



## Psychological Impact Of COVID-19 Pandemic On Dental Student: A Cross-Sectional Pilot Study

Fatemeh Naderi<sup>a</sup>, Ahmad Karami<sup>b</sup>, Negin Moradi<sup>c\*</sup>, Zahra Naderi<sup>d</sup>

<sup>a</sup>Assistant Professor, Department of Pediatric Dentistry, Shahrekord University of Medical Sciences, Shahrekord, Iran, Email: fatemehnaderidnt@gmail.com.

<sup>b</sup>Assistant Professor, Department of psychiatric, Shahrekord University of Medical Science, Shahrekord, Iran. Ahmad373karami@gmail.com .

<sup>c\*</sup>dentist, Shahrekord University of Medical Science, Shahrekord, Iran. negin2015moradi96@gmail.com .

<sup>d</sup>Assistant professor, Department of general pathology, Baghiatallah university of medicine, Tehran, Iran. Znaderi930@gmail.com.

**\*Corresponding Author:** Negin Moradi,

dentist, Shahrekord University of Medical Science, Shahrekord, Iran,

Email: negin2015moradi96@gmail.com negin2015moradi96@gmail.com, Phone: +989134832202

Article History	Abstract
Received: Revised: Accepted:	<p><b>Background and purpose:</b> The covid-19 disease is widely spreading worldwide and has adversely impacted mental health in society, especially among the medical staff. In addition to the stresses related to the outbreak of covid-19, the suspension of in-person classes, undertaking electronic online learning, and concerns about achieving clinical skills cause increasing anxiety and stress in dental students, which might be related to increased mental health problems. Thus, the present study examined dental students' levels of stress, anxiety, and depression in Shahrekord during the covid-19 pandemic.</p> <p><b>Methods:</b> In this cross-sectional study, 110 dental students completed the questionnaires of demographic data and depression, anxiety, and stress scale (DASS-21) in 2021. The data were analyzed with SPSS.</p> <p><b>Results:</b> In the DASS-21 questionnaire, the rate of depression was 57%, anxiety 76%, and stress 33%. The total score of the DASS-21 questionnaire was significantly different between the two genders (<math>P &lt; 0.05</math>), and the mean score of females was significantly higher than males.</p> <p><b>Conclusion:</b> The prevalence of depression and anxiety in dental students, especially females, was high during the covid-19 pandemic.</p>
CC License CC-BY-NC-SA 4.0	<b>Keywords:</b> Anxiety, covid-19, DASS-21 questionnaire, dental student, depression, stress.

### Introduction

Throughout history, the world has witnessed the outbreak of deadly diseases, but the new coronavirus disease 2019 (covid-19) outbreak has been fatal and life-threatening, challenging researchers and health systems (1). Cases of pneumonia of unknown etiology were reported in Wuhan, China, by Chinese researchers in December 2019 (2). The World Health Organization named it covid-19 as a new disease in February 2020 (3). The covid-

19 virus has features that make it more transmissible than other viruses(4). This virus spreads mainly between people who are in close contact. This virus is transmitted between people when a person comes in direct contact with an infected person or infectious respiratory droplets. Since covid-19 is an airborne disease and dental care providers are at high risk of close contact with this virus, dental care systems face significant pressure.

The Occupational Safety and Health Administration has placed dental students and specialists in the very high exposure risk category. Due to certain procedures that generate occupational bioaerosols, dental students and specialists might be exposed to known or suspected virus sources, resulting in covid-19(5-7). Such procedures expose dental students and dental care specialists to physical and mental pressures, leading to occupational burnout, depression, stress and anxiety(8). A total of 156 countries closed educational institutions prohibiting any activity on campus as of March 25, 2020 (6).

Such conditions may hinder students' education, disrupt their daily routines, and affect their mental health (9). Public health crises can provoke significant negative emotions related to stress and perceived risk theories(10-12). For students, covid-19-related stressors may include health concerns due to increased cases of infected people, consequences of isolation/distancing strategies, and disruptions in curricula and exams(13), which may lead to a feeling of hopelessness, fear of death, and growing frustration among students in quarantine (14). Therefore, the volatility and unpredictability of the situation regarding when and how to manage the disease and reduce risk are particularly challenging (14). Students in quarantine and outside the university may experience stress, anxiety, anger, boredom, loneliness, and other feelings, with short-term and long-term effects(15-17).

Dentistry is a stressful major. Dental education is competitive and rigorous, and students undergo emotional and psychological burdens in addition to physical ones(18). In general, studies have shown that medical and dental students suffer from psychological distresses during their professional and academic years(18-32). Studies conducted in dental schools have reported psychological stress, especially depression, anxiety, and obsessive-compulsive disorders (19, 20, 27, 29). A study in the US showed that higher levels of stress, anxiety, depression, and hostility decreased students' performance(25, 31).

A certain amount of stress improves performance and prevents fatigue and boredom, but the continuation of chronic stresses or adverse experiences of stress-related symptoms increases the level of depression and anxiety (32).

On March 11, the Saudi Ministry of Education imposed a lockdown that included suspending in-person classes and the onset of an e-learning system to facilitate learning until colleges and schools reopen. Long-term suspension of in-person classes significantly affected students' academic performance and had a debilitating effect on health. As a result, dental students may encounter challenges associated with their education, such as clinical requirements, dental examination patterns, and more stress. Studies have shown that dental students in Saudi Arabia suffer significant depression, anxiety, and stress during their academic years(33).

A study reported high levels of moderate to severe depression (52.2%), anxiety (58%), and stress (24.9%) during pre-covid-19 periods among university students in Bangladesh (27). Various studies on Bangladeshi university students have shown a high prevalence of mental disorders (13, 34, 35). A study in Saudi Arabia reported increased depression, anxiety, and stress among students during the coronavirus pandemic(8). Another study in Saudi Arabia showed that during the covid-19 pandemic, a high percentage of university students suffered from serious to very severe depression, anxiety, and stress(36). Researchers in China concluded that by the end of the covid-19 quarantine, medical students and staff were the most affected and needed support concerning potential anxiety disorders (37).

Raja et al (2020) conducted a study on Pakistani dental students during the covid-19 quarantine and reported that dental students had 53.5% high stress, 4.43% moderate stress, and 2.9% low stress (38).

Chakraborty (2020) et al investigated the psychological disorders among dental students and dentists during the covid-19 pandemic in India. Many dental students (54%) and dentists (44%) suffered from moderate to severe depression. The results of the correlation analysis showed that concerns about professional development, hindered clinical and research experiences, a previous history of mental health issues, and fear of contracting covid-19 were related to depression(39).

Agius et al (2021) examined the dental students' stress and experiences during the covid-19 pandemic in Malta. The results showed that students were significantly affected by the covid-19 pandemic, which led to the fear of not achieving professional skills, the anxiety related to its long-term consequences, and examination-related stress. Therefore, they concluded that dental schools should adapt quickly and make changes according to their students' stage of education (39).

Hakami et al (2021) investigated the coronavirus pandemic's impact on the level of stress, depression, and anxiety of dental students in Saudi Arabia using the DASS-21 questionnaire, which showed that the spread of

the covid-19 outbreak increased the level of depression, anxiety, and stress in 60.64%, 37.02%, and 34.92% of the students, respectively (8).

There is little information about Iranian students' mental state during the covid-19 pandemic. The DAS questionnaire could examine the effects of the covid-19 pandemic on dental students' mental health and determine the need for intervention to minimize mental health problems. Therefore, this study evaluated dental students' psychological effects and mental health in the Faculty of Dentistry, Shahrekord University of Medical Sciences.

## Materials and Methods

This cross-sectional study aimed to examine the psychological problems of dental students during the covid-19 pandemic in 2022 in Shahrekord (located in the west of Iran). Ethics approval for this study was obtained from the Ethics Committee of Shahrekord University of Medical Sciences (IR.SKUMS.REC.1400.134). In this study, the census sampling method was used. The inclusion criteria were students studying at the university and their consent to participate in the study, and the exclusion criteria were lack of cooperation in the study, the presence of psychological and anxiety disorders, and not filling out questionnaires completely. A total of 122 dental students were included from the Shahrekord Faculty of Dentistry in the study; 12 were excluded due to lack of cooperation. The data collection tools included the demographic questionnaire and the valid Persian version of DASS-21 (the depression, anxiety, and stress scale questionnaire). Informed consent was obtained from the students. The demographic questionnaire included age, gender, marital status, educational semester, place of residence, number of people who live together at home, history of domestic or overseas travel in the last month, and coronavirus infection.

DASS-21 is used to assess depression, anxiety, and stress levels. The questionnaire contains 21 multiple-choice tests with four choices and has three subscales. Each subscale of anxiety and stress includes seven questions, and the final score of each is obtained by summing up the scores of the related questions. The total (8, 40).

SPSS 22 was used for data analysis. The mean, standard deviation, frequency, and percentage indices were used to describe the data. One-way analysis of variance and independent t-test were used for data analysis.

## Results

In this study, 122 dental students were included, 110 of which (60 women and 50 men) completed the questionnaire, and 12 did not cooperate in filling out the questionnaire. 92.7% of students were single, and 54.5% were 18–22 years old; 40% lived in Shahrekord, and 59.1% lived with their families. Also, 33.3% of students reported that they were infected with coronavirus, and 60% reported that a family member had been infected since the onset of the pandemic. Finally, 70.9% of students also declared that the number of people with whom they lived was  $\geq 4$  (Table 1). The mean scores of depression, anxiety, and stress are shown in Table 2.

The total score of the DASS-21 scale was between 0 and 63, and each dimension was between 0 and 21. The final score of each examined item was obtained by summing up the scores of the related questions. Since this questionnaire is a short form of the main scale (42 questions), the final score of each subscale is doubled. In addition, according to the DASS-21 questionnaire's scoring protocol, people were assigned into five categories: normal, mild, moderate, severe, and very severe. The mean score of the DASS-21 questionnaire in the samples was  $39.16 \pm 25.62$ . Also, the mean score for depression in students was  $11.42 \pm 10.10$ ; the mean score for anxiety was  $15.56 \pm 10.39$ , and the mean stress score was  $12.18 \pm 8.96$ , where depression, anxiety, and stress were mild, severe, and normal, respectively.

The overall mean score of the DASS-21 questionnaire in samples was  $39.16 \pm 25.62$ , which was deemed normal considering the five categories and was within the normal range. Also, the mean score of depression was  $11.42 \pm 8.10$ , with  $15.56 \pm 10.39$  and  $12.18 \pm 8.96$  for anxiety and stress, respectively, in 5 categories: very severe, severe, moderate, mild, and normal.

Considering depression (43.6%) of the subjects had a normal condition, and 57% had depression; in terms of severity, 20.9% had mild, 21.8% had moderate, 8.2% had severe, and 5.5% had very severe depression.

Considering anxiety, 24.5% of the subjects had a normal condition, and 76% had anxiety; in terms of severity, 9.1% had mild, 19.1% had moderate, 9.1% had severe, and 38.2% had very severe anxiety.

Considering stress, 67.3% of the subjects had a normal condition, and 33% had stress; in terms of intensity, 16.4% had mild, 8.2% had moderate, 4.5% had severe stress, and 3.6% had very severe stress.

The present study reported that 57%, 76%, and 33% of students had depression, anxiety, and stress, respectively. The total score of the DASS-21 scale was not significantly different between the two genders, but the mean score of female students was higher than male ones, which was not significant. The score of depression and anxiety dimensions of the DASS-21 scale did not show a significant difference between the two genders, but the stress dimension score was higher in female students, which was statistically significant (Table 3). The DASS-21 scale showed that most of the students were in the normal category in the subscale of depression (43.6%) and stress (67.3%), and in the subscale of anxiety (38.2%) were in the extreme category (Table 4).

The level of stress, anxiety, and depression in the sample students based on the entry year was reported to be the same in most cases, and no significant difference was observed between the entry year and the level of the disorders (Table 5). In addition, the students' levels of stress and depression were reported to be similar in most cases, with no significant difference, in terms of their marital status, history of coronavirus infection, and age. However, in the anxiety dimension of the DASS-21 scale, a significant difference was reported between the students' marital status and their anxiety level, with higher levels in single students than in married ones (Table 6).

## Discussion

The present study assessed the levels of stress, anxiety, and depression of dental students at Shahrekord Faculty of Dentistry during the coronavirus pandemic in 2021. In this study, 57%, 76%, and 33% of students suffered from depression, anxiety, and stress, respectively. A few studies investigating the prevalence of stress, depression, and anxiety in dental students were undertaken during the covid-19 pandemic. Raja et al (2020) reported that 53% of Pakistani dental students had high stress, and the prevalence of stress was higher in areas affected by the coronavirus(38), which is not consistent with the results of the present study. Since the present study was conducted in 2021 when modes of transmission of the coronavirus and the methods of its prevention became established and the positive effect of the vaccine was demonstrated, it became available for the medical staff, and dental students received one shot. Therefore, the stress caused by covid-19 decreased among dental students, and depression and anxiety, which are the long-term results of stress, increased among dental students. Chakraborty et al. (2020) reported that 27% of dental students and dentists in India had moderate depression and 27% had severe depression(39) during the outbreak of covid-19 pandemic, which is similar to the results of the present study concerning depression.

This study showed that psychological disorders, especially anxiety and depression, had a high prevalence among dental students during the coronavirus pandemic. Studies have mentioned various reasons for the high prevalence of anxiety and moderate depression during the Corona era. Abdulrazzaq et al (2020) reported that physiological stress increased in dental students in Baghdad due to the changes in the university curriculum after the outbreak of covid-19(41). Dental students were concerned about acquiring sufficient skills before graduation due to the implementation of fully online or semi-online classes by many dental schools, compressed curricula, and the lack of patients in dental schools. Chakraborty et al (2020) reported that dental students and dentists exhibited increased levels of depression in India during the coronavirus outbreak due to concerns about professional development, restraints in obtaining clinical and research experience, previous history of mental health issues, and fear of becoming infected with covid-19(39). Hakami et al. (2021) reported that in Saudi Arabia, the dental students' level of depression, anxiety, and severe and very severe stress was 60%, 37%, and 34%, respectively, according to the DASS-21 questionnaire (8), consistent with the present study. At the beginning of covid-19 pandemic, the stress level was very high, but after some time and the identification of ways to prevent it, the level of stress decreased, and anxiety became more prevalent because the remaining stress caused health problems and raised anxiety. It appears that if the covid-19 pandemic continues to spread, depression will also increase.

Agius et al. (2021) reported that dental students were severely affected by the covid-19 pandemic and faced the fear of not achieving professional skills, and the relevant anxiety resulted in academic failure(42). Therefore, dental schools, in turn, should quickly adapt themselves and adopt new ways and make modifications according to the students' stage of education to reduce their stress and anxiety.

This study on Shahrekord dental students revealed that the total score of the DASS-21 questionnaire and its anxiety and depression scale was not significantly different between the two genders, despite female students' higher scores. However, female students' scores were significantly higher on the stress scale of the DASS-21 questionnaire. Other studies investigating the students' stress levels reported more stress in women, consistent with this study(38, 41, 43). Huang et al. (2020) reported that women's anxiety was higher than men's on the self-reported anxiety scale and the self-rating scale of post-traumatic stress disorder of medical staff in

infectious diseases hospitals in China during the covid-19 pandemic(9). In a systematic study by Vizheh et al (2020) on 100 articles, the prevalence of anxiety, depression, and stress among female medical staff was significantly higher than among males(44). Bashir et al (2020) reported that depression was not significantly related to gender, although the level of anxiety in medical science students was significantly related to gender and was higher in women (45). Therefore, most studies reported a higher level of psychological disorders, especially anxiety in women, consistent with this study. However, other studies have reported that male students were affected at a higher rate than female students, which is contrary to the results of this study (46). Based on findings from previous studies, women are more responsive to stimuli than men and have more experience, which might explain these differences(47-49).

Based on the results of this study, single students had more anxiety than married students, which is different from the results reported by Hakami et al. (2021) on dental students in Saudi Arabia (8). Such discrepancy might be due to the difference in the sample size of single and married students in this study and the study above. This study reported no significant difference between depression, anxiety, and stress in students with and without a record of coronavirus infection, as well as students in three different age groups.

Chronic stress causes harmful effects such as physical, mental, and emotional effects, and psychological complications such as depression, obsession, personality disorders, a feeling of inefficiency, anxiety, and declining interest in the academic major. If stress is left untreated effectively, it can lead to mental and physical disorders and endanger health. In addition, stress seriously harms people's health and efficiency(50).

Therefore, it is recommended that the stress and anxiety associated with educational challenges be reduced by taking some initiatives, identifying at-risk students, and providing counseling to prevent further complications and problems.

## Conclusion

A high percentage of students reported having symptoms of depression and anxiety, and some students reported stress during the covid-19 pandemic. The stress score was higher in female students. University officials have to undertake initiatives to control and deal with students' anxiety and depression, considering its harmful effects on students' careers and learning skills.

**Funding:** This work was supported by the research deputy of Shahrekord university under Grant [IR.SKUMS.REC.1400.134.].

**Conflict of interest:** The authors declare that they have no conflict of interest.

**Table 1. Frequency distributions of different variables in participants**

Variable	Subgroup	No.	Percentage
Gender	Female	60	54.5
	Male	50	45.5
Marital status	Single	102	92.7
	Married	8	7.3
Age	18–22	60	54.5
	23–25	42	38.2
	>25	8	7.3
Educational year	1	16	14.5
	2	23	20.9
	3	13	11.8
	4	20	18.2
	5	23	20.9
	6	15	13.6
Living place	Shahrekord	44	40
	Other	66	60
Living condition	Living in a dormitory	45	40.9
	Living with the family	65	59.1
Trip in the past month	Yes	28	25.5
	No	82	74.5
Affliction with coronavirus	Yes	37	33.6
	No	73	66.4
Affliction of a family member with coronavirus	Yes	66	60

	No	44	40
The number of individuals living together	1	2	1.8
	2	13	11.8
	3	17	15.5
	4	54	49.1
	5	19	17.3
	>5	5	4.5

**Table 2.** Depression, anxiety, and stress scale (DASS-21)

Variable	Score range	Mean	Median	SD
DASS-21 scale for depression	0–42	11.42	10.00	8.10
DASS-21 scale for anxiety	0–42	15.56	14.00	10.39
DASS-21 scale for stress	0–42	12.18	13.00	8.96
DASS-21 overall score	0–126	39.16	37.00	25.62

**Table 3.** Comparison of the mean scores of the depression, anxiety, and stress scale measured separately for males and females (DASS-21)

Variable	Subgroup	Mean	SD	P-value
DASS-21 scale for depression	Female	11.87	8.10	0.53
	Male	10.88	8.14	
DASS-21 scale for anxiety	Female	16.73	10.12	0.20
	Male	14.16	10.63	
DASS-21 scale for stress	Female	13.83	9.07	0.03
	Male	10.20	8.49	
DASS-21 overall score for depression, anxiety, and stress	Female	42.43	25.89	0.14
	Male	35.24	24.99	

**Table 4.** The frequency of depression, anxiety, and stress in students based on the DASS-21 scale

Frequency grouping (%) Variable	Normal	Mild	Moderate	Severe	Very severe
	DASS-21 scale for depression	48 (43.6)	23 (20.9)	24 (21.8)	(8.2) 9
DASS-21 scale for anxiety	27 (24.5)	10 (9.1)	21 (19.1)	(9.1)10	42 (38.2)
DASS-21 scale for stress	74 (67.3)	18 (16.4)	9 (8.2)	(4.5)5	4 (3.6)

**Table 5.** Means and standard deviations of depression, anxiety, and stress in students based on the entry year

Variable		Educational year						P-value
		First	Second	Third	Fourth	Fifth	Sixth	
DASS-21 scale for depression	Mean	9.88	9.13	13.23	11.40	14.00	11.07	0.37
	SD	7.17	8.54	8.22	6.80	10.32	5.23	
DASS-21 scale for anxiety	Mean	13.25	12.00	20.00	14.80	18.87	15.60	0.14
	SD	8.91	9.94	9.86	10.06	12.86	7.37	
DASS-21 scale for stress	Mean	11.63	10.52	16.15	10.90	14.17	10.53	0.37
	SD	7.31	8.96	9.78	7.35	11.59	6.52	
DASS-21 overall score for depression, anxiety, and stress	Mean	34.75	31.65	49.38	37.10	47.04	37.20	0.23
	SD	21.98	25.13	26.90	22.89	32.07	18.12	

**Table 6.** Means and standard deviations of depression, anxiety, and stress of dental students based on marital status, history of coronavirus, and age

Variable		Marital status		Affliction with coronavirus		Age		
		Single	Married	Yes	No	22-18	25-23	>25
DASS-21 scale for depression	Mean	11.67	8.25	12.43	10.90	11.40	11.00	13.75
	SD	8.28	4.33	9.16	7.52	8.01	8.30	8.37
	P-value	0.25		0.35		0.68		
DASS-21 scale for anxiety	Mean	16.14	8.25	17.35	14.66	15.43	15.43	17.25
	SD	10.47	5.39	12.26	9.25	10.15	10.46	12.82

	<b>P-value</b>	0.03		0.20		0.89		
<b>DASS-21 scale for stress</b>	<b>Mean</b>	12.59	7.00	12.65	11.95	12.83	10.86	14.25
	<b>SD</b>	9.02	6.32	10.81	7.92	8.87	8.41	12.25
	<b>P-value</b>	0.08		0.69		0.43		
<b>DASS-21 overall score for depression, anxiety, and stress</b>	<b>Mean</b>	40.39	23.50	42.43	37.51	39.67	37.29	45.25
	<b>SD</b>	25.91	15.18	30.48	22.82	25.34	24.97	33.03
	<b>P-value</b>	0.07		0.34		0.70		

## References

1. COVID-19 and Conflict: Seven Trends to Watch- Special Briefing 4/The COVID-19 pandemic and deadly conflict, 24 March 2020. <https://www.crisisgroup.org/global/sb4-covid-19-and-conflict-seven-trends-watch>. Accessed on 20 April, 2020.
2. Pneumonia of unknown cause – China. World Health Organization. 2020. Jan 5, [2020-08-01]. <https://www.who.int/csr/don/05-january-2020-pneumonia-of-unknown-cause-china/en/>.
3. Timeline of WHO's response to COVID-19. World Health Organization. 2020. Jun 29, [2020-08-01]. <https://www.who.int/news-room/detail/29-06-2020-covid-timeline>.
4. Meo SA, Al-Khlaiwi T, Usmani AM, Meo AS, Klonoff DC, Hoang TD. Biological and epidemiological trends in the prevalence and mortality due to outbreaks of novel coronavirus COVID-19. *Journal of King Saud University-Science*. 2020;32(4):2495-9.
5. Guidance on Preparing Workplaces for COVID-19. <https://www.osha.gov/Publications/OSHA3990.pdf>. Accessed on May 11, 2020.
6. Harrel SK, Molinari J. Aerosols and splatter in dentistry: a brief review of the literature and infection control implications. *The Journal of the American Dental Association*. 2004;135(4):429-37.
7. Rautemaa R, Nordberg A, Wuolijoki-Saaristo K, Meurman JH. Bacterial aerosols in dental practice—a potential hospital infection problem? *Journal of hospital infection*. 2006;64(1):76-81.
8. Hakami Z, Khanagar SB, Vishwanathai S, Hakami A, Bokhari AM, Jabali AH, et al. Psychological impact of the coronavirus disease 2019 (COVID-19) pandemic on dental students: a nationwide study. *Journal of dental education*. 2021;85(4):494-503.
9. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*. 2020;395(10223):497-506.
10. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry: Interpersonal and biological processes*. 2002;65(3):240-60.
11. Naderi F, Karami A, Farsani RK, Naderi Z. Evaluation Of The Relationship Between Parents' Stress And Early Childhood Caries. *Journal of Pharmaceutical Negative Results*. 2022:7995-8001.
12. Naderi F, Khosravi R, Karami A, Naderi Z. THE RELATIONSHIP BETWEEN PARENTAL DEPRESSION AND ANXIETY AND CHILDREN'S EARLY CHILDHOOD CARIES.
13. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry research*. 2020;287:112934.
14. Zandifar A, Badrfam R. Iranian mental health during the COVID-19 epidemic. 2020.
15. Boyraz G, Legros DN. Coronavirus disease (COVID-19) and traumatic stress: probable risk factors and correlates of posttraumatic stress disorder. *J Loss Trauma*. 2020; 1–20. <https://doi.org/10.1080/15325024.2020.1763556>.
16. Islam MS, Ferdous MZ, Potenza MN. Panic and generalized anxiety during the COVID-19 pandemic among Bangladeshi people: an online pilot survey early in the outbreak. *J Affect Disord*. 2020; 276: 30–37. <https://doi.org/10.1016/j.jad.2020.06.049> PMID: 32697713.
17. Islam MS, Potenza MN, Van Os J. Posttraumatic stress disorder during the COVID-19 pandemic: upcoming challenges in Bangladesh and preventive strategies. *Int J Soc Psychiatry*. 2020. <https://doi.org/10.1177/0020764020954469> PMID: 32873127.
18. Burk DT, Bender DJ. Use and perceived effectiveness of student support services in a first-year dental student population. *Journal of dental education*. 2005;69(10):1148-60.
19. Lloyd C, Musser LA. Psychiatric symptoms in dental students. *Journal of Nervous and Mental Disease*. 1989.

20. Humphris G, Blinkhorn A, Freeman R, Gorter R, Hoad-Reddick G, Murtomaa H, et al. Psychological stress in undergraduate dental students: baseline results from seven European dental schools. *European journal of dental education*. 2002;6(1):22-9.
21. Stewart DW, de Vries J, Singer DL, Degen GG, Wener P. Canadian dental students' perceptions of their learning environment and psychological functioning over time. *Journal of dental education*. 2006;70(9):972-81.
22. Newbury-Birch D, Lowry R, Kamali F. The changing patterns of drinking, illicit drug use, stress, anxiety and depression in dental students in a UK dental school: a longitudinal study. *British dental journal*. 2002;192(11):646-9.
23. Schmitter M, Liedl M, Beck J, Rammelsberg P. Chronic stress in medical and dental education. *Medical teacher*. 2008;30(1):97-9.
24. Ey S, Henning KR, Shaw DL. Attitudes and factors related to seeking mental health treatment among medical and dental students. *Journal of College Student Psychotherapy*. 2000;14(3):23-39.
25. Naidu RS, Adams JS, Simeon D, Persad S. Sources of stress and psychological disturbance among dental students in the West Indies. *Journal of dental education*. 2002;66(9):1021-30.
26. Dahan H, Bedos C. A typology of dental students according to their experience of stress: a qualitative study. *Journal of dental education*. 2010;74(2):95-103.
27. Uraz A, Tocak YS, Yozgathgil C, Cetiner S, Bal B. Psychological well-being, health, and stress sources in Turkish dental students. *Journal of dental education*. 2013;77(10):1345-55.
28. Adams DF. The embedded counseling model: an application to dental students. *Journal of dental education*. 2017;81(1):29-35.
29. Montero-Marín J, Piva Demarzo MM, Stapinski L, Gili M, García-Campayo J. Perceived stress latent factors and the burnout subtypes: a structural model in dental students. *PloS one*. 2014;9(6):e99765.
30. Rada RE, Johnson-Leong C. Stress, burnout, anxiety and depression among dentists. *The Journal of the American Dental Association*. 2004;135(6):788-94.
31. Heath J, Macfarlane T, Umar M. Perceived sources of stress in dental students. *Dental update*. 1999;26(3):94-100.
32. Alzahem A, Van der Molen H, Alaujan A, Schmidt H, Zamakhshary M. Stress amongst dental students: a systematic review. *European Journal of Dental Education*. 2011;15(1):8-18.
33. Al-Rabiaah A, Temsah M-H, Al-Eyadhy AA, Hasan GM, Al-Zamil F, Al-Subaie S, et al. Middle East Respiratory Syndrome-Corona Virus (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. *Journal of infection and public health*. 2020;13(5):687-91.
34. Anjum A, Hossain S, Sikder T, Uddin ME, Rahim DA. Investigating the prevalence of and factors associated with depressive symptoms among urban and semi-urban school adolescents in Bangladesh: a pilot study. *International health*. 2022;14(4):354-62.
35. Hossain A, et al. (2020). COVID-19 and Bangladesh. Retrieved from [https://www.researchgate.net/publication/340476880\\_Report\\_II\\_Weekly\\_Situation\\_Analysis\\_of\\_COVID-19\\_in\\_Bangladesh](https://www.researchgate.net/publication/340476880_Report_II_Weekly_Situation_Analysis_of_COVID-19_in_Bangladesh).
36. Islam MS, Sujon MSH, Tasnim R, Sikder MT, Potenza MN, Van Os J. Psychological responses during the COVID-19 outbreak among university students in Bangladesh. *PloS one*. 2020;15(12):e0245083.
37. Du J, Mayer G, Hummel S, Oetjen N, Gronewold N, Zafar A, et al. Mental health burden in different professions during the final stage of the COVID-19 lockdown in China: cross-sectional survey study. *Journal of medical Internet research*. 2020;22(12):e24240.
38. Raja HZ, Saleem MN, Saleem T, Rashid H, Ehsan S, Hakeem S, et al. Perceived stress levels in Pakistani dental students during COVID-19 lockdown. *European Journal of Dental and Oral Health*. 2020;1(4).
39. Chakraborty T, Subbiah GK, Damade Y. Psychological distress during COVID-19 lockdown among dental students and practitioners in India: a cross-sectional survey. *European journal of dentistry*. 2020;14(S 01):S70-S8.
40. Mohebian M, Dadashi M, Motamed N, Safdarian E. Evaluation of Depression, Anxiety, Stress Levels and Stressors among Dental Students of Zanjan University of Medical Sciences in Academic Year of 2015. *J Med Educ Dev*. 2017;10(26):108-22.
41. Abdulrazzaq MM, Adnan MM, Al-Ani ZTA. Psychological stress among dental students at al-iraqia university after corona virus pandemic. *Indian Journal of Forensic Medicine & Toxicology*. 2020;14(3):2397-401.
42. Agius AM, Gatt G, Vento Zahra E, Busuttill A, Gainza-Cirauqui ML, Cortes AR, et al. Self-reported dental student stressors and experiences during the COVID-19 pandemic. *Journal of dental education*. 2021;85(2):208-15.



43. Valaee N. Evaluation of Stress level, its Sources and Related Factors Among Senior Dental Students at Islamic Azad University in year 2010. *Res Dent Sci.* 2011;8(3):130-4.
44. Vizheh M, Qorbani M, Arzaghi SM, Muhidin S, Javanmard Z, Esmaili M. The mental health of healthcare workers in the COVID-19 pandemic: A systematic review. *Journal of Diabetes & Metabolic Disorders.* 2020;19(2):1967-78.
45. Bashir TF, Hassan S, Maqsood A, Khan ZA, Issrani R, Ahmed N, et al. The psychological impact analysis of novel COVID-19 pandemic in health sciences students: a global survey. *European journal of dentistry.* 2020;14(S 01):S91-S6.
46. Peker I, Alkurt MT, Usta MG, Turkbay T. The evaluation of perceived sources of stress and stress levels among Turkish dental students. *International dental journal.* 2009;59(2):103-11.
47. Holtzman JM, Berg RG, Mann J, Berkey DB. The relationship of age and gender to fear and anxiety in response to dental care. *Special care in dentistry.* 1997;17(3):82-7.
48. Stecker T. Well-being in an academic environment. *Medical education.* 2004;38(5):465-78.
49. Peretz B, Rosenblum A, Zadik D. Stress levels and related variables among dental students in Jerusalem, Israel. *European Journal of Dental Education.* 1997;1(4):162-6.
50. Rabiei M, Safarpour M. Assessment of dental environment stress and related factors in dental students. *Research in Medical Education.* 2017;9(1):57-46.