



Evaluation of Dental Environment Stress and Dental Student' Characteristics

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Abstract

Background: Dentistry is a stressful profession. This stress is related to educational and clinical factors. This study assessed stress levels among dental students in clinical departments at Shahid Beheshti University of Medical Sciences and explored its association with personal characteristics.

Methods: In this cross-sectional study, 231 dental students from clinical semesters (7th to 12th) at Shahid Beheshti University of Medical Sciences were surveyed using three tools: a demographic questionnaire, the Dental Environment Stress (DES) questionnaire covering six domains of academic and clinical stress, and the neuroticism subscale of the Eysenck Personality Questionnaire. Data were analyzed using independent t-tests for binary variables, one-way ANOVA for multi-group comparisons, and Pearson correlation to assess the relationship between neuroticism and stress, with significance set at $p < 0.05$ in SPSS version 26.

Results: The mean total perceived stress score was 2.42 ± 0.41 on a 1–4 scale. The highest stress was reported in the domain of academic performance ($\text{mean} = 3.00 \pm 0.75$), while the lowest was in the “other factors” domain ($\text{mean} = 2.13 \pm 0.59$). The female students reported significantly higher total stress scores than males (80.51 ± 12.47 vs. 74.05 ± 13.72 ; $p < 0.001$). Fourth-year students exhibited the highest stress levels compared to other academic years ($p < 0.05$). A significant positive correlation was found between neuroticism scores and perceived stress ($r = 0.40$, $p < 0.001$). No significant relationship was observed between overall stress and marital status, age, systemic disease, or medication use ($p > 0.05$).

Conclusion: This study identified significant levels of stress among dental students, particularly in academic and clinical domains, with female and fourth-year students experiencing the highest levels. The strong correlation between neuroticism and perceived stress suggests the need for psychological support and stress management interventions tailored to student personality traits. Implementing targeted mental health programs and curriculum adjustments may help reduce stress and improve student well-being and academic performance.

Keywords: Dental students, Dental education, Psychological, Personality, Stress, Surveys and questionnaires

Introduction

Mental health is a critical determinant of societal dynamism and efficiency (1). The World Health Organization (WHO) defines health as a comprehensive state of physical, mental, and social well-being, extending beyond the mere absence of illness or infirmity (2). Mental illness results in suffering and constraints for a person; moreover, due to the stigma of mental illness, a person faces discrimination in performing their social activities (3,4). Stress is one of the most common psychiatric disorders (5,6). The term “stress” was first introduced by Hans Selye (7). Stress is now recognized as a major contributor to mental health issues. The results of studies suggest a significant relationship between the number of stressful events in life and the physical plus psychological health of a person (8,9). Among different groups in society, students experience higher levels of stress due to various factors (10). These include being away from family, participating in large and stressful classes, and carrying heavy course loads. Medical and dental students are more at risk of losing mental health than other students since they not only deal with the stressors of other students but also have their own concerns, including psychological pressures of the environment (hospitals, clinics, *etc.*), dealing with patients, and the possibility of contracting viral infections such as hepatitis and AIDS (11). As such, students are more at risk of losing their mental health than other students (12,13).

Previous studies have shown that dental students experience high levels of stress, especially during transitions between didactic, preclinical, and clinical phases, due to factors such as workload, examinations, and clinical responsibilities, indicating that dentistry is a psychologically demanding field (14,15). Studies have reported a relatively high prevalence of mental health issues among dentists, with stress-related conditions such as anxiety and depression being common concerns in the profession. It has also been reported that stress-related illnesses can lead to neuromuscular and temporomandibular problems among dentists, which may contribute to a higher rate of disability in the profession (16,17). Dental schools are widely recognized as one of the most stressful academic environments (18). Dental students face stress from both their academic studies

and their clinical work (19,20). Stress among dentists is reported to be three times that of ordinary people, and in general, the average stress among students of this field is higher than among students of other fields (20). Over time, high stress levels in students cause a decline in self-confidence, weakness in controlling the study process, and inability to compensate for clinical weaknesses, in response to which academic efficiency falls (21,22). On the other hand, students facing constant stress may adopt unhealthy coping mechanisms such as smoking, abuse of alcohol and drugs and medicines or actions such as suicide (23). Also, according to studies, students who are more stressed get poorer grades (24). As a result, the existence of areas contributing to stress in students will cause challenges in the education for professors, which will be detrimental to the educational system (18). Studies suggested emotional intelligence as a selection criterion for dental students (25). Personality is one of the factors that plays an important role in reducing or strengthening stressful factors, since personality results in a different perception of events (26). But new studies suggest the link between personality and the outcomes of major life events is complex and often indirect. Rather than a direct effect, personality operates by shaping the subjective perception of events (27). The three personality dimensions from Eysenck’s point of view are: extraversion *vs.* introversion, neuroticism *vs.* emotional stability, and psychotic *vs.* impulse control. Among these, neuroticism is defined as a tendency to experience negative emotions such as anxiety and depression in response to environmental stress. The Eysenck Adult Questionnaire was designed in 1975 with three subscales to measure these characteristics (28). People who achieve a high score in neuroticism show a more negative reaction to unpleasant stimuli than those who obtain a lower score and are prone to unpleasant experiences including anxiety and depression (29). Several studies have noted the relationship between neuroticism and poor mental health (30,31).

Understanding the stressors in dental students’ educational environment and their perceptions of it can help develop effective coping strategies, enhance quality of life, and improve mental health and academic performance. This study examined

these stressors and their relationship with individual characteristics among students at Shahid Beheshti University during the 2020–2021 academic year.

Materials and Methods

The study protocol was reviewed and approved by the Institutional Review Board (IRB) of Shahid Beheshti University of Medical Sciences (Approval Number: IR.SBMU.DRC.REC.1399.025). The research was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all the participants before data collection. This study was a cross-sectional descriptive study. After obtaining informed consent, among all the dentistry students of Shahid Beheshti Faculty of Dentistry who entered the clinical departments (7th to 12th semester students willing to complete the questionnaire), 231 individuals completed the questionnaires. The only exclusion criteria were unwillingness to participate and the presence of a known mental disease.

Eligibility required students to be actively enrolled during the study period. After obtaining the code of ethics and distributing the consent forms, the data were collected in a 3-month period in the academic year of 2020–21 using the Eysenck personality questionnaire for adults (neuroticism subscale) and the DES questionnaire taken from Shahravan questionnaire at Kerman Dentistry Faculty (32).

Experts validated the DES questionnaire using content and narrative form analysis based on the opinions of an expert English translator, plus psychiatric and dental specialists, while its reliability was confirmed using Cronbach's alpha test ($\alpha=0.85$) (33). The reliability and validity of the Eysenck questionnaire were evaluated by Bakhshi Poorroudsari and Bagherian Khosroshahi on the Iranian population. The results obtained from this research for the neuroticism scale reported a reliability of 0.9 and a Cronbach's alpha coefficient of 0.74, which indicates the satisfactory reliability and validity of this questionnaire in the Persian language (34).

The demographic information questionnaire captured information including gender, entry year and academic semester, student status (universal, international, supplementary, domestic transfer), marital status and if married, having children, suffering from a systemic

disease and if diagnosed, its type, mental illness (depression, anxiety disorder, bipolar), drug use and, if used, its type.

The DES questionnaire contains 32 items in 6 areas including academic efficiency 7 items, treatment of patients 4 items, internal beliefs 4 items, academic factors 2 items, clinical training 11 items, and other matters 4 items (lack of enough time to rest, *etc.*). It is used to identify and classify student stressors in the dentistry school environment. Sample items included stress factors related to 'heavy daily workload,' 'fear of contracting contagious diseases,' and 'lack of time to complete clinical requirements'.

The questionnaire used a Likert scale for scoring. Each question is given one score between 1 (lowest) and 4 (highest). For each of the areas, the average stress score (taking into account the average of each factor within the group) is calculated. A higher score of each group is a sign of stress (2.5 to 4) and a low score (1 to <2.5) is a sign of less importance of stressful factors in that group. Then, each of the fields would be given a score and through dividing the total scores by the number of questions in each field, the leveled scores were obtained, through dividing the total scores by the number of questions in each area, with this score being based on the value of 1–4). 1 represents the lowest stress level while 4 is the highest one. Also, for each of the areas, the average stress score of the desired area was determined. Thus, the range of the total stress score of the dental environment would be within 32–128, where for the domain of academic efficiency it would be within 7–28, treatment of patients 4–16, internal beliefs 4–16, academic factors 2–8, clinical training 11–44, and other cases 4–16 (35). Then the Eysenck questionnaire was presented to the students. The neuroticism subscale of the Eysenck questionnaire has 24 items. Answers are indicated by yes and no. For each question with a yes answer, one mark is assigned, and for a no answer, a zero mark is considered (maximum 24 marks). Then, the percentage rank of each person is determined based on the conversion table of raw scores to percentage ranks. The percentage rank shows the individual's position among 100 people. When it is stated that the percentage rank of the subject is 85, it means that the subject is higher than 85 out of 100 people and lower than 15 people. When a person's percentage

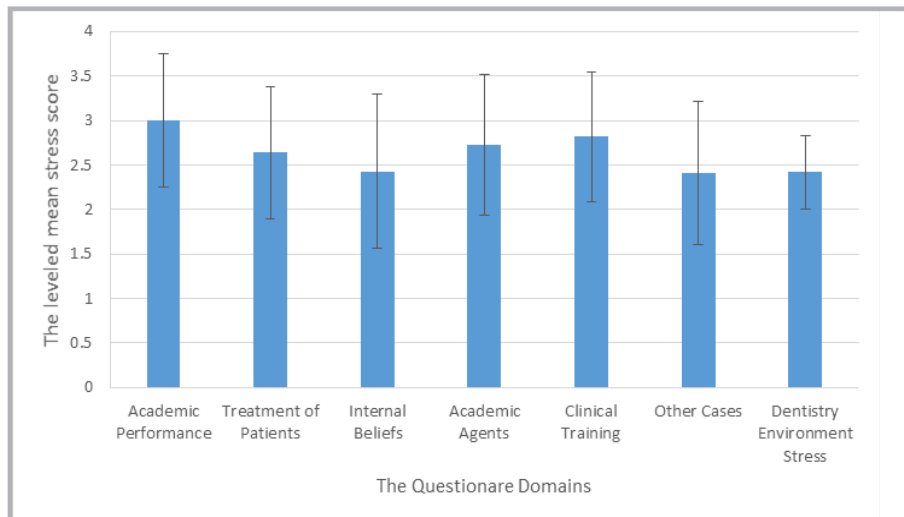


Figure 1. Mean perceived stress scores (1–4 scale) across domains of DES questionnaire among dental students. Error bars represent standard error of the mean. The highest stress was reported in the “Academic Performance” domain (mean≈3.0), while the lowest was in “Internal Beliefs” and “Other Cases” (mean≈2.4). A score ≥2.5 indicates elevated perceived stress.

rank in the neuroticism scale is 50, it means that he/she is completely balanced in terms of neuroticism compared to normal people. That is, he/she is a completely normal person. The higher a person's neuroticism percentage is, the more neurotic he will be, and *vice versa* (34).

After the data collection, they were entered into the SPSS26 software (at a significance level of 0.05). To compare the relationship of dentistry environment stress (DES) scores according to two-state variables (such as gender, marital status, *etc.*), the independent t-test was used, while for multi-state variables (such as occupation, academic year, *etc.*) one-way analysis of variance (ANOVA) and Pearson's correlation were used (due to normality of the data after assessing Skewness and Kurtosis).

Results

Among 231 students, 104 male students and 127 female students with an average age of 23.74 ± 2.6 participated in the study. The results showed that ‘heavy working day’ was the most severe stressor in academic efficiency (32.9%); regarding patient treatment, it was linked to ‘working for patients with contagious diseases’ (29.4%). Finally, with reference to clinical education, it was related to ‘lack of time to do tasks assigned to a rotation’ (28.6%).

In the questions related to the variable ‘psychological

distress’, the highest percentage was related to the item ‘Are you worried about your health?’, found as 62.3% and the lowest percentage was associated with the item ‘Do you feel inferior’, equaled to 10.8%. Figure 1 displayed the leveled score of stress by different areas. Accordingly, the highest average score of the stress level was related to the perceived stress in the area of academic efficiency with an average of 3 ± 0.75 , while the minimum average score of the stress level was related to the perceived stress in the area of internal beliefs with an average of 2.43 ± 0.87 . In general, the leveled score of the total perceived stress was equal to 2.42 ± 0.41 in all areas.

In a comparative study of the perceived stress score in the studied areas and in general according to the gender of the students, the information in table 1 showed that in most areas, the stress level of female students was higher than that of male students. The mean total perceived stress in women was 80.51 ± 12.47 and in men it was 74.05 ± 13.72 , which was 6.46 units greater in women than in men.

The results indicated that there was no significant difference between the state of systemic disease and drug use among students, as well as their age and the level of perceived stress in different areas ($P > 0.05$). The comparison of the stress score according to the marital status revealed that only in the area of academic performance, the perceived stress score was

Table 1. Comparison of research variables according to gender

Variable name	Male (Mean±SD)	Female (Mean±SD)	p-value	Cohen's d	Effect size interpretation
Academic performance	16.43±3.73	17.02±3.20	0.190	0.17	Small
Treatment of patients	9.29±2.31	10.47±2.29	<0.001	0.51	Medium
Internal beliefs	7.61±3.06	8.69±3.12	0.009	0.35	Small to medium
Academic agents	5.10±1.51	5.39±1.54	0.150	0.19	Small
Clinical training	26.81±5.93	30.12±5.23	<0.001	0.60	Medium to large
Other cases	8.78±2.39	8.80±2.59	0.960	0.01	Negligible
Total stress score (DES)	74.05±13.72	80.51±12.47	<0.001	0.50	Medium
Neuroticism	36.86±32.61	43.07±30.77	0.130	0.20	Small

Table 2. Correlation test results for research variables, neuroticism was positively correlated with stress in all domains

Domain of dental environment stress	Correlation with neuroticism (r)	p-value	Interpretation
Academic performance	0.210	0.001	Weak, significant positive correlation
Treatment of patients	0.210	0.001	Weak, significant positive correlation
Internal beliefs	0.483	<0.001	Moderate, significant positive correlation
Academic agents	0.195	0.003	Weak, significant positive correlation
Clinical training	0.288	0.001	Weak to moderate, significant positive correlation
Other cases	0.266	<0.001	Weak to moderate, significant positive correlation
Total stress score (DES)	0.400	<0.001	Moderate, significant positive correlation

higher in married students than in single students, where this difference was statistically significant ($p=0.01$). The comparison of the perceived stress score with the year of entering the university and the academic semester demonstrated that there was a significant difference only in the area of academic factors and neuroticism, where the students of the entry year of 2016 (academic semester 7) had the highest level of perceived stress in these two areas ($p<0.05$). There was a significant difference with the level of perceived stress in two areas of academic efficiency ($p=0.006$) and other cases ($p=0.039$); internal higher education and transfer students reported more stress than other students in these two areas. In relation to the age of the students, $p=0.001$ was

obtained for the variable 'neuroticism'. As a result, the mean value of this variable had a significant difference among students of different ages, which was higher in '21-year-old' students than in other groups.

In the present study, Pearson correlation was applied to investigate the relationship between DEC variables and neuroticism. Table 2 indicated that there was a positive and significant relationship between the stresses of the dentistry environment in different areas and in general with neuroticism; that is, as neuroticism increased, so did the stresses of the dentistry environment.

Discussion

A general analysis of responses from dental students at Shahid Beheshti University of Medical Sciences

demonstrated that the average overall perceived stress score, based on leveled scores across all domains of the Dental Environment Stress questionnaire, fell within the moderate to low range. The results of studies of Halboub *et al* (36) were consistent with the findings of our studies. Morse stated that the average stress experienced by all students was at a moderate level (37). Therefore, it can be stated that the dentistry environment is an environment with stress and the reasons for the concurrence of the results in these studies can be due to the similarity of the educational system and the nature of courses, educational goals, and teaching methods in the studied dentistry schools. In the present study, the highest average stress among the studied areas was associated with the perceived stress regarding academic performance followed by clinical training. Also, the six factors that caused the most stress among students were: heavy daily work (classes and intensive clinical work), working for patients with infectious diseases, lack of time to do the tasks assigned to a rotation, mismatch between expectations and reality of college environment, discrimination due to academic status or other reasons, and lack of self-confidence about being a successful student.

In Iranian and even non-Iranian studies, one of the most prominent stressful factors is “intense clinical work and amount of homework” (38,39). One of the reasons that can explain the stress caused by this factor is that students do not have enough time to complete the requirements; on the other hand, the number of referring patients may not be enough to complete these requirements. As a result, stress in this field increases due to lack of a regular schedule and proper schedule for doing homework (39). Dodge’s study reported that when clinical training was structured around patient needs rather than fixed procedural requirements, students not only demonstrated significantly higher academic achievement and clinical productivity but also reported substantially lower stress levels compared to peers in a traditional, requirement-driven curriculum (40).

The results of the present study revealed that working for patients with infectious diseases is considered another stress-causing factor in students. The result of Akbari *et al*’s study (41) indicated that most students are afraid of contracting contagious infections, which

may cause a negative impact on students’ performance. Students’ limited knowledge of infection control principles likely contributes to this stressor. Golshiri *et al*’s study in Isfahan School of Dentistry reported that the knowledge of the majority of students about the principles of infection control is very low. By organizing infection control training courses and providing a suitable platform to comply with the standard principles of infection control, it is possible to reduce the stress caused by this factor and assure the students that by following these principles, they can avoid contracting these infections in the clinical environment (42).

According to the results of the present study, “discrimination due to academic status or other factors such as gender, socioeconomic background, or transfer status” was identified as the fifth most significant source of stress. The results of some studies also suggest that the atmosphere created by professors for students contributes to stress (41). Due to the stress caused by the inappropriate behavior of professors, students will have little adaptation to their opinions and try to remain hidden from the professors and be at an ordinary level in terms of efficiency. It is better for professors to pay attention to each student separately in the clinic environment; as a result, students will receive longer time and more attention, which will reduce their stress (21).

According to the results of the present study, students exhibited moderate-to-low neuroticism levels; as the level of neuroticism increased, so did the level of stress in the dentistry environment. The results of various studies in this field were similar to the findings of current study (43). However, in the results of Kazemizadeh’s study (33), a complete and significant correlation was not found between the general stress of the dentistry environment and the stress caused by individual personality. It can be due to the fact that the study environment of dentistry is inherently stressful and the stress caused by the individual personality of students alone cannot contribute to a greater understanding of stress in the students.

Several studies have reported that perceived stress tends to be higher in female students than in their male counterparts (35,44,45), although some have found the opposite trend, with male students reporting higher stress (46,47). In the present study, female students

had significantly higher mean total stress scores than males (80.51 ± 12.47 vs. 74.05 ± 13.72 ; $p < 0.001$), consistent with the majority of previous findings. This gender difference may be influenced by variations in emotional expression, coping strategies, social support, or how stress is appraised and reported (48).

Regarding the marital status, the present study found no statistically significant association between marital status and overall perceived stress ($p > 0.05$), aligning with some prior research (46). However, one domain-academic performance-did show significantly higher stress in married students ($p = 0.01$) (35). These findings describe associations only; since this is a cross-sectional study, no causal relationships can be inferred (49). Differences in results across studies may stem from variations in family responsibilities, cultural expectations, or levels of support in different populations (39).

According to the results of some studies, as with the results of the present study, students experience more stress at the beginning of entering the clinic (33,41), while it is contrary to the results of some studies (35,50). The lower stress in students who have just entered the clinic compared to the final year students in these studies could be related to the fact that the final year students have more clinical units than the students of other levels, which can increase the stress in these students.

Another finding of the study was the absence of a relationship between age and the level of stress perceived by students, which may be due to the small number of statistical samples or the statistical population along with the different cultural background of the students. In his research, Muirhead concluded that overall stress does not depend on age at all (39), while according to other studies, there was an inverse relationship between age and the amount of overall stress perceived by students, such that with increasing age, the amount of overall perceived stress decreased (35,38). This trend may reflect improved communication skills with professors and officials, enhanced people's realism, and improvements of self-confidence, as well as self-belief with increasing age (46).

According to the data of present study, the mean overall perceived stress was higher in internal supplementary and transfer students than in other students, in two domains of academic performance and other cases.

Perhaps, this stress is more due to changes in the study environment and getting to know people as well as the new environment thereby creating a sense of competition. Also, differences in the educational system, not being familiar with how professors evaluate them, and cost of education can contribute to this stress.

Another point examined in our study was the relationship between systemic disease plus drug use and stress, though no relationship was found. Perhaps reasons such as the small number of students participating in this study as well as lack of honesty in participants' answers to the questionnaire questions have caused this result.

Based on the findings, it is suggested that practical interventions could include mandatory infection control workshops to reduce fears of treating patients with infectious diseases, and time-management training and consulting sessions specifically for fourth-year students to handle their heavy clinical workload.

This study has some limitations. First the cross-sectional study design prevents any causal links to be drawn between stress and personality traits. In order to overcome this limitation, longitudinal studies are strongly suggested (in different times of the academic year and during study years). Furthermore, the use of self-report questionnaires has the risk of recall bias or social desirability bias. At last, this study was conducted in a single institute and cannot be applicable to all dental students in Iran.

Conclusion

The present study identified moderate levels of perceived stress among dental students with the highest stress reported in the domains of academic performance and clinical training. Female students and those in earlier clinical semesters experienced significantly higher stress levels. A positive correlation was also found between neuroticism and perceived stress, suggesting that personality traits play a role in stress vulnerability. These findings highlight the need for implementing targeted mental health support, improving time management resources, and creating a more equitable and supportive clinical learning environment to reduce stress and enhance student well-being.

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Ethical approval

The participants were informed of the entire protocol and gave their written consent before taking part in the experiment.

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Conflict of Interest

There was no conflict of interest in this manuscript.

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