

Factors influencing self-reported tooth clenching/grinding in dental patients

Fatores associados ao apertamento e ao ranger de dentes autodeclarados em pacientes odontológicos

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ABSTRACT

Objective: This study evaluates the prevalence of self-reported tooth clenching and grinding among dental school patients and explores its associations with demographic and clinical factors. **Material and Methods:** Data from 14,643 patients at the University of Iowa College of Dentistry were analyzed. Descriptive statistics summarized demographic and clinical characteristics. Bivariate analyses, followed by multivariable logistic regression, were conducted to identify significant factors associated with self-reported clenching/grinding. **Results:** Of the participants, 54% reported tooth clenching/grinding. Significant factors associated with tooth clenching/grinding included age, gender, race/ethnicity, type of insurance, number of daily medications, substance abuse, and mental health disorders. Specifically, male participants reported 64% higher odds of experiencing self-reported tooth clenching/grinding compared to females. The prevalence of self-reported tooth clenching/grinding was also higher among those with substance abuse and mental health disorders, but the effects were smaller. **Conclusion:** A high proportion of dental school patients self-reported tooth clenching/grinding.

KEYWORDS

Bruxism; Temporo-mandibular disorders; Tooth clenching; Tooth grinding, Tooth wear.

RESUMO

Objetivo: Este estudo investigou a prevalência do apertamento e do ranger de dentes autodeclarados entre pacientes atendidos na Faculdade de Odontologia da Universidade de Iowa, bem como suas associações com fatores demográficos e clínicos. **Material e Métodos:** Foram analisados dados de 14.643 pacientes por meio de estatísticas descritivas, análises bivariadas e regressão logística multivariada. **Resultados:** Dos participantes, 54% relataram episódios de bruxismo (apertamento/ranger de dentes). Fatores significativamente associados ao apertamento e do ranger de dentes autodeclarados incluíam idade, sexo, raça/etnia, tipo de plano de saúde, número de medicamentos de uso diário, uso de substâncias e transtornos mentais. Homens apresentaram uma chance 64% maior de relatar apertamento e do ranger de dentes autodeclarados em comparação às mulheres. A prevalência também foi mais elevada entre indivíduos com histórico de uso de substâncias e transtornos psiquiátricos, embora com menor magnitude de efeito. Os resultados sugerem a necessidade de atenção clínica multidisciplinar. **Conclusão:** Uma proporção elevada de pacientes atendidos em uma Faculdade de Odontologia reportaram apertar e ranger de dentes.

PALAVRAS-CHAVE

Bruxismo; Desordem temporo-mandibular; Apertamento dos dentes; Ranger de dentes; Desgaste dentário.

INTRODUCTION

Bruxism has been previously defined as an oral habit involving involuntary rhythmic or spasmodic gnashing, grinding, or clenching of teeth, outside of chewing movements of the mandible, potentially leading to occlusal trauma [1,2]. A more recent definition described unspecified bruxism as repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or bracing or thrusting of the mandible. Bruxism manifests in two distinct circadian forms: sleep bruxism, and awake bruxism [3,4]. Sleep bruxism is considered a masticatory muscle activity during sleep that is characterized as rhythmic (phasic) or non-rhythmic (tonic) and is not a movement disorder or a sleep disorder, and Awake bruxism is a masticatory muscle activity during wakefulness that is characterized by repetitive or sustained tooth contact and/or by bracing or thrusting of the mandible and is not a movement disorder [4]. While a certain amount of bruxism activity may be physiological, additional bruxism could be associated with, or indicative of, an underlying condition or disorder. Bruxism may be harmless or may have negative clinical consequences [5].

Negative consequences of bruxism encompass a wide range of issues, including severe tooth wear that can lead to a loss of vertical dimension of occlusion, tooth fractures, restoration fractures, and temporomandibular disorders [6-8]. In fact, bruxism have been reported as being among the most important factors associated with the development and worsening of temporomandibular disorders [9], which in turn are associated with intense pain and suffering in a significant proportion of the population [10]. Despite its clinical significance, the precise etiologic mechanisms of bruxism remain unknown [1]. However, multiple factors have been associated with unspecified bruxism, including psychosocial factors such as anxiety, stress, mood disturbances, distress, nervousness, and depression [11]. Other contributing factors include caffeine consumption, smoking, alcohol use, methamphetamine, heroin, piperazine, sleep disturbances, medications, and genetic predispositions, among others [1,12,13]. Understanding the multifactorial nature of bruxism might help understanding why its prevalence varies in different populations. These etiological factors might contribute to the variability observed in bruxism prevalence rates across various demographic groups [14].

The prevalence of sleep bruxism (SB) has been reported to be between 19% and 43%, averaging 21%. The prevalence of awake bruxism (AB) has been reported between 18% and 30%, averaging 23%. The global bruxism (sleep and awake) prevalence is 22.22% [14]. These variations in prevalence may also be attributed to differences in the analyzed samples and the diversity in methodology, particularly the diagnostic criteria used by various researchers. To address these discrepancies, a comprehensive and standardized tool has recently been developed for the assessment of bruxism [15]. While not yet fully adopted in clinical practice [16], this tool offers valuable guidance through multiple items distributed in its two axes: Axis A assesses bruxism status and consequences, while Axis B evaluates risk factors, etiology, and comorbid conditions [15]. Commonly used diagnostic criteria for bruxism in clinical practice include parameters such as the presence of abnormal tooth wear, masticatory muscle hypertrophy, morning jaw muscle tenderness, symptoms related to temporo-mandibular disorders, and report of grinding sounds during sleep [17]. A recent study has emphasized the critical role of tooth grinding and clenching as screening tools for bruxism. The findings revealed a high sensitivity, with these indicators aiding in the diagnosis of bruxism in 80% of cases [18].

Given its significance as a screening tool, the question “Do you grind your teeth?” has been incorporated into the dental history questionnaire used in numerous practices. The primary objective of this study is to evaluate the prevalence of affirmative responses to this question among a large cohort of dental school patients, utilizing a retrospective analysis of electronic health records (EHR). Additionally, the study aims to investigate potential correlations between the frequency of positive responses and other variables available within the same database.

MATERIALS AND METHODS

Following the receipt of a non-human subject research determination from the University of Iowa Institutional Review Board (202503055), unidentified data were extracted from the electronic health records (EHR) database for all 68,304 active (as for March 5, 2025) patients at the University of Iowa College of Dentistry and Dental Clinics. Of these, 14,643 patients have answered the question

“Do you clench, brux, or grind your teeth?” and were included in the subsequent analysis. Table I presents the distribution of tooth grinding status across four age groups.

Descriptive statistics were employed to summarize the demographic and clinical characteristics of the patients. Categorical variables were presented as frequencies and percentages, while continuous variables were described using means, standard deviations, medians, and interquartile ranges (IQRs). Bivariate analyses were conducted to examine associations between self-reported tooth clenching/grinding status (yes vs. no) and selected demographic and clinical characteristics. Depending on the data type and distribution, Pearson’s chi-square test was utilized for categorical variables, and the nonparametric Wilcoxon rank-sum test was applied to continuous variables. Additionally, the normality assumption for continuous variables was evaluated using the Shapiro-Wilk test to justify the use of nonparametric tests when appropriate.

To identify significant factors associated with self-reported tooth clenching/grinding, a multivariable logistic regression analysis was performed. Odds ratios (ORs) and 95% confidence intervals (95% CIs) were calculated for each factor. The model’s goodness-of-fit was assessed using the Hosmer-Lemeshow test to ensure the model adequately fit the data. Multicollinearity among independent variables was evaluated using variance inflation factors (VIF) and tolerance values (TIF), and selected two-way interactions were also assessed.

All statistical tests were conducted at a significance level of 0.05. Analyses were performed using the SAS® System, version 9.4 (SAS Institute Inc., Cary, NC, USA).

RESULTS

Table II presents the demographic characteristics of the participants and their associations with self-reported tooth clenching/grinding. The analysis included 14,643 participants, of whom 7,910 (54.0%) reported tooth clenching/grinding, while 6,733 (46.0%) did not. The majority of participants identified as white (86.2%), and 62.2% were female. The average age of participants was 36.1 ± 20.5 years, with a median age of 33 years (IQR: 20 - 53). Additionally, most participants (75.2%) were covered by dental insurance. The bivariate analysis indicated that all four demographic characteristics available in the EHR (i.e., age, gender, race/ethnicity, and type of insurance) were significantly associated with the presence of tooth grinding.

Table III presents the clinical characteristics of the participants and their association with the presence of self-reported tooth clenching/grinding. Among all participants, 33.9% were classified as obese, and the average number of daily medications taken was 4.3 ± 5.9 , with a median of 2 (IQR: 0 - 6). Tobacco use was reported by 40.3% of participants, while 44.1% and 17.3% reported histories of alcohol and drug addiction, respectively. Mental health issues were noted in 48.5% of the sample, and 23.2% had neurological conditions. Additionally, 28.3% of participants reported breathing or lung problems, 3.2% had eating disorders, 28.1% had diabetes, and 16.3% experienced muscle disorders. The bivariate analysis revealed that five out of eleven selected clinical characteristics—BMI, number of daily medications, alcohol addiction, breathing or lung problems, and diabetes status—were significantly associated with the presence of tooth grinding ($p < 0.05$ in each instance).

Table I - Frequency distribution of self-reported tooth clenching/grinding in the original dataset by age groups (N=68,304)

Age Group	Do you clench, brux, or grind your teeth?			Total
	Yes n (%)	No n (%)	Missing n (%)	
<=6 (Preschoolers)	659 (16.6%)	272 (6.9%)	3,026 (76.5%)	3,957 (5.8%)
7 to 18 (School age)	1,236 (7.3%)	934 (5.6%)	14,702 (87.1%)	16,872 (24.7%)
19-64 (Adults)	5,162 (14.8%)	4,782 (13.7%)	24,981 (71.5%)	34,925 (51.1%)
>=65 (Older Adults)	853 (6.8%)	745 (5.9%)	10,952 (87.3%)	12,550 (18.4%)
Total	7,910 (11.6%)	6,733 (9.9%)	53,661 (78.5%)	68,304 (100.0%)

Table II - Demographic characteristics of participants and their association with self-reported tooth clenching/grinding

Characteristics	All Participants (N=14,643) n (%)	Do you clench, brux, or grind your teeth?		
		Yes (n=7,910) n (%)	No (n=6,733) n (%)	p-value
Age (years)				
Mean ± SD	36.1±20.5	35.7±21.0	36.5±19.8	0.007*
Median (Range)	33 (1-97)	33 (1-97)	32 (1-92)	
Age Group				
<=6 years (Preschoolers)	931 (6.4%)	659 (8.3%)	272 (4.0%)	<0.001*
7 to 18 years (School age)	2,170 (14.8%)	1,236 (15.6%)	934 (13.9%)	
19-64 years (Adults)	9,944 (67.9%)	5,162 (65.3%)	4,782 (71.0%)	
>=65 years (Older Adults)	1,598 (10.9%)	853 (10.8%)	745 (11.1%)	
Gender				
Female	9,063 (62.2%)	4,572 (58.1%)	4,491 (66.9%)	<0.001*
Male	5,518 (37.8%)	3,300 (41.9%)	2,218 (33.1%)	
Race-Ethnicity				
White	1,790 (17.1%)	999 (17.6%)	791 (16.5%)	0.139
Non-White	8,702 (82.9%)	4,690 (82.4%)	4,012 (83.5%)	
Types of insurance				
Self-pay	3,629 (24.8%)	1,859 (23.5%)	1,770 (26.3%)	<0.001*
Non-self-pay (AG+DWP+INS+ XIX)	11,014 (75.2%)	6,051 (76.5%)	4,963 (73.7%)	

Note: Due to missing data, not all variables add up to the total sample size of 14,643. * means statistically significant difference

Table III - Clinical characteristics of participants and their association with self-reported tooth clenching/grinding

Characteristics	All Participants (N=14,643) n (%)	Do you clench, brux, or grind your teeth?			p-value
		Yes (n=7,910) n (%)	No (n=6,733) n (%)		
BMI (kg/m2)					
Mean ± SD	28.3±8.8	28.3±9.3	28.2±8.2	0.041*	
Median	26.6	26.9	26.6		
BMI Level (kg/m2)					
<30 (Non-obesity)	6,983 (66.1%)	3,593 (65.2%)	3,390 (67.1%)	0.041*	
≥30 (Obesity)	3,580 (33.9%)	1,917 (34.8%)	1,663 (32.9%)		
Number of daily medications					
Mean year ±SD	4.3±5.9	4.5±6.2	4.0±5.6	0.001*	
Median	2	2	2		
Number of daily medications					
0	4,263 (29.1%)	2,260 (28.6%)	2,003 (29.7%)	0.001*	
1-2	3,535 (24.1%)	1,886 (23.8%)	1,649 (24.5%)		
3-8	4,488 (30.7%)	2,390 (30.2%)	2,098 (31.2%)		
9+	2,357 (16.1%)	1,374 (17.4%)	983 (14.6%)		
Tobacco use					
Yes	4,325 (40.3%)	2,366 (40.8%)	1,959 (39.6%)	0.210	
No	6,418 (59.7%)	3,432 (59.2%)	2,986 (60.4%)		

*Statistically significant difference was observed between the two groups, as determined by either the chi-square test or the Wilcoxon rank-sum test (p<0.05).

Note: Due to missing data, not all variables add up to the total sample size of 14,643.

Table III - Continued...

Characteristics	All Participants (N=14,643) n (%)	Do you clench, brux, or grind your teeth?		
		Yes (n=7,910) n (%)	No (n=6,733) n (%)	p-value
Alcohol addiction				
Yes	4,518 (44.1%)	2,320 (42.5%)	2,198 (45.8%)	<0.001*
No	5,739 (55.9%)	3,143 (57.5%)	2,596 (54.2%)	
Drug addiction				
Yes	1,849 (17.3%)	998 (17.3%)	851 (17.2%)	0.958
No	8,865 (82.7%)	4,779 (82.7%)	4,086 (82.8%)	
Breathing or lung problems				
Yes	3,347 (28.3%)	1,963 (29.7%)	1,384 (26.6%)	<0.001*
No	8,465 (71.7%)	4,646 (70.3%)	3,819 (73.4%)	
Eating disorder				
Yes	379 (3.2%)	216 (3.3%)	163 (3.2%)	0.670
No	11,344 (96.8%)	6,340 (96.7%)	5,004 (96.8%)	
Muscle disorder				
Yes	1,921 (16.3%)	1,092 (16.6%)	829 (16.0%)	0.375
No	9,839 (83.7%)	5,485 (83.4%)	4,354 (84.0%)	
Neurological problems				
Yes	2,730 (23.2%)	1,571 (23.8%)	1,159 (22.3%)	0.052
No	9,053 (76.8%)	5,019 (76.2%)	4,034 (77.7%)	
Mental Health Problems				
Yes	5,751 (48.5%)	3,202 (48.2%)	2,549 (48.8%)	0.559
No	6,111 (51.5%)	3,435 (51.8%)	2,676 (51.2%)	
Presence of diabetes				
Yes	974 (28.1%)	590 (26.7%)	384 (30.6%)	0.014*
No	2,489 (71.9%)	1,619 (73.3%)	870 (69.4%)	

*Statistically significant difference was observed between the two groups, as determined by either the chi-square test or the Wilcoxon rank-sum test ($p < 0.05$).

Note: Due to missing data, not all variables add up to the total sample size of 14,643.

In the multivariable logistic regression analysis, self-reported tooth clenching/grinding status (1 = yes, 0 = no) served as the outcome variable. Fourteen independent variables were included in the analysis: gender, age, race/ethnicity, type of insurance coverage, number of daily medications, obesity status (i.e., BMI level), tobacco use, alcohol addiction, drug addiction, breathing or lung problems, eating disorders, muscle disorders, neurological problems, and mental health issues. Although diabetes was included in the descriptive and bivariate analyses (reported in Table III), it was excluded from the multivariable logistic regression analysis due to a high proportion of missing data (76.4%).

Table IV presents the results of a multivariable logistic regression analysis predicting the odds of self-reported tooth clenching/grinding, with factors adjusted for other variables in the model. The final model identified seven significant predictors: age (OR=1.00, 95% CI: 1.00-1.01; $p=0.028$), gender (OR=1.64, 95% CI: 1.47-1.84; $p < 0.001$), race-ethnicity (OR=1.35, 95% CI: 1.14-1.58; $p < 0.001$), type of insurance (OR=1.16, 95% CI: 1.02-1.31; $p=0.021$), number of daily medications (OR=1.02, 95% CI: 1.01-1.03; $p < 0.001$), drug addiction (OR=1.19, 95% CI: 1.02-1.39; $p=0.025$), and mental health problems (OR=1.13, 95% CI: 1.00-1.27; $p=0.047$).

Table IV - Logistic regression predicting odds of clenching/grinding behavior significant factors

Variables	OR (95% CI)*	P-Value
Age (per year)	1.00 (1.00-1.01)	0.028*
	1.004 (1.000-1.008)	
Gender (Male vs. Female)	1.64 (1.47-1.84)	<0.001**
Race-Ethnicity (Non-White vs. White)	1.35 (1.14-1.58)	<0.001**
Insurance (Non-self-pay vs. Self-pay)	1.16 (1.02-1.31)	0.021**
BMI (kg/m2) (≥ 30 Obesity vs. <30 Non-obesity)	0.99 (0.88-1.11)	0.887
Number of daily medications taken	1.02 (1.01-1.03)	<0.001**
Tobacco use (Yes vs. No)	1.08 (0.96-1.21)	0.192
Alcohol addiction (Yes vs. No)	1.10 (0.99-1.23)	0.072
Drug addiction (Yes vs. No)	1.19 (1.02-1.39)	0.025**
Breathing or lung problem (Yes vs. No)	1.09 (0.96-1.23)	0.201
Eating disorder (Yes vs. No)	1.17 (0.86-1.59)	0.323
Muscle disorder (Yes vs. No)	1.06 (0.91-1.24)	0.440
Neurological problem (Yes vs. No)	1.06 (0.93-1.22)	0.388
Mental Health Problem (Yes vs. No)	1.13 (1.00-1.27)	0.047**

*OR, odds ratio; CI, 95% Wald Confidence Limits; **Statistically significantly associated with the outcome ($p < 0.05$).

Note: The Hosmer-Lemeshow Goodness of Fit test statistic=5.24 with $df=8$, $p=0.732$.

Multicollinearity among fourteen independent variables were examined, and no multicollinearity was detected. An interaction between age and the number of daily medications was also explored, but no significant interaction on self-reported tooth clenching/grinding was found. Additionally, the Hosmer-Lemeshow goodness-of-fit test statistic was 5.24 with 8 degrees of freedom ($p = 0.732$), indicating that the final model provides a good fit to the data.

DISCUSSION

Despite being recognized as an important screening tool for bruxism [18], which has significant oral health implications [6-9], the question regarding teeth clenching/grinding was left unanswered by the majority of patients whose electronic health records were reviewed for this study. Inaccuracies in patient-reported dental health records have been previously documented and pose significant patient safety concerns [19]. These inaccuracies are frequently cited as a rationale for implementing integrated health records, which could help identify inconsistencies and enhance patient safety [20].

Among the 14,643 patients who responded to the question about teeth grinding, 54% reported clenching/grinding their teeth. Given the reported prevalence of bruxism, which reached a maximum frequency of 40.6% in children [21]

and 31.4% in adults, ¹³ this high percentage appears to corroborate previous findings [18] showing that, despite its high sensitivity, the teeth grinding question also yields a significant number of false positives. No directly comparable studies using the same methodological approach and question were found. However, a similar retrospective study was recently conducted in Finland with a sample of 1,962 subjects [22]. This Finnish study employed a slightly different question and presented an overall prevalence of self-reported teeth grinding at 39.6%, with a sex distribution of 34.0% in men and 44.5% in women, compared to 41.9% and 58.1% in the present study. Although the Finnish study is also retrospective and employed a similar question, its results are not directly comparable to ours due to its focus on an adult cohort born in 1966. In contrast, our sample encompasses a much broader age range.

The logistic regression model identified seven significant factors associated with self-reported tooth clenching/grinding: age, gender, race-ethnicity, type of insurance [which can be seen in this study as a surrogate for socio-economic status], number of daily medications, substance abuse, and mental health disorders. These findings underscore the complex nature of tooth clenching/grinding, with its occurrence correlated with a variety of demographic, health, and behavioral factors [1].

These correlations bear some resemblance to factors previously reported as being associated with bruxism [1,11-13]. Of particular interest was the correlation with gender, where male participants exhibited 1.64 times odds of experiencing tooth grinding compared to female participants. This finding aligns with the reported higher prevalence of bruxism among men [23]. Similarly, the observed associations between self-reported tooth grinding and the number of medications taken, substance abuse, and mental health disorders also appear to be consistent with similar correlations previously noted for bruxism [1,11-13,24]. These observations warrant further investigation. Nevertheless, it is important to note that, although statistically significant, these correlations appear to have relatively small effects, which may not reach the threshold to be considered of clinical significance.

This study has several important limitations. The most significant concerns representativeness, as the data was drawn from patients at a single institution and may not fully reflect the broader population. This convenience sampling may have introduced some bias, potentially favoring individuals who are more aware of their dental conditions and needs. The regional scope of the sample may also limit the generalizability of the findings to other populations or settings. Other limitations include data quality, given that EHR data can be subject to inaccuracies, missing information, and inconsistencies in documentation; and selection bias, as certain types of patients are more likely to have complete records or respond to specific questions. Additionally, it is crucial to note that this study is correlational in nature and does not imply causation.

Despite these limitations, the study's large sample size provides additional empirical evidence supporting previously reported associations between teeth clenching/grinding and various demographic, health, and behavioral factors. Future research should aim to expand the sample size to achieve national representativeness and explore causality using different methodologies, such as longitudinal cohort studies. It may also be valuable to replicate this methodology in a private practice setting to compare self-reported tooth grinding between academic and non-academic environments.

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Author's Contributions

LM, FQ: Conceptualization, Data Curation, Formal Analysis, Funding Acquisition, Investigation, Methodology, Project Administration, Resources, Software, Supervision, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing.

Conflict of Interest

The authors have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

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Regulatory Statement

This study was conducted in accordance with all the provisions of the local human subjects oversight committee guidelines and policies of: The University of Iowa Review Board. The approval code for this study is: 202503055.

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