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Assessment of Dental Students' Stress Level Using the Validated Pss-14 Questionnaire

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ABSTRACT

Introduction: Stress is an important factor affecting education and clinical practice of dental students. The purpose of the present study was to assess stress levels of dental students using the validated PSS-14 questionnaire in Iran.

Materials and Methods: A cross-sectional study was conducted in 2024 using stratified non-random sampling method on Iranian undergraduate dental students. Following ethical clearance, the concurrent validity of the DASS-21 and the PSS-14 questionnaires was assessed on a sample of dental students. The Persian version of the PSS-14 questionnaire in addition to demographic characteristics, history of COVID-19 vaccination status and systemic disease in student/family member was used for data collection electronically. Data was analyzed using SPSS ver. 26.0, descriptive and analytical analysis performed ($p < 0.05$).

Results: In the first phase, 211 subjects responded and the concurrent validity was confirmed ($r = 0.621$, $p < 0.001$). In the second phase, 420 students replied 53.1% were female ($n = 223$) and 46.9% were male ($n = 197$), with a mean age of 23.5 (SD = 2.7) years. The mean stress score of the respondents was 26.7± 8.1 out of 56 (female: 43.14 (SD = 7.90) and male: 38.18 (SD = 7.54). There was a significant association between stress level and being female ($B = -0.344$, $p = 0.000$), having lower Grade Point Average (GPA) ($B = -0.136$, $p = 0.008$), having systemic disease in students' family ($B = 0.158$, $p = 0.001$), and studying in Type I universities ($B = -0.105$, $p = 0.036$).

Conclusion: PSS-14 and DASS-21 questionnaires exhibited high concurrent validity. In the post-COVID-19 era, stress levels were modest among dental students in Iran. There is a need for stress management training, especially for high-risk students.

Keywords: COVID-19; Students; Dental; Pandemics; Stress disorders; Post-traumatic.

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Introduction

Stress is a multifactorial phenomenon influenced by several internal and external factors. This is particularly important as dental education can be influenced by the stress level of students. In recent years, the COVID-19 pandemic influenced dental education worldwide due to direct contact with COVID-19 patients and the risk of transmission, particularly in Iran where COVID-19 influenced dental education during February 2020 to July 2023. Studies have shown that the psychological impact of the COVID-19 pandemic has a lasting impact on students' ability on stress management and could lead to post-traumatic stress disorder (PTSD) [1,2]. In a study conducted in an Australasian dental school during the pandemic, the majority of students perceived their health to be at risk and this increased their stress level that adversely impacted clinical performance [3]. In an Indian study in 2020, delay in academic activities, uncertainties about being carrier and the impending exams were discussed to be the main causes of anxiety and stress [4]. In Nguyen's study, conducted in two dental schools in Japan and Vietnam in 2016, the mean scores of stress measured by the PSS-10 questionnaire were moderate (16.97 and 17.19, respectively) [5]. Undergraduate dental students in Kerman University, Iran, also considered insufficient knowledge and awareness to be the main cause of stress, especially regarding students' clinical capability [6].

Measuring stress levels requires a comprehensive, valid and reliable tool. The PSS-14 questionnaire is one of the most commonly used tools for measuring stress, developed by Cohen and colleagues in 1983 [7]. The Persian version of the PSS-14 questionnaire was translated by Maroufizadeh and colleagues and its reliability was determined using Cronbach's alpha coefficient of 0.90 [8]. On the other hand, the DASS-21 questionnaire is recently developed, comprehensive and valid instrument for measuring depression, anxiety, and stress, developed by Lovibond and colleagues in 1995 [9]. The translated version of the DASS-21 questionnaire to Farsi was validated by Sahebi and colleagues, with a Cronbach's alpha of 0.87 [10]. As there is no evidence on the validation of the stress measurement tools in the dental setting, the purpose of the present study was a) to assess the concurrent validity of PSS-14 and DASS-21 questionnaires on Iranian dental students, b) to assess the stress level of dental students in the post-COVID-19 pandemic using the validated questionnaire.

Materials and Methods

A multi-center cross-sectional study was conducted across 6 states at the national level in Iran following ethics approval. The ethics committee of Tehran University of Medical Sciences (IR.TUMS.DENTISTRY.REC.1401.121) approved the study. At the first step, the concurrent validity of the instruments (PSS-14 and DASS-21) was assessed on a sample of undergraduate dental students in Tehran University of Medical Sciences. In the second phase after concurrent validity was confirmed, a cross-sectional study was conducted using the PSS-14 questionnaire to measure post-COVID-19 pandemic era stress levels among undergraduate dental students in 2024.

Data collection

In the first phase, 201 dental students in the 8th, 10th, and 12th semesters in the Faculty of Dentistry, Tehran University of Medical Sciences were approached. After ethical clearance, the questionnaires and consent forms were distributed among students and a reminder was sent after one week to increase response rate. For the main survey, after concurrent validity was confirmed, the Persian version of the PSS-14 questionnaire [8], was used to collect data across 6 dental schools using stratified non-random sampling method. In addition, questionnaire on demographic variables including age, gender, academic semester, grade point average (GPA), residential status, socioeconomic status (m2/per-person) [11], COVID-19 vaccination status, history of systemic disease in the student and family member and university type was distributed. According to the Ministry of Health and Medical Education in Iran, universities are divided into two types from a scientific and structural point of view: Type I and Type II. Among Type I universities, Tehran University of Medical Sciences, Shahid Beheshti University of Medical Sciences, and Shiraz University of Medical Sciences were selected and among Type II universities, Qazvin University of Medical Sciences, Alborz University of Medical Sciences and Shahed University of Medical Sciences were selected through quota sampling which is considered stratified non-random sampling method [12] and included in this study.

Sample size

Sample size was calculated using the formula for cross-sectional studies as:

$$n = \frac{Z\ (1-\frac{a}{2})^{*}\ P\ (1-p)}{d^{2}}$$

Considering $\alpha = 0.05$ and $\beta = 0.2$ to assess the associ-

ation between 12 independent variables with the outcome. Total sample of 384 was calculated considering z (1-a/2) [2] as 1.96, proportion as 50% and d as 5%. Given the stratified sampling model in this study, the minimum sample size was increased to n = 426 by considering a design effect of 1.1. The questionnaires were sent electronically on the Porsline platform after general announcement in the students' groups through common social media platforms used as Telegram and WhatsApp. Students were asked to fill out the questionnaire after giving informed consent. A reminder was sent after one week following the initial distribution of the questionnaires in the six dental schools. Following receiving the filled questionnaire a pamphlet was distributed virtually on stress management to dental students.

Instruments

The Persian version of the DASS-21 questionnaire was validated by Sahebi et al., a Cronbach's alpha of 0.78 [10]. This instrument comprised of 21 questions, with 7 questions related to each domain, such as depression, anxiety, and stress having a score of 0 to 3, and a score range of 0—21 in each domain. Regarding the stress level, scores 0—7 indicate normal stress, 8—9 indicate mild stress, 10—12 indicate moderate stress, 13—16 indicate severe stress, and scores > 17 indicate a high severe stress level. The Persian version of the PSS-14 questionnaire with 14 questions measuring stress was validated by Maroufizadeh et al., confirming the reliability (Cronbach's alpha coefficient of 0.90) [8]. The PSS-14 questionnaire includes 14 questions; each is assigned a score of 0 to 4, with a total score of 0—56. Scores 0—18 indicate low stress, 19—37 indicate moderate stress, and 38—56 indicate high stress.

Statistical Analysis

In the first phase, we used the Pearson correlation test to assess the correlation between the PSS-14 and DASS-21 questionnaires. In the second phase, percentages and mean values were calculated for descriptive statistics. For analysis, the Linear Regression Model was used. Data was analyzed using SPSS version 26.0 ($p < 0.05$).

Results

In the first phase of the study, a total number of 112 dental students responded. Fifty-nine respondents (48.8%) were female and 62 were male (51.2%). The mean age of the respondents was 22.622 (SD = 1.3), ranging from 20-29 years. There was a significant positive correlation between stress scores according to the DASS-21 and PSS-14 questionnaires ($r = 0.621$, $p < 0.001$) (Table 1). In the second phase, using the online PASS questionnaire, 420 subjects responded across 6 dental schools. Respondents' age range was 19- 47, with a mean score of 23.5 (SD = 2.71) years old. 53.1% of the respondents were female (n = 223) and the rest were male. The majority of participants (41.9%, n = 176) were from Tehran University of Medical Sciences. Most students were in the 8th academic semester, and the least were in the 6th academic semester. Students' level of stress was between 6 and 49 with the mean score of 26.7 (±8.1) out of 56. Demographic characteristics and study variables are presented in Table 2. Linear regression model assessing the impact of different variables on students' stress level, showed that there was a statistically significant relationship between gender (B = -0.344, p = 0.000), Grade Point Average (GPA) (B = -0.136, p = 0.008), having history of systemic disease in students' family members (B = 0.158, p = 0.001), university type (B = -0.105, p = 0.036) and students' stress level. There was marginally significant relationship between COVID-19 vaccination status (B = 0.082, p = 0.095), socioeconomic status (B = -0.084, p = -0.089) and students' stress level (Table 3). There was no statistically significant relationship between stress levels and other variables such as; age, academic semester, residential status and history of systemic disease of the respondent.

Table 1. The concurrent validity of the DASS-21 and PSS-14 questionnaires.

	Statistics	*PSS-14*	*DASS-21 (stress)*
PSS-14	*Pearson's correlation*	*1*	*0.621*
	Sig. (2-tailed)		*<0.001**
	N	*113*	*110*
DASS-21 (stress)	*Pearson's correlation*	*0.621*	*1*
	Sig. (2-tailed)	*<0.001**	
	N	*110*	*117*

*p < 0.05.

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Table 2. Demographic characteristics of study subjects (n = 420).

		N	%
Gender			
	Male	197	46.9
	Female	223	53.1
Residential status			
	With the family	206	49
	Private House	73	17
	Dormitory	138	33
	no answer	3	0.7
Socio-economic status			
	<25	88	21
	25-45	198	47.1
	>45	118	28.1
History of systemic disease (Yes)			
	Student	22	5.2
	Family member	329	78.3
COVID-19 vaccination status			
	Yes	411	97.9
	No	8	1.9
	no answer	1	0.2
Stress level (PSS-14)			
	Low	69	16.4
	Moderate	301	71.6
	High	38	9
	no answer	12	3
University of education			
	Tehran University of Medical Sciences (type I)	176	41.9
	Shahid Beheshti University of Medical Sciences (type I)	54	12.9
	Shiraz University of Medical Sciences (type I)	49	11.7
	Qazvin University of Medical Sciences (type II)	55	13.1
	Shahed University of Medical Sciences (type II)	45	10.7
	Alborz University of Medical Sciences (type II)	41	9.8
Age	Mean (SD): 23.5 (2.71); Range: (19- 47)		

Table 3. The linear Regression analysis of the impact of dependent variables on the mean score of students' stress.

	t	*Standardized coefficients B*	*Standardized coefficients Standard deviation error*	*Non-standardized coefficients B*	**Sig.*
Gender	*6.948*	*-0.344*	*0.814*	*-5.659*	*0.000*
Grade Point Average (GPA)	*2.688*	*-0.136*	*0.349*	*-0.937*	*0.008*
Having history of systemic disease in students' family member	*3.214*	*0.158*	*0.985*	*3.167*	*0.001*
COVID-19 vaccination status	*1.675*	*0.082*	*3.464*	*5.803*	*0.095*
Socio-economic status	*1.704*	*-0.084*	*0.018*	*-0.030*	*0.089*
University type	*2.102*	*-0.105*	*0.859*	*-1.806*	*0.036*

T*p value < 0.05.

Discussion

The results of our study confirmed the concurrent validity of the two validated Persian-version questionnaires for assessing stress: DASS-21 and the PSS-14. Assessment of stress level among dental students using the PSS-14 questionnaire in our multi-center cross-sectional study showed that Iranian dental students had moderate level of stress. Multiple regression analysis showed that there was a significant relationship between having higher stress level and being female, having lower GPA, having systemic disease in students' families, and studying in Type I universities. There was marginal significance between having COVID-19 vaccination and lower socio-economic status with students' stress level. The DASS-21 questionnaire is widely used in clinical assessment but is long and time-consuming in comparison with PSS-14. As compared with the DASS-21 questionnaire, the PSS-14 questionnaire is simple and easy to understand, and hence this was used in our study. Similarly, Du and Andreou also reported a significant and positive correlation between PSS-14 and DASS-21 questionnaires, confirming the concurrent validity of these instruments in Chinese and Greek communities [13,14]. Reyes states that the English version of PSS-14 is a valid and reliable scale for measuring perceived stress among Filipino college students during the peak of the COVID-19 pandemic [15]. Comparing the two instruments showed that the PSS-14 questionnaire is a specific tool to measure stress, while DASS-21 is general and measures depression, anxiety and stress [7]. Regarding the stress levels in our study, the mean stress score of dental students was 26.7, which is a moderate level. In a study conducted in Shiraz, Iran, dental students reported a moderate stress level with a mean Dissociative Experiences Scale (DES) score of 71.08 ± 14.49. The most prominent stressors were clinical education, academic efficiency and conducting patient treatment [16]. Moreover, a cross-sectional study in Jordan reported that dental students experienced significant stress during clinical training. The study emphasized the need for interventions to address stressors that are specific to clinical education [17]. In our study, there was a positive and significant relationship between female gender and stress level in dental students. In many studies, stress anxiety, depression, and lack of interest in daily activities were observed in women more than male subjects [2,18]. However, some studies have reached the conclusion that women are more adaptable than males in all fields [19]. However, in Rabie's study, conducted on Iranian dental students, the stress level of male students was less than that of female students [20]. In our study, those students whose family member had an underlying systemic disease reported being stressed. Surprisingly, this did not apply to the existence of an underly-

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ing disease in students themselves. Similarly, in a study conducted in Netherlands, over half of students with chronically ill family member indicated experiencing more emotional distress and challenges balancing caregiving responsibilities with academic demands [21]. A longitudinal study at the University of Jordan demonstrated that stress levels increased from the first to the fifth year of dental school, likely due to increased clinical responsibilities and academic demands, suggesting that stress correlates more with academic progression than age [22], which is in-line with our study. In previous studies, students in higher academic semesters had more stress, as they get closer to graduation, due to confronting the graduation exam as well as facing job selection [1]. Though Iranian dental students do not take a graduation exam, the reported stress level is higher at the end [20].

In the present study, students studying in Type I universities and students with higher GPAs were more stressed. Students who have a higher grade accepted to a Type I universities are usually those for whom learning and competition are more important, which could lead to stress. Similarly, In China, studies conducted reported that students with higher average scores had more stress [1,2]. However, some indicate that students employing coping strategies, such as problem-solving and seeking social support, are those experiencing lower stress and better academic performance [23]. In the present study, higher stress levels were present in dental students with lower socio- economic status though it was marginally significant. In Shi's study, students with low family income experienced long-term pressure, making them prone to negative feelings such as low self-esteem and depression [24].

Drachev's study also showed that dental students with lower subjective socio-economic status reported more stress compared to those with higher socio-economic status [25]. There was a marginally significant relationship between having COID-19 vaccination and students' stress level meaning that vaccinated students had higher stress levels. It was interesting that those who were not vaccinated during the two-year pandemic were more likely to have a relaxed and stress-free mind [26]. Several studies have reported high levels of stress in students due to coronavirus, though most have been conducted during the COVID-19 pandemic in populations other than dental students [20,27]. Besides, the impact of COVID-19-related distress might have impact on career perspective even after the pandemic.

Limitations and Strengths

In our study, validated instruments were used and concurrent validity in the Persian language among dental students was confirmed. One of the strengths of our study was sampling across type I and II universities. Despite using stratified sampling, the non-random selection process limits the representativeness of the sample. On the other hand, due to the virtual nature of our study, it was not possible to increase the response rate.

Conclusion

Two instruments, DASS-21 and PSS-14, exhibited an acceptable concurrent validity in the dental setting. Dental students had modest level of stress according to our study. There was statistically significant relationship between being female, having lower Grade Point Average, having systemic disease in students' families, studying in Type I universities, and the students' stress level. In conclusion, it is necessary to plan for students' psychological and emotional support programs to control stress and increase students' emotional coping abilities during academic years.

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Conflict of Interest

There is no conflict of interest to declare.

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