: Bruxism, Circadian Rhythm, Dentistry.

Diş Hekimliği Öğrencilerinin Kendi Bildirdikleri Uyku ve Uyanıklık Bruksizm Varlığının Kronotip Profilleri ile İlişkisinin Değerlendirilmesi

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ÖZ

Amaç: Bu çalışmanın amacı diş hekimliği fakültesinde eğitim gören öğrencilerin kendi bildirdikleri uyku ve/veya uyanıklık bruksizmi varlığı veya yokluğu ile kronotip profilleri arasındaki olası ilişkinin değerlendirilmesidir.

Gereç ve Yöntemler: Bu çalışmaya 2020-2021 eğitim-öğretim dönemi güz yarıyılında İstanbul Medipol Üniversitesi ve İstanbul Medeniyet Üniversitesi'nde eğitim gören diş hekimliği öğrencileri katılmıştır. Demografik verilerle birlikte uyku durumlarını ve kendi bildirdikleri uyku ve uyanıklık bruksizmini değerlendiren 11 soruluk bir anket ile kronotip profillerini belirleyen 19 soruluk sabahçıl-akşamcıl anketi uygulanmıştır. İstatistiksel analiz için anlamlılık düzeyi P≤ 0.05 olarak ayarlanmıştır.

Bulgular: Çalışmaya 171 öğrenci (kadın:128, %74,9; erkek:43, %25,1) katılmıştır. Yaş ortalamaları 22,3±2,2'dir. Öğrencilerin kendi bildirdikleri uyku ve/veya uyanıklık bruksizmi varlığı veya yokluğu ile kronotip profilleri arasında istatiksel olarak fark yoktur. Uyku bruksizmi olanlarda uyku kalitesi diğer bruksizm türlerine göre istatiksel olarak daha düşüktür. Uyku bruksizmi olanların günlük aktivitelere odaklanmada zorluk yaşamaları diğer bruksizm türlerine sahip olanlara göre istatiksel olarak daha yüksektir.

Sonuçlar: Bruksizm varlığı veya yokluğu ile kronotip profilleri arasında bir ilişki yoktur. Ancak uyku bruksizmi hem uyku kalitesini hem de günlük aktivitelere odaklanmayı olumsuz yönde etkilemektedir.

Anahtar kelimeler: Bruksizm, Sirkadiyen Ritim, Diş Hekimliği.

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Introduction

Bruxism is a repetitive muscular activity of the masticatory system characterized by grinding or clenching of the teeth during sleep and/or wakefulness.[1] Its etiology is multifactorial and is associated with various psychological factors, especially personality traits such as anxiety and susceptibility to stress.[2,3] According to current literature, stress plays an important role in the pathogenesis of bruxism. The presence of bruxism is a relatively easy clinical symptom to detect and indicates the presence of stress.[4]

The human body is regulated by an internal clock whose health and adaptive skills are essential. This internal clock controls their daily rhythms, sleep/wake cycles, behavior, and physiological functions (such as temperature, melatonin secretion-light/dark cycle, cortisol levels, cellular replication, and digestion). This biological clock repeats cyclically (every 24 hours) and is expressed by the Latin term circadian, which means about one day.[5] The endogenous circadian rhythm is personal and therefore the daily cyclical system in humans differs from person to person. The chronotype refers to the circadian rhythm differences between individuals.[6] In other words, it is a feature that reflects the preference for what activities to do at different times of a day.[7,8]

There are three different chronotype profiles: the morning-type, the evening-type and the intermediate-type. 1) The morning-type: These individuals reach the optimal mental and physical performance in the early hours of the day and when they wake up and go to sleep early. 2) The evening-type: These individuals perform best towards the end of the day and when they wake up and go to the bed late. 3) The intermediate-type: These individuals do not have a clear morning-type or evening-type profile and therefore adapt more quickly to the variation in the circadian cycle.[5]

Many mental health-related conditions have also been associated with the chronotype used to describe the interindividual differences in the daily activity patterns and the sleep-wake cycles.[9,10] The modern lifestyles of these individuals require more adaptation to daily activities that do not fit their chronotype profiles. Therefore, inappropriate circadian cycles lead to inconsistencies between the social and biological clocks that determine sleep and wakefulness.[11] Also, reducing sleep times for social life causes a lack of sleep on workdays. This negatively affects daytime functioning and performance in general, and more effort is required to perform tasks.[12,13] Therefore, it was thought that performing tasks that are not compatible with the chronotype profiles could potentially lead to higher stress levels and ultimately trigger bruxism.[14]

The examining of the chronotype profiles and their possible association between the presence or absence of sleep and/or awake bruxism will provide a deeper understanding of the pathophysiology of bruxism. The aim of this study is to examine the possible relationship between the presence or the absence of the self-reported sleep and awake bruxism and their chronotype profiles. The null hypothesis of this study is that there is no relationship between the presence or the absence of bruxism and the chronotype profiles. The second null hypothesis of the study is that bruxism types do not affect sleep quality.

Materials and Methods

This study was carried out with the approval of the Istanbul Medipol University Ethics Committee (Date: 06/08/2020, Decision no: 10840098-772.02-E.34488). A questionnaire was uploaded to Google Forms. The sample size of the study was calculated using a power analysis (G*Power 3.1.9.2, Düsseldorf, Germany) that an alpha error probability of 0.05 and a power of 95%. Power analysis (effect size = 0.352) showed that at least 125 students should be included in the study. 356 dental students studying at Istanbul Medipol University and Istanbul Medeniyet University were invited to the study in the fall semester of the 2020-2021 academic year. 171 of them responded to the entire questionnaire.

On the front page of the questionnaire, detailed information about the study was given to the participants, and the consent form was placed in this section. The participants were informed that they could contact the researchers if there were any difficulties in understanding and completing the questionnaire. The questionnaire consisted of 11 items to obtain demographic information (*e.g.* gender and age), sleep condition, the presence or absence of sleep and/or awake bruxism, and 19 items from the Morningness-Eveningness Questionnaire (MEQ), which was used to determine the chronotype profile of the participants. The questionnaire consisting of 11 items was created by compiling questions from studies of Serra-Negra *et al.*[15] and Paesani *et al.*[16]. Firstly, the questions were translated into Turkish by two experienced educators. Then, the clarity of the questions was pretested with 15 PhD students. After the pretest, the questionnaire was finalized by the educators who conducted this study.

The Questionnaire for the Assessment of the Sleep Condition

In this survey, it was evaluated whether the participants had difficulty in focusing on the daily activities due to sleep duration, sleep quality, drug use for sleeping and not sleeping well. A similar questionnaire was used in a previous study by Serra-Negra *et al*.[15]

The Questionnaire for the Assessment of Sleep and Awake Bruxism

To evaluate the sleep or awake bruxism of the participants, a questionnaire including the following questions was applied:[15,16]

- Have you been told that you clenched your teeth while sleeping at night?

- Have you noticed that you are clenching and grinding your teeth at night while you are asleep?
- In the last 6 months, has your jaw locked when you woke up?
- Have you had pain in your face when you woke up in the last 6 months?
- Do you grind your teeth during the day?

The questionnaire consisted of "yes" and "no" answers. In the evaluation of this questionnaire, it was accepted that the participant who answered "yes" to at least one of the questions 1, 2, 3 and 4 had probable sleep bruxism, and the "yes" answer of a participant to question 5 was considered to have probable awake bruxism. The participants who answered "yes" to at least one of the questions 1, 2, 3, 4 and question 5 were considered to have both probable sleep and probable awake bruxism. It was decided that those who answered "no" to all questions did not have bruxism.

The Morningness-Eveningness Questionnaire (MEQ)

The Morningness-Eveningness Questionnaire (MEQ) consisted of 19 items answered with a 5-point Likert-type scale (ranging from "never" to "always") to rate the frequency of events. The sum of the answers to the questions provided a total score that determined the chronotype profile of the individuals, and this total score ranged from 16 to 86. The scores less than or equal to 41 indicated the evening-type, while scores between 42 and 58 indicated the intermediate type. The participants with scores higher than or equal to 59 were considered as the morning-type.[17]

Statistical Analysis

Data were analyzed with the IBM SPSS V23. The conformity to normal distribution was examined by Kolmogorov-Smirnov and Shapiro-Wilk. The chi-square test was used to compare the categorical data. The categorical data were presented as frequency (percentage). The significance level was taken as $p<0.050$.

Results

171 dental students participated in this study. 128 (74.9%) of the participants were female and 43 (25.1%) were male. The mean age of the students was 22.3±2.2. 15.2% (n=26) of the participants was the 1st grade, 17.5% (n=30) of them was the 2nd grade, 6.4% (n=11) of them was the 3rd grade, 15.2% of them (n=26) was in the 4th grade and 45.7% (n=78) were in the 5th grade (Table 1).

14.6% (n=25) of the participants had self-reported sleep bruxism, 9.3% (n=16) of them had self-reported awake bruxism, 39.8% (n=68) of them had both self-reported sleep and awake bruxism. In 36.3% (n=62) of the participants, none of the bruxism types were observed. 4% (n=7) of the participants had the morning-type chronotype profile, 53.9% (n=92) of them had the intermediate-type chronotype profile, and 42.1% (n=72) of them had the evening-type chronotype profile. As can be seen in Table 2, there was no statistically significant relationship between the presence or absence of the bruxism types and the chronotype profiles (P=0.815).

Table 1. The distribution of groups with the sleep bruxism, the awake bruxism, both the sleep and the awake bruxism, and no bruxism type, by sex and grade

	The sleep bruxism (n=25)	The awake bruxism (n=16)	Both the sleep and the awake bruxism (n=68)	No bruxism (n=62)	P[1]
Sex					
Female	16 (%64)	12 (%75)	53 (%77.9)	47 (%75.8)	0.585
Male	9 (%36)	4 (%25)	15 (%22.1)	15 (%24.2)	
Grade					
1	3 (%12)	2 (%12.5)	8 (%11.8)	13 (%21)	0.146
2	5 (%20)	1 (%6.3)	9 (%13.2)	15 (%24.2)	
3	1 (%4)	0 (%0)	4 (%5.9)	6 (%9.7)	
4	2 (%8)	2 (%12.5)	16 (%23.5)	6 (%9.7)	
5	14 (%56)	11 (%68.8)	31 (%45.6)	22 (%35.5)	

[1]Chi-square test

Table 2. The comparison of groups with the sleep bruxism, the awake bruxism, both the sleep and the awake bruxism, and no bruxism according to the chronotype profiles

	The sleep bruxism (n=25)	The awake bruxism (n=16)	Both the sleep and the awake bruxism (n=68)	No bruxism (n=62)	P[1]
The morning-type	0 (%0)	0 (%0)	4 (%5.9)	3 (%4.8)	0.815
The intermediate type	13 (%52)	8 (%50)	37 (%54.4)	34 (%54.8)	
The evening-type	12 (%48)	8 (%50)	27 (%39.7)	25 (%40.3)	

[1]Chi-square test statistic

Table 3. The comparison of the answers to the questions about the sleep status of the groups with the sleep bruxism, the awake bruxism, both the sleep and the awake bruxism, and no bruxism type

	The sleep bruxism (n=25)	The awake bruxism (n=16)	Both the sleep and the awake bruxism (n=68)	No bruxism (n=62)	P[1]
How many hours do you sleep?					
8 hours or more	10 (%40)	8 (%50)	24 (%35.3)	25 (%40.3)	0.739
Less than 8 hours	15 (%60)	8 (%50)	44 (%64.7)	37 (%59.7)	
How do you find your sleep quality?					
Good	9 (%36)[a]	13 (%81.3)[b]	36 (%52.9)[b]	46 (%74.2)[ab]	0.001*
Bad	16 (%64)[a]	3 (%18.8)[b]	32 (%47.1)[b]	16 (%25.8)[ab]	
Do you use medication to sleep?					
Yes	0 (%0)	0 (%0)	2 (%2.9)	2 (%3.2)	0.728
No	25 (%100)	16 (%100)	66 (%97.1)	60 (%96.8)	
Do you have trouble concentrating on daily activities because you are not sleeping well?					
No	6 (%24)[a]	10 (%62.5)[b]	24 (%35.3)[ab]	35 (%56.5)[ab]	0.006*
At least once a week	19 (%76)[a]	6 (%37.5)[b]	44 (%64.7)[ab]	27 (%43.5)[ab]	

[1]Chi-square test statistic, a-b: There is no difference between groups with the same letter. (*P <0.05)

As can be seen in Table 3, the sleep quality depended on the types of bruxism (P=0.001). The rate of good sleep quality in those with sleep bruxism was 36%, and this rate was lower than the groups with awake bruxism, both sleep and awake bruxism. The sleep quality of those who did not have any type of bruxism did not differ from other types of bruxism. The difficulty in concentrating on the daily activities of those who did not sleep well depended on the types of bruxism (P=0.006). While the rate of having difficulty concentrating on daily activities at least once a week was 76% in those with sleep bruxism, this rate was 37.5% in those with awake bruxism, and the other groups did not differ.

Discussion

In this study, the relationship between the bruxism types and the chronotype profiles of dental students, and the effects of bruxism types on the sleep condition were evaluated. According to the results obtained from the study, there was no statistically significant difference between the presence or absence of the bruxism types (sleep bruxism, awake bruxism, both sleep and awake bruxism) and the chronotype profiles (the morning-type, the intermediate type, the evening-type). Therefore, the first null hypothesis of the study, that there was no relationship between the presence or absence of the bruxism types and the chronotype profiles, was accepted. Since the presence of sleep bruxism affected the sleep quality and made it difficult to concentrate the daily activities, the second null hypothesis of the study, the hypothesis that the bruxism types did not affect the sleep condition, was rejected.

According to the consensus report published in 2013, the presence of bruxism was graded as “possible”, “probable”, “definite”.[1] In the consensus updated in 2018, the diagnoses of sleep and awake bruxism were handled separately. The same rating was used for both groups.[18] It has been reported that in order to determine the presence of “definite” sleep bruxism, the presence of sleep bruxism should be determined according to the presence of sleep bruxism according to the polysomnography data in addition to the clinical observation and the presence of self-reported sleep bruxism. In the “definite” awake bruxism, it has been reported that the presence of awake bruxism by the participants and the presence of awake bruxism should be determined according to electromyography data in addition to the clinical observation. In the studies with a large number of participants, the determination of bruxism in this way is both expensive and difficult in the practice, and it has been reported that the determination of “possible” bruxism, which the participants self-reported, is appropriate in both consensuses. In this study, according to the consensuses on the evaluation of bruxism published in 2013[1] and 2018[18], the presence of “possible” bruxism was determined by self-reported questionnaires.

In the determination of the chronotype profile, the “Morningness-Eveningness Questionnaire” consisting of 19 items, developed by Horne *et al.*[17] in 1976, was used. This questionnaire, which consists of the Likert type questions, was frequently used to determine the chronotype profiles. The translation of the scale into Turkish and the reliability studies were carried out by Pünduk *et al.*[19] in 2005.

It has been reported that the rate of bruxism in the general adult population ranges from 8% to 31.4%.[20] Studies have shown that the rate of bruxism in university students is higher than in the general population.[21,22] This is thought to be due to their higher stress levels.[4] In this study, the rate of those with only sleep bruxism was 14.6%, the rate of those with only awake bruxism was 9.3%, and the rate of those with both sleep and awake bruxism was 39.7%. While the rate of sleep bruxism in all participants was 54.3%, the rate of awake bruxism in all participants was 49.1%. In the study conducted by Serra Negra *et al.*[21] with dental students, the rate of sleep bruxism was 21.5%, and in the study by Aguiar *et al.*[23] it was 24%. The reason for these differences may be the cultural factors, the differences of the populations and increased the stress factors since this study was conducted during the COVID-19 pandemic period.

In this study, there was no gender difference between sleep bruxism, awake bruxism, both sleep and awake bruxism, or no bruxism. At least one type of the bruxism was seen in 63% of the female participants and 65% of the male participants. Although sleep bruxism was more common among the females than the males in the studies conducted by Serra Negra *et al.*[15] and Yıldırım *et al.*[24], they reported that sleep and awake bruxism were not affected by gender in a systemic review prepared by Manfredini *et al.*[25] in line with the present study.

When the chronotype profiles of the participants are examined, as in the previous studies[15,26], the majority has the intermediate-type profile. As in the study of Serra Negra *et al.*[15], no correlation was found between the chronotype profiles and sleep and awake bruxism. It is recommended to confirm this situation with data obtained as a result of examining the situation in large populations by increasing the number of samples in future studies.

In this study, it was observed that the sleep quality of students with sleep bruxism was statistically lower than those with awake bruxism and both sleep and awake bruxism. Consistent with the current study, the studies with the dental students in Brazil[21] and Saudi Arabia[27] also reported that sleep bruxism leads to poor sleep quality.

This study had some limitations. One of them was determined as the presence or absence of bruxism according to the students' self-reports as "possible" bruxism. The future studies should confirm the "definite" presence of bruxism by polysomnography for sleep bruxism and the EMG values for awake bruxism, together with the self-reports of the participants and the clinical observations of the clinicians. Another limitation was that the results obtained may not overlap with the general population, as the study was conducted only on dental students. Further epidemiological studies involving adults are recommended for the future studies.

Conclusions

Within the limitations, the following results were obtained from this study:

- There is no relationship between the presence or absence of bruxism types and chronotype profiles.
- Sleep bruxism negatively affects sleep quality and focusing on the daily activities.

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Conflict of Interest

The authors declare no conflict of interest.

References

1. Lobbezoo F, Ahlberg J, Glaros AG, Kato T, Koyano K, Lavigne GJ, et al. Bruxism defined and graded: An international consensus. J Oral Rehabil. 2013;40:2-4.
2. Ahlberg J, Lobbezoo F, Ahlberg K, Manfredini D, Hublin C, Sinisalo J, et al. Self-reported bruxism mirrors anxiety and stress in adults. Med Oral Patol Oral Cir Bucal. 2013;18:e7-11.
3. Manfredini D, Arreghini A, Lombardo L, Visentin A, Cerea S, Castroflorio T, et al. Assessment of anxiety and coping features in bruxers: A portable electromyographic and electrocardiographic study. J Oral Facial Pain Headache. 2016;30:249-254.
4. Cavallo P, Carpinelli L, Savarese G. Perceived stress and bruxism in university students. BMC Res Notes. 2016;9:1-6.
5. Ribeiro MB, Manfredini D, Tavares-Silva C, Costa L, Luiz RR, Paiva S, et al. Association of possible sleep bruxism in children with different chronotype profiles and sleep characteristics. Chronobiol Int. 2018;35:633-642.
6. Vitale JA, Weydahl A. Chronotype, physical activity, and sport performance: A systematic review. Sports Med. 2017;47:1859-1868.
7. Adan A, Archer SN, Hidalgo MP, Di Milia L, Natale V, Randler C. Circadian typology: A comprehensive review. Chronobiology Int. 2012;29:1153-1175.
8. Burgess HJ, Fogg LF. Individual differences in the amount and timing of salivary melatonin secretion. PLoS One. 2008;3:e3055.
9. Kivelä L, Papadopoulos MR, Antypa N. Chronotype and Psychiatric Disorders. Vol. 4, Curr Sleep Med Rep. 2018;4:94-103.
10. Roenneberg T, Kuehnle T, Juda M, Kantermann T, Allebrandt K, Gordijn M, et al. Epidemiology of the human circadian clock. Vol. 11, Sleep Med Rev. 2007;11:429-438.
11. 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;36:1558-1569.
12. Beşoluk Ş, Önder I, Deveci I. Morningness-eveningness preferences and academic achievement of university students. Chronobiol Int. 2011;28:118-125.
13. Haraszti RÁ, Ella K, Gyöngyösi N, Roenneberg T, Káldi K. Social jetlag negatively correlates with academic performance in undergraduates. Chronobiol Int. 2014;31:603-612.
14. Serra-Negra JM, Lobbezoo F, Martins CC, Stellini E, Manfredini D. Prevalence of sleep bruxism and awake bruxism in different chronotype profiles: Hypothesis of an association. Med Hypotheses. 2017;101:55-58.
15. Serra-Negra JM, Lobbezoo F, Correa-Faria P, Lombardo L , Siciliani G, Stellini E, Manfredini D. Relationship of self-reported sleep bruxism and awake bruxism with chronotype profiles in Italian dental students. Cranio. 2019;37:147-152.
16. Paesani DA, Lobbezoo F, Gelos C, Guarda-Nardini L, Ahlberg J, Manfredini D. Correlation between self-reported and clinically based diagnoses of bruxism in temporomandibular disorders patients. J Oral Rehabil. 2013;40:803–809.
17. Horne JA, Ostberg O. A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. Int J Chronobiol. 1976;4:97-110.

18. 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;45:837-844.
19. Pündük Z, Gür H, Ercan I. Sabahçıl-akşamcıl anketi Türkçe uyarlamasında güvenilirlik çalışması. Türk Psikiyatri Dergisi. 2005; 16:40-45.
20. Okeson JP. Bell's orofacial pains: the clinical management of orofacial pain. 6th edition. Chicago, ILL: Quintessence Publishing Company; 2005.
21. Serra-Negra JM, Scarpelli AC, Tirsa-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;25:241-247.
22. Quadri MFA, Mahnashi A, Al Almutahhir 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.
23. Aguiar SO, Prado IM, Silveira KSR, Abreu LG, Auad SM, Paiva SM, et al. Possible sleep bruxism, circadian preference, and sleep-related characteristics and behaviors among dental students. Cranio. 2019;37:389-394.
24. Yıldırım B, Kırarslan Karagoz O, Tekeli Simsek A, Koca C, Cicek MF. Associations between self-reported bruxism, sleep quality, and psychological status among dental students in Turkey. Cranio.2021;1:1-6.
25. Manfredini D, Winocur E, Guarda-Nardini L, Paesani D, Lobbezoo F. Epidemiology of bruxism in adults: a systematic review of the literature. J Orofac Pain. 2013;27:99-110.
26. Korczak AL, Martynhak BJ, Pedrazzoli M, Brito AF, Louzada,FM. Influence of chronotype and social zeitgebers on sleep/wake patterns. Braz J Med Biol Res. 2008;41:914-919.
27. S 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.