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The relationship between personality traits, dental anxiety, and self-reported bruxism among health professional students: A cross-sectional study

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ABSTRACT

Introduction: Dental anxiety proves to be the hurdle for dental care, making self-awareness among the population more crucial. Similarly, bruxism has also been reported to be due to stress, but the pathophysiology has not been clearly understood. The current research aims to explore the association of personality traits with bruxism and dental anxiety among health professional students.

Methods: A total of 120 dental and medical students were included in our study. All the participants received three different questionnaires: The "modified dental anxiety scale" questionnaire to measure dental anxiety, the "modified bruxism assessment questionnaire" to assess the presence of bruxism, and "the big five inventory" to identify the personality trait. The collected data were statistically evaluated with significance at $p < 0.05$.

Results: Comparison of dental anxiety among professional students showed significantly ($p < 0.001$) higher anxiety among medical than dental students. Analyzing the prevalence of bruxism revealed awake bruxism to be significantly ($p < 0.05$) higher in males than females. On analyzing the relation between personality traits and dental anxiety, a positive correlation was seen between the neuroticism type of personality ($r = 0.193$, $p < 0.05$) and dental anxiety, especially in females.

Conclusion: The prevalence of self-reported awake bruxism was higher among male students, indicating the necessity for more investigation to ascertain the influence of various psychological factors. The correlation between dental anxiety and neuroticism type of personality trait points out the importance of identifying these individuals in a clinical setting and implementing strategies to reduce anxiety and enhance motivation for treatment.

Keywords: Dental anxiety; personality traits; neuroticism; self-reported bruxism

INTRODUCTION

Bruxism is the clenching or grinding of the teeth during awakeness or sleep due to repetitive muscle activity (1). It is estimated to account for about 6-20% of the general population; children under 11 years of age are affected by around 14-20%, and the least common are older adults affected at 5-8% (1). International consensus on a concise and effective definition of bruxism was achieved in 2013. It is defined as "repetitive masticatory muscle activity, that is, characterized by teeth clenching, grinding, bracing, or thrusting, and, that is, classified as either sleep bruxism (SB) or awake bruxism depending on its circadian phenotype" (2,3). Daytime clenching affects about 20% of the general population (4), as compared to the prevalence of SB, which occurs only in approximately 8% (5). Although both types of parafunction are often recognized as unique clinical findings, there is limited understanding regarding their distinctions (6). Bruxism is thought to be triggered by three different groups of factors: First, biological causes such as abnormal neurotransmissions and arousal of cortisol, as well as genetic defects; second, psychological factors such as an individual with elevated aggression, hyperactivity, anxiety, and stress; and finally, the trending causes include an exogenous group of factors such as drugs, caffeine, nicotine, alcohol, and medicines (2,7). The clinical diagnosis of bruxism is crucial, which involves two approaches: Non-instrumental and instrumental (8). Non-instrumental methods encompass self-report measures such as questionnaires and oral histories, as well as clinical inspection techniques that can assess both awake and sleep bruxism (9). Self-reported assessment

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of bruxism during awake or sleep is still the most common technique used both in research and clinical practice (3). Soft-tissue abnormalities such as hypertrophy of masticatory muscles, indentation on the lip or tongue, and the existence of a linea alba on the buccal mucosa are common clinical signs indicative of either awake and sleep bruxism or both (3). "Bruxofacets," the tooth wear occurring in an eccentric closing position, might also be considered strong evidence for the presence of bruxism (10). However, the worn tooth surface should not be solely considered a definitive sign of ongoing bruxism. It is crucial to assess additional clinical indicators alongside it for a more accurate evaluation (10). Instrumental approaches employed for the diagnosis include intraoral devices, electromyography, and polysomnography (10).

Dental fear or anxiety is another condition closely associated with stress. Although dental anxiety is often seen in children, research suggests that it declines with age (11). Among adults, 5-19% of people worldwide report having dental anxiety, and they express it either verbally or through their gestures during dental procedures. Such emotional states can have a deleterious effect on oral health and be a hindrance during dental treatment (12). Individuals with excessive fear of dental care and high motivation for control express gagging as a coping mechanism during dental treatment due to stress and anxiety (12). Although fear and anxiety are multifactorial, psychological aspects such as personality, a dread of pain, traumatic dental incidents as a kid, and the influence of peers or family members who are dentally anxious can induce dental anxiety in individuals (13). The occurrence and course of dental anxiety are strongly associated with certain personality factors. An association of neuroticism with bruxism is observed due to their usual tendency toward withdrawal, anxiety, and labile and tensed behavior (14). Personality traits, for instance, neuroticism and extroversion, are reported to be associated with dental anxiety, and these individuals are also more likely to be bruxers (14). It is crucial to evaluate the distinctive psychological characteristics of patients to rule out the specific cause of dental anxiety and self-reported bruxism. Definite planning and management of these patients through precautions and counseling can improve patient care and reduce hindrances during dental treatment. This study investigated the relationship between personality traits, bruxism, and dental anxiety among dental and medical students to understand if oral health awareness and a basic understanding of dental procedures among professional students can have an influence on the prevalence of dental fear or anxiety.

METHODS

All questionnaires for the assessment of bruxism, personality, and dental anxiety were distributed among 350 on-campus 1st- and 2nd-year Malaysian dental and medical students enrolled in the twining program at the Melaka Manipal Medical College, Manipal, Karnataka, India. A total of 120 responses were received, which was more than the minimum sample size required for the study, considering the expected prevalence of dental anxiety and bruxism as previously reported (1,15) with a 95% confidence level and a 5% margin of error. Before the research, ethical permission was obtained from the Institutional Ethics Committee (IEC: 225/2021). Every student provided their informed consent before responding to the questionnaire. The inclusion criteria consisted of volunteers who expressed their willingness to participate and respond to the questionnaire. Students who were taking anxiolytic or antidepressant medications were excluded from the study. Each student was given a questionnaire consisting of 44 items called "the big five inventory" (BFI) (16), by which their type of personality was identified. The "modified dental anxiety scale" (MDAS) (17) was used to score the dental anxiety level, and the "modified bruxism assessment questionnaire" (MBAQ) (12) was used to assess the existence of bruxism. The questionnaire was uploaded onto the online survey platform (Google Form), and the link was shared with the students. The responses were downloaded and analyzed.

The BFI (16) consists of 44 items that were used to assess a person's personality traits. It utilizes five factors, that include (introversion vs. extraversion), (antagonism vs. agreeableness), (lack of direction vs. conscientiousness), (emotional stability vs. neuroticism), and (openness vs. closedness to experience). Scorings are determined on a scale of 1–5, indicating an increase in compliance to agreeability. Each question is associated with a specific personality trait, and the personality of the subject is based on their scoring on the questions (Appendix 1).

BFI scoring (items with a "R" indicating reverse scoring): Conscientiousness: 3, 8R, 13, 18R, 23R, 28, 33, 38, and 43R; Agreeableness: 2R, 7, 12R, 17, 22, 27R, 32, 37R, and 42; Openness: 5, 10, 15, 20, 25, 30, 35R, 40, 41R, and 44; Neuroticism: 4, 9R, 14, 19, 24R, 29, 34R, and 39; and Extraversion: 1, 6R, 11, 16, 21R, 26, 31R, and 36.

MDAS was used to assess dental anxiety (17). It consisted of items in which participants were required to score their level of fear on a 5-point scale regarding five different dental scenarios. The total scores for dental anxiety ranged from 5 to 25 and higher scores correspond to greater degrees of anxiety levels. Dental anxiety levels were further categorized as less anxious (total score 5-9), moderately anxious (total score 10-18), and highly anxious or suffering from a dental phobia (≥19 total scores) (18) (Appendix 1).

MBAQ was used for assessing sleep and awake bruxism, which was modified from the suggestions of earlier studies by Winocur et al. (12), Pintado et al. (19), and Lavigne et al. (20). The questionnaire was based on the diagnostic criteria of the American Academy of Sleep Medicine (2005). The respondent's awareness was the only factor used to diagnose awake bruxism ("Have you ever been aware of clenching or grinding your teeth during wakefulness in the past 6 months?" yes/no). If the response of the subject was positive to this question, he or she was identified as suffering from awake bruxism (Appendix 1).

To assess SB, if a respondent answered affirmatively to any of the first two questions (Question 1 and/or 2) and at least one of the three symptoms stated in Question 3, they were considered to have active SB based on their self-report (Appendix 1).

The data were analyzed statistically using the Statistical Package for Social Sciences version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were performed for the calculation of percentages, means, and standard

deviations. Comparisons between different groups were done using Student's t-tests, Chi-square tests, and one-way ANOVA. The linear relationship between personality and dental anxiety was studied using Pearson coefficients. The level of significance $p < 0.05$ was considered in this study.

RESULTS

Out of 120 students who responded to the questionnaire, 40 (33.3%) were males and 80 (66.7%) were females with an average age of 21.25 years.

Table 1 summarizes the mean values and standard deviation of the study variables. There was no discernible disparity in anxiety levels observed between both genders. Both male and female participants exhibited increased levels of anxiety toward anesthesia, drilling, and waiting. However, there was no considerable difference observed between genders. According to the MDAS score, 41.6% (n = 50) of the patients were classified as having low levels of anxiety, 51.6% (n = 62) as having moderate levels of anxiety, and 6.66 (n = 8) as suffering from dental phobia. Furthermore, 61.2% (n = 38) of participants with moderate levels of anxiety and 75% (n = 6) of participants suffering from high anxiety or dental phobia were females, respectively (Table 1).

A higher number of males (27.5%) showed self-reported awake bruxism compared to females (11.25%), which was statistically significant ($p < 0.05$). However, self-reported SB was observed to be higher among females (25%) compared to males (22.5%), although this difference did not reach statistical significance (Table 1).

A significant difference ($p < 0.001$) in dental anxiety level was observed between the dental and medical students, as indicated in Table 2. The medical students were more anxious compared to dental students regarding dental treatment. It has been observed that dental and medical students exhibit higher levels of anxiety when it comes to dental procedures involving drilling and anesthesia. The prevalence of self-reported bruxism was found to be higher among dental students in comparison to medical students. However, no significant difference was observed.

A significant positive correlation (r = 0.193, $p < 0.05$) was observed between the neuroticism personality trait and dental anxiety, as indicated in Table 3. In terms of gender correlation, a significant positive correlation was seen between neuroticism in females and dental anxiety (r = 0.203, $p < 0.05$).

The analysis of personality traits among individuals who do not engage in teeth grinding (non-bruxers) (62-6%), those who grind their teeth while awake (awake bruxers) (15-3%), and those who grind their teeth during sleep (sleep bruxers) (22.1%) did not yield any statistically significant correlations. No significant association was observed between bruxism and dental anxiety, as indicated in Table 4.

TABLE 1. Comparison of gender differences in bruxism and dental anxiety

Dental anxiety	MDAS item	Male	Female	*p*-value
	Anticipation	2±1.06	1.76±0.97	0.22
	Waiting	2.02±0.91	1.91±1.05	0.56
	Drilling	2.82±1.17	2.73±1.42	0.73
	Scaling	1.87±0.96	1.78±1.08	0.66
	Anesthesia	2.87±1.22	3.15±1.38	0.29
	Total	11.60±4.33	11.35±4.84	0.783
Bruxism	Parameter	Male n (%)	Female n (%)	*p*-value
	Awake bruxism	11 (27.5)	9 (11.25)	0.036*
	No awake bruxism	29 (72.5)	71 (88.75)	
	Sleep bruxism	10 (25)	18 (22.5)	0.93
	No sleep bruxism	30 (75)	62 (77.5)	

Significance *P*<0.05*, MDAS: Modified dental anxiety scale

TABLE 2. Comparison of bruxism and dental anxiety levels between dental and medical students

Dental anxiety	MDAS item	BDS	MBBS	*p*-value
	Anticipation	1.57±0.91	2.16±1.02	0.001*
	Waiting	1.72±0.90	2.22±1.07	0.0071*
	Drilling	2.37±1.30	3.24±1.22	0.0003**
	Scaling	1.51±0.86	2.18±1.13	0.0003**
	Anesthesia	2.78±1.24	3.38±1.37	0.0136*
	Total	9.98±4.21	13.20±4.60	0.000115**
Bruxism	Parameter	BDS	MBBS	*p*-value
	Awake bruxism	1.87±0.32	1.77±0.41	0.142
	Sleep bruxism	1.75±0.43	1.77±0.41	0.797

Significance *P*<0.05*, *P*<0.001**, MDAS: Modified dental anxiety scale

TABLE 3. Correlation between personality traits and dental anxiety using Pearson's correlation

Gender	Personality trait	r	*p*-value
Male (n=40)	Extroversion	−0.167	0.304
	Agreeableness	0.002	0.988
	Conscientiousness	−0.092	0.569
	Neuroticism	−0.052	0.746
	Openness	−0.138	0.39
Female (n=80)	Extroversion	−0.151	0.18
	Agreeableness	−0.088	0.434
	Conscientiousness	−0.068	0.548
	Neuroticism	0.293	0.0084*
	Openness	−0.0708	0.532
Total (n=120)	Extroversion	−0.158	0.085
	Agreeableness	−0.064	0.482
	Conscientiousness	−0.074	0.42
	Neuroticism	0.193	0.034*
	Openness	−0.093	0.308

Significance *P*<0.05*, *P*<0.001**

DISCUSSION

Bruxism results in various physical and biological consequences, such as abnormal tooth wear, muscle fatigue and pain, temporal headache, hypersensitivity, hypercementosis, temporomandibular joint pain, and disc displacement (21). Most self-reported bruxism, regardless of age and gender, has been associated with mental disorders, mostly related to attention-deficit hyperactivity disorder, Parkinson's disease, epilepsy, and sleep apnea (22). Although bruxism is not life-threatening, it may still have a damaging effect on one's quality of well-being, particularly if it results in dental issues (23). Stress is the main etiological factor and can be associated with other problems in dentistry, such as dental anxiety. It can be defined as "an exaggerated psychological

TABLE 4. Personality traits and the dental anxiety status in bruxers and non-bruxers

Traits	Non-bruxers (n=62.6%)		Awake bruxers (n=15.3%)		Sleep bruxers (n=22.1%)		*p*-value
Personality	Mean	SD	Mean	SD	Mean	SD	
Extroversion	24.15	4.85	25.25	5.10	24.60	4.38	0.64
Agreeableness	32.78	4.90	32.50	4.31	32.32	5.49	0.90
Conscientiousness	28.69	5.05	27.65	4.30	27.75	5.42	0.55
Neuroticism	25.34	5.21	25.85	5.51	24.92	4.75	0.83
Openness	32.44	4.70	34.10	4.42	33.78	4.77	0.22
Dental anxiety (MDAS)	11.39	4.66	10.85	5.38	11.85	4.96	0.77

SD: Standard deviation, MDAS: Modified dental anxiety scale

apprehensive response of an individual to perceived dental treatment and can affect people of any gender, age, or social status" (24). According to the World Health Organization, 15-20% of the population globally is affected by dental fear or anxiety, which results in the avoidance of indispensable dental treatment (15). The personality trait is one of the various factors determined to be causing dental anxiety. Identification of the type of personality before treatment can help the dentist in better treatment planning and help the patient overcome dental anxiety (25).

Psychological research has revealed a lower tolerance for pain at a given stimulus in women than men, resulting in higher levels of anxiety (lower thresholds) among women (26). Our research sought to compare dental anxiety prevalence among genders. However, the findings did not indicate a significant difference. On evaluating the individuals with moderate dental anxiety and those afflicted with dental phobia, it was observed that a significant majority of the participants were females. The possible explanation for the high prevalence of dental anxiety in females could be due to the tendency of women to openly acknowledge their fears more readily than men, their low pain tolerance, and the fact that they may experience neuroticism (18,25,27). When the dental anxiety prevalence among professional students was evaluated, it was seen that medical students' mean dental anxiety scores were much greater than those of dentistry students. This is consistent with earlier research by Gunjal et al. (28), and Jasser et al. (24), suggesting that inadequate exposure to dental education and awareness of dental procedures can be one of the predisposing factors for dental anxiety (28). Hence, there is a growing imperative for increased awareness of oral health and dental education within the medical community. Highlighting the significance and fundamentals of dental procedures can assist in mitigating dental anxiety (24,28).

Our study revealed a notable disparity in the awake bruxism prevalence between males and females. The results of our research showed a higher prevalence of awake bruxism in men, consistent with those of Levartovsky et al. (29). As compared to previous research (30), ours shows a lower frequency of awake bruxism among female students. Nevertheless, the female participants exhibited a slightly higher prevalence of SB. However, the results did not reach statistical significance, which aligns with the results reported by Cavallo et al. (30). The previous research and comprehensive reviews identify several psychological components that influence bruxism. These factors include stress, anxiety, depression, and certain other personality characteristics (31-33). Students' self-reported bruxism and academic stress have been shown to be positively correlated (34). It is important to highlight that psychological factors have a well-established impact on awake bruxism, although there is conflicting evidence on their link with SB. (31-33). In our study, we did not assess our student population's stress levels or other psychological aspects, which would have provided insight into the underlying causes for the elevated prevalence of bruxism among males. The same has been reported by Cavallo et al. with a positive association between stress and awake bruxism in males (30). When bruxism prevalence was compared between dental and medical students, no significant difference was seen between the two groups. However, dental students had a greater prevalence. The comparable prevalence of bruxism may potentially be associated with academic pressure (29,34).

As far as our awareness, this is one of the first studies evaluating the relationship between dental anxiety and personality traits and self-reported bruxism in dental and medical professional students. Analyzing the association can help in planning remedial measures to lower dental anxiety in students as well as in patients. However, previously, Montero et al. (14) carried out a similar study, but the subjects were not professional students. Assessing the relationship between personality and dental anxiety has revealed a significant positive correlation between the neuroticism type of personality and dental anxiety. Gender-based analysis showed a significant positive correlation between neuroticism and dental anxiety in females. Montero et al. (14), Saheer et al. (35), and Halonen et al. (13) reported similar findings with the association of personality traits with neuroticism, suggesting that the behavior of individuals is modulated by personality, especially in the neuroticism type of personality, emotional stress seems to be high with a high susceptibility to negative emotions (14). The presence of dental anxiety can potentially impact the relationship between the patient and the dentist. Inadequate oral health awareness and education can lead to patient apprehension and anxiety, ultimately resulting in suboptimal patient adherence. Consequently, this can impede effective patient management (35).

The possible association between bruxism and short-term signs of depression and anxiety as well as its link to mood disorders suggests that grinding teeth may also be connected to a person's way of experiencing unpleasant emotions (36). A significant association between bruxism and personality traits was not seen in the present study. Montero et al. (14) found a different result: There was a positive relationship between neuroticism and extraversion and the risk of

developing bruxism. This suggests that it is a multifactorial disorder with neurological deficits (37).

The present study has the limitation of including a higher number of female participants compared to males in the sample. This discrepancy was the result of a lower number of male students within the institution. However, as our study revealed higher dental anxiety among medical students, we recommend the need for oral health awareness and dental education among medical professionals. Emphasizing the importance and basics of dental procedures can help overcome dental anxiety.

CONCLUSION

The high prevalence of self-reported awake bruxism among male students emphasizes the necessity for additional research to ascertain the influence of various social and psychological factors in the development of these parafunctional habits. The association of dental anxiety with a neurotic type of personality highlights the need for recognizing such patients in clinical practice and planning measures for the alleviation of anxiety and motivation for treatment. Evaluating the anxiety level before initiating dental treatment can provide valuable insights into the patient's attitude and behavior toward dental procedures. This information can be used to develop effective strategies for managing patient anxiety.

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DECLARATION OF INTERESTS

Authors declare no conflict of interest.

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APPENDIX

APPENDIX 1. BIG FIVE INVENTORY

	I see myself as someone who …	Disagree Strongly (1)	Disagree A Little (2)	Neither Agree or Disagree (3)	Agree A Little (4)	Agree Strongly (5)
1	Is talkative					
2	Tends to find fault with others					
3	Does a thorough job					
4	Is depressed, blue					
5	Is original, comes up with new ideas					
6	Is reserved					
7	Is helpful & unselfish with others					
8	Can be somewhat careless					
9	Is relaxed, handles stress well					
10	Is curious about many different things					
11	Is full of energy					
12	Starts quarrels with others					
13	Is a reliable worker					
14	Can be tense					
15	Is ingenious, a deep thinker					
16	Generates a lot of enthusiasm					
17	Has a forgiving nature					
18	Tends to be disorganized					
19	Worries a lot					
20	Has an active imagination					
21	Tends to be quiet					
22	Is generally trusting					
23	Tends to be lazy					
24	Is emotionally stable, not easily upset					
25	Is inventive					
26	Has an assertive personality					
27	Can be cold and a loof					
28	Perseveres until the task is finished					
29	Can be moody					
30	Values artistic, aesthetic experiences					
31	Is somethimes shy, inhibited					
32	Is considerate & kind to almost everyone					
33	Does things efficiently					
34	Remains calm in tense situations					
35	Prefers work that is routine					
36	Is outgoing, sociable					
37	Is sometimes rude to others					
38	Makes plans & follows through with them					
39	Gets nervous easily					
40	Likes to reflect, play with ideas					
41	Has few artistic interests					
42	Likes to cooperate with others					
43	Is easily distracted					
44	Is sophisticated in art, music, or literature					

Bruxism assessment questionnaire

Diurnal Bruxism			
	Yes	No	Don't know
1. Have you been aware of clenching or grinding your teeth when awake over last 6 months?			
Nocturnal Bruxism			
1. Are you aware, or has anyone heard you, grinding your teeth frequently during sleep? (yes/no)			
2. Are you aware that your dentition is worn down more than it should be? (yes/no)			
Are you aware of any of the following symptoms upon awakening? (yes/no): The questionnaire refers to events during the past 6 months as follows:			
a. Sensation of fatigue, tightness or soreness of your jaw upon awakening?			
b. Feeling that your teeth are clenched or that your mouth is sore upon awakening?			
c. Aching of your temples upon awakening?			
d. (Difficulty in opening your mouth wide upon awakening?			
e. Feeling of tension in your jaw joint upon awakening and feeling as if you have to move your lower jaw to release it?			
f. Hearing or feeling a "click" in your jaw joint upon awakening that disappears afterwards?			

Modified dental anxiety scale

Questions	Not anxious (1)	Slightly anxious (2)	Fairly anxious (3)	Very anxious (4)	Extremely anxious (5)
1. If you went to your dentist for TREATMENT TOMORROW, how would you feel ?					
2. If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel ?					
3. If you were about to have your TEETH DRILLED, how would you feel ?					
4. If you were about to have your TEETH SCALED AND POLISHED, how would you feel ?					
5. If you were about to have a LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel ?					