Received: 24 January 2022 | Revised: 14 June 2022 | Accepted: 11 August 2022

DOI: 10.1002/jdd.13095

ADEA | THE VOICE OF DENTAL EDUCATION WILEY

ORIGINAL ARTICLE

Effects of COVID-19 epidemic on mental health of dental students of Tehran University of Medical Sciences in 2020

Arghavan Tonkaboni [1,2] | **Abolfazl Razi-Avarzamani** [1] | **Maryam-Sadat Sadrzadeh-Afshar** [3]

[1]Oral & Maxillofacial Medicine Department, Faculty of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

[2]Grupo de Investigacion en Patologia Oral Medico Quirurgica, Universidade de Santiago de Compostela, Santiago, de Compostela, Spain

[3]Oral & Maxillofacial Medicine Department, Faculty of Dentistry, Aja University of Medical Sciences, Tehran, Iran

Correspondence
Maryam-Sadat Sadrzadeh-Afshar, Oral & Maxillofacial Medicine Department, Faculty of Dentistry, Aja University of Medical Sciences, 13th East Street, Ajudanieh, Tehran, Iran.
Email: m_sadrzade@alumnus.tums.ac.ir

Abstract

Objectives: Coronavirus disease 2019 (COVID-19) pandemic has imposed panic and fear among people in the community, and has endangered the mental health of people, including students. The purpose of this study was to determine the psychological effects of COVID-19 outbreak on dental students of our university in 2020.

Methods and materials: The present cross-sectional and descriptive-analytical study was conducted on 133 dental students from the fifth and 11th semesters in our University. Data collection tools included the Demographic Information Questionnaire, the 28-item Goldberg General Health Questionnaire (GHQ-28) to measure the psychological aspects, the BarOn Emotional Quotient-Inventory (BarOn EQ-i) to determine emotional intelligence, and the COVID-19 Anxiety Scale (CAS) of students during the epidemic. The reliability and validity of the questionnaires had already been reviewed and confirmed. The correlation of the scores of the questionnaires was evaluated by Pearson correlation coefficient and the effects of different variables in predicting the scores of the questionnaires by regression model.

Results: Among the tested students, the mean GHQ-28 score was 35.73%, the mean BarOn EQ-i score was 59.94%, and the mean CAS score was 25.27%. There was a significant and direct correlation between GHQ-28 and BarOn EQ-i scores and also a significant and negative correlation between GHQ-28 and CAS scores and between BarOn EQ-i and CAS scores.

Conclusion: Despite limited CAS scores and high BarOn EQ-i scores, psychological disorders were observed in a significant number of students during the COVID-19 pandemic period; there is a need for therapeutic and counseling interventions to mitigate the effects of these disorders.

KEYWORDS
anxiety, COVID-19, emotional intelligence, mental health

1 | INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an acute respiratory disease that is closely related to severe acute respiratory syndrome (SARS), whose early symptoms include pneumonia, fever, myalgia, and fatigue.[1,2] According to the World Health Organization (WHO), the COVID-19 mortality rate was 4.3%.[2] To prevent transmission of COVID-19, the WHO has suggested that countries must reduce person-to-person transmission of the disease by restricting contact, especially between infected people and healthcare workers, as well as must control the global spread of this pandemic.[3,4] However, this method alone did not work and some countries were forced to establish full quarantine (China and Italy) or implement preventive care at the national level (such as Iran, UAE, and South Korea). The implementation of these health policies, despite the positive consequences, has caused negative psychological effects in the community. Fear of illness, fear of death, spreading false news and rumors, interference in daily activities, travel prohibitions or restrictions, reduced social relations, and the occurrence of occupational and financial problems are all cases that threaten the mental health of people in society.[5,6]

Meanwhile, the healthcare students such as medicine, dentistry, and nursery are at greater risk for infection, stress, and related psychological problems due to their contact with COVID-19 patients. Dental students are in direct contact with aerosols from rotary and ultrasonic devices during intraoral applications. These factors can range from symptoms to serious clinical conditions. One of the leading causes of anxiety among students is concern about the impact of COVID-19 on their future education, career, and social relationships. According to the results from the spread of SARS and Ebola diseases, the healthcare workers suffer from some harmful psychological disorders such as anxiety, fear, and stress, which can severely affect the quality of their activities and services.[7,8]

Emotional intelligence, a form of social intelligence, is a suitable predictor of efficiency in certain areas such as job and academic performance.[9,10] People with psychological impairments have been reported to be deficient in recognizing and describing differences between emotional stimuli, and are unable to utilize their own emotional intelligence skills. As a result, they are twice as likely to experience anxiety, depression, or addiction.[11,12]

Research on anxiety caused by the spread of COVID-19 may help identify the prevalence of mental disorders, and may improve the quality of life and mental health of individuals. It seems that the fear of COVID-19 is mostly due to its unknownness and little information about it. Also stress and anxiety can weaken the immune system.[13,14] Due to the rapid spread of the disease and the lack of research in this regard at the time of the study, it seems that doing research that can help to identify the disease and especially anxiety created and strategies to deal with anxiety is essential and can improve the quality of life and help people and community health. Among medical practitioners, dentists and dental students are always exposed to aerosols and droplets produced during treatment procedures. Therefore, they have significant risk of being infected with airborne microorganisms such as SARS-CoV-2.[15] Accordingly, the current study aimed to determine the psychological effects of COVID-19 outbreak on dental students in 2020.

2 | METHODS

The present cross-sectional and descriptive-analytical study was conducted using the data collection tools including the Demographic Information Questionnaire, the 28-item Goldberg General Health Questionnaire (GHQ-28) to measure the psychological aspects, which is designed to identify whether an individual's current mental state differs from his/her typical state,[16] the BarOn Emotional Quotient-Inventory (BarOn EQ-i), which is one of the first scientific developed measures to determine emotional intelligence that measures the potential to succeed rather than the success itself,[17] and the COVID-19 Anxiety Scale (CAS) of students, which measures similar and different constructs of anxiety during the epidemic.[18] The sampling method was census and all students who matched the inclusion and exclusion criteria were included in the study. Students in the first to fourth semesters (basic science course) who do not work in the dental clinic, were not included in the study. Students in fifth semester (from preclinic course) and 11th semester (from clinical course) were selected to participate in the study. The research protocol was approved by the Ethics Committee in Medical Research, School of Dentistry (IR.TUMS.DENTISTRY.REC.1399.132).

Using multiple regression tool in PASS 25 software and considering $\alpha = 0.05$, $\beta = 0.2$, and $\rho = 0.1$, the minimum sample size required to evaluate the effect of six independent variables in the present study was estimated at 132. With a census of incoming students in 2018 ($n = 64$) and incoming students in 2015 ($n = 69$), a total of 133 subjects were included in the study. The incoming students in 2018 do not pass the courses related to the medical wards, and the incoming students in 2015 mostly pass the courses related to the clinical wards. Accordingly, the inclusion criteria in this study were the incoming students in 2015 and 2018 of the School of Dentistry. Exclusion criteria included the following:

- History of underlying diseases, such as chronic lung disease or moderate to severe asthma/chronic kidney disease/need for dialysis/liver disease/immune system problems such as people undergoing cancer treatment/diabetes.
- History of mental illness.
- History of referring to psychiatry.
- History of receiving psychological counseling.
- History of drug use due to mental illness.
- Loss of a family member in a recent year.
- Family history of incurable disease.

After explaining the objectives and methodology of the research and applying the survey to the future decisions of the officials, students were asked to cooperate in completing the questionnaire. The research questionnaire consisted of four sections: demographic information, GHQ-28, BarOn EQ-i, and CAS.

Data were analyzed by statistical Package for Social Sciences (version 25) software. The frequency and percentage (absolute and relative frequency) of students' answers to each of the Goldberg Mental Health Questionnaire, BarOn Emotional Intelligence, and Coronary Anxiety Questionnaire were calculated and reported in general and according to their semester. Then, the scores of the questionnaires were summarized based on the Likert scale and their sum was calculated and reported for each student. The correlation between the scores of Goldberg Mental Health Questionnaire, BarOn Emotional Intelligence, and Coronary Anxiety Questionnaire was statistically determined by Pearson correlation coefficient. The role of different variables in the prognosis of students' mental health, emotional intelligence, and coronal anxiety scores was also investigated by a linear regression model. The type I error (α) was considered to be 0.05.

3 | RESULTS

The study target population was 140 dental students at Faculty of Dentistry, 70 in fifth semester, and 70 in 11th semester; of this number, seven cases (six in fifth semester and one in 11th semester) were excluded by exclusion criteria. Ultimately, the study was conducted on 133 cases, of which 64 (48.1%) were fifth semester students and 69 (51.9%) were 11th semester students.

In addition, 72 (54.1%) were female, 61 (45.9%) were male, 118 (88.7%) were single, and 15 (11.3. %) were married.

Concerning the number of siblings, six (4.5%) had no siblings, 71 (53.3%) had one sibling, 35 (26.3%) had two siblings, 12 (9%) had three siblings, seven (5.3%) had four siblings, one (0.8%) had five siblings, and one (0.8%) had six siblings.

TABLE 1 Tools to access mental health of studied subjects

Questionnaires	Number of items	Scales
Goldberg General Health Questionnaire (GHQ-28)	28	4
BarOn Emotional Quotient-Inventory (BarOn EQ-i)	90	5
COVID-19 Anxiety Scale (CAS)	18	4

Moreover, 57 (42.9%) were the first child of the family, 55 (41.4%) were the second child of the family, 13 (9.8%) were the third child of the family, six (4.5%) were the fourth child of the family, and two (1.5%) were the fifth child of the family.

On the other hand, 54 (40.6%) lived at home with the family, 24 (18.0%) had a private house, and 55 (41.4%) lived in a dormitory.

Regarding the commuting to the university, 52 (39.1%) used to go to university by personal vehicle, nine (6.8%) by internet taxi, 63 (47.4%) by taxi, and nine (6.8%) by subway.

However, a family history of COVID-19 infection was recorded in 44 (33.1%). Among students, 27 (20.3%) were working while studying and 11 (8.3%) were employed in the health sector outside of school while studying.

Table 1 presents the tools used in the present study to access mental health of subjects.

Of fifth semester students ($n = 64$), 36 (56.3%) were female and 28 (43.8%) were male. Among 11th semester students ($n = 69$), 36 (52.2%) were female and 33 (47.8%) were male. Of fifth semester students, 59 (92.2%) were single and five (7.8%) were married. Among 11th semester students, 59 (85.5%) were single and 10 (14.5%) were married.

As for the number of siblings among fifth semester students, three (4.7%) had no siblings, 34 (53.1%) had one sibling, 15 (23.4%) had two siblings, eight (12.5%) had three siblings, two (3.1%) had four siblings, one (1.6%) had five siblings, and one (1.6%) had six siblings. Among 11th semester students, three (4.3%) had no siblings, 37 (53.6%) had one sibling, 20 (29.0%) had two siblings, four (5.8%) had three siblings, and five (7.2%) had four siblings.

Among fifth semester students, 30 (46.9%) were the first child, 25 (39.1%) were the second child, seven (10.9%) were the third child, one (1.6%) was the fourth child, and one (1.6%) was the fifth child in the family. Among 11th semester students, 27 (39.1%) were the first child, 30 (43.5%) were the second child, six (8.7%) were the third child, five (7.2%) were the fourth child, and one (1.4%) was the sixth child in the family.

Among fifth semester students, 31 (48.4%) lived at home with their families, 10 (15.6%) had private houses, and 23 (35.9%) lived in dormitories. Among 11th semester students, 23 (33.3%) lived at home with their families,

14 (20.3%) had private houses, and 32 (46.4%) lived in dormitories.

Among fifth semester students, 20 (31.3%) went to university by personal vehicle, five (7.8%) by internet taxi, 30 (46.9%) by taxi, and nine (14.1%) by subway. Among 11th semester students, 32 (46.4%) went to university by personal vehicle, four (5.8%) by internet taxi, and 33 (47.8%) by taxi.

Regarding COVID-19 infection among family members, 23 (35.9%) of family members of fifth semester students and 21 (30.4%) of family members of 11th semester students were infected with this disease.

In addition, 11 (17.2%) among fifth semester students and 16 (23.2%) among 11th semester students were working at the same time, as well as two (3.1%) among fifth semester students and nine (13.0%) among 11th semester students were employed in the health sector while studying.

The mean GHQ-28 scores of students were 35.73% with a standard deviation of 16.76%. The mean score of BarOn EQ-i of students was 59.94% with a standard deviation of 8.99%. The mean CAS score of students was 25.27% with a standard deviation of 17.05%.

According to the results of Pearson correlation coefficient, there was a significant and direct correlation between GHQ-28 and BarOn EQ-i scores ($r = 0.537$, $p < 0.001$), a significant and negative correlation between GHQ-28 and CAS scores ($r = -0.349$, $p < 0.001$), and a significant and negative correlation between BarOn EQ-i and CAS scores ($r = -0.235$, $p = 0.007$).

According to the results of linear regression model, the effects of students' gender ($p = 0.01$) and number of siblings ($p = 0.038$) on GHQ-28 scores of students were significant, but other variables had no significant effects on the prediction of GHQ-28 scores of students.

In addition, the effects of family income level ($p = 0.026$) and students' means of commuting to university ($p = 0.006$) on BarOn EQ-i scores of students were significant, but other variables had no significant effects on the prediction of BarOn EQ-i scores of students.

On the other hand, the effects of students' semester ($p = 0.01$), gender ($p = 0.006$), and number of siblings ($p = 0.025$) on CAS scores of students were significant, but other variables had no significant effects on the prediction of CAS scores of students.

4 | DISCUSSION

In the present study, the mean GHQ-28 scores and percentage were 0.30 and 35.73%, respectively. In this questionnaire (Goldenberg), a score of ≥23 has been determined as an indication for mental disorder.[19] In this study, 92 (69.2%) students had a GHQ-28 score of >23, indicating the presence of a mental disorder. This level of psychological stress is not necessarily related to the current situation. This can be partly because of the COVID-19 and partly because of previous underlying causes. So it seems that psychological examination before entering the college is necessary to identify possible problems.

Students are highly prone to mental disorders due to specific issues and problems. Most of these students lived in dormitories (in the present study, 41.4% of students lived in dormitories) and may be from low-income families. They are likely to make more efforts to provide appropriate facilities.[20] The sum of these cases increases the incidence of mental disorders in students. On the other hand, certain issues and problems, as well as forced quarantines during the COVID-19 pandemic have exacerbated mental disorders in students.

The incidence of mental disorders in medical disciplines such as dentistry and medicine is higher than other majors because they are engaged in education and experience in environment where COVID-19 patients are hospitalized and treated.[15]

In general, male students have better mental health due to their greater ability to communicate with others in society and at university, their greater ability to cope with problems and difficulties, as well as their ability to earn more money, while female students have an overly emotional attachment to family and lack a sense of social security. The number of siblings is also one of the effective components in people's mental health. In general, an increase in the number of siblings leads to an elevation in the ability of family members to understand people's feelings and the ability to communicate effectively, and thus the ability to deal with problems, possibly leading to better mental health.

The difference in the prevalence rate of mental disorders can be attributed to the difference in the scales and questionnaires studied and also the sampling of students in different academic years. In addition, differences in students' contextual circumstances (individual, social, cultural, and economic dimensions) affect responses. Students' level of knowledge about the symptoms of mental disorders and the level of access to counseling services also vary among them. All of these factors can influence the results of various studies. On the other hand, the role of compatibility styles and emotional intelligence should be considered in this regard, so it has been reported that the higher the emotional intelligence and self-efficacy of students, the better is their mental health.[21]

In the present study, the semester had no significant effect on the prognosis of students' GHQ-28 and BarOn EQ-i scores, but its effect on CAS scores was significant. Upon entering the higher semesters, students have more specialized courses and enter the patient's bedside and

are in direct contact with the patient and have a greater sense of responsibility. On the other hand, parameters such as concern for future careers, nearing completion of education, and concerns about the ability to acquire the required clinical skills in the remaining time according to the existing conditions are logically more pronounced in senior students compared to junior students. However, as students in the higher semesters spent more time starting their studies, they gained more experience by going through the various stages of college, and became more familiar with the solutions to potential problems, the occurrence of anxiety and in general their mental disorders would be alleviated.

In the present study, the mean BarOn EQ-i score of students was estimated to be 59.94%, which was more than half of the scores. At the same time, in the present study, the effects of family income level and students' means of commuting to university were significant on the BarOn EQ-i scores of students, but other variables had no significant effects on the prediction of the BarOn EQ-i scores of the students. These findings indicate the importance of economic variables in predicting students' BarOn EQ-i scores. There is no doubt that some problems arise for students in families with more limited financial status and income because students face expenses such as travel, book purchase, accommodation, and food while studying. If the economic situation of the family is unsatisfactory, these problems will affect the area of emotional intelligence and in general the educational status of the individual.

Son et al.[22] examined the effects of COVID-19 on student mental health in the United States, and reported that 71% of students had increased stress and anxiety due to the COVID-19 pandemic, consistent with the present study.

Wathelet et al.[23] examined the prevalence of mental disorders among French students during the COVID-19 pandemic. They identified risk factors for these disorders, including female gender, poor quality housing, a history of treatment follow-ups for mental illness, COVID-19-compliant symptoms, social quarantine, poor quality of social relationships, and poor quality of information received. This issue is consistent with the results of the present study regarding the risk factor of gender and the number of siblings, which is a sign of better quality of social relations. Further restrictions on girls in Iranian society, biological and hormonal factors, environmental stress, and the sensitivity of this group to their environment are predisposing factors to these emotional and psychological problems.

Fard and Saffarinia[24] investigated the correlation of anxiety and social cohesion caused by COVID-19 with mental health in Tehran (Iran), and reported that COVID-19-induced anxiety (negatively) and social cohesion (positively) correlated with mental health, in consistent with the findings of the present study, which indicates a negative correlation between COVID-19 anxiety and mental health. To the best of our knowledge, no significant research has been performed previously on measuring the anxiety level of students during COVID-19 outbreak using CAS, and only one study evaluated the psychometric properties of the fear of COVID-19 risk.[25] Alipoor et al.[26] examined the results of preliminary validity for CAS in the Iranian population, and documented that the CAS had acceptable validity during preliminary validation and suggested this scale as a scientific and valid tool to measure COVID-19-induced anxiety. The shortness of this scale is very useful in research to examine the relationships between this scale and other variables.

The current study was the first to use CAS to determine the anxiety level among dental students, the results of which showed that the mean CAS score was 25.27% for these students. In addition, the students' variables of semester, gender, and number of siblings had significant effects on their CAS scores. Explanations for the correlation of some variables with GHQ-28 scores can also be provided in this article.

According to the regression model analysis, although some demographic and economic variables did not play a significant role in predicting GHQ-28, BarOn EQ-i and CAS scores, these parameters may play a significant role in the occurrence of these disorders by enlarging the sample size. On the other hand, the present study was conducted only among dental students of one school. It seems that the role of most of the studied variables in the mental health of the samples during the COVID-19 epidemic can be recognized as significant by choosing a population different from the current study population. It was impossible to determine the cause-and-effect relationships of the variables tested in the research due to data collection in a short period of time. In addition, it is impossible to generalize the findings to the entire dental student community in the country due to the implementation of a research protocol on students in a dental school.

The COVID-19 pandemic period endangered the mental health of individuals at various levels of society, including students. Accordingly, identifying the cause of these psychological disorders in people is indispensable to maintain the mental health of individuals using appropriate psychotherapy approaches. The use of suitable and remote psychotherapy methods, up-to-date facilities such as video conferencing, online and convenient applications or telephone are reasonable treatment protocols in this field.[27–29]

In China, using the Internet, while screening and identifying people prone to psychological disorders, self-help protocols have been provided in the form of videos and articles for the general public as well as for special groups such as children, pregnant women, the elderly, medical

staff, and people who have lost loved ones due to an outbreak. In this country, 29 guidelines have been made available to the people, most of which have been developed in accordance with the current state of society. One of these guidelines is to reduce the anxiety of employees in returning to work after completing the course of the disease in this country.[30,31]

China also uses several artificial intelligence programs to intervene in psychological crises caused by the COVID-19 pandemic. For example, people at risk of suicide are tracked by this program as well as by monitoring and analyzing messages sent to online counseling systems. The intervention system in the Chinese crisis consisted of three principles: determining the psychological status of different groups of people in the community affected by the COVID-19 outbreak, identifying people at high risk of suicide and violence, and providing appropriate therapeutic interventions.[32] In the current high-risk situation where the mental health of all members of the community is at risk due to the COVID-19 epidemic, the mental health of people at different levels of society can be maintained by identifying these psychological disorders in vulnerable people in society and providing appropriate and targeted psychotherapy programs and protocols.

In general, activating online student counseling centers, teaching effective methods of toleration through the mass media and health professionals, using the capacities of religious beliefs and practices, and institutionalizing the mental health assessment of students can improve the mental health indicators of medical and other students at the beginning and all stages of education.[33]

Some limitations of the study were that sampling was limited to one faculty and impossibility of conducting clinical assessments of students' mental health due to quarantine at the time of the study. Suggestions that can be made for further studies include conducting a study on the mental health of students of other dental and medical schools during the COVID-19 pandemic and comparing their results, conducting face-to-face clinical assessments of students' mental health, and providing mental health counseling to students on social media or online during quarantine.

Despite limited scores of the CAS and high scores of the BarOn EQ-i, it can be suggested that the probability that these individuals suffer from psychological disorders is greater; therefore, there is a need for therapeutic and counseling interventions to mitigate the effects of these disorders on students' health and academic achievement.

ACKNOWLEDGMENTS

The current article has been adapted from Doctor of Dentistry dissertation in 2020 entitled "Effects of COVID-19 epidemic on the mental health of dental students of in 2020," with the code of IR.TUMS.DENTISTRY.REC.2020.132, which was implemented with the support of our University and Health Services.

ORCID

Arghavan Tonkaboni https://orcid.org/0000-0003-3461-4847

Maryam-Sadat Sadrzadeh-Afshar https://orcid.org/0000-0001-8277-3805

REFERENCES

1. Shigemura J, Ursano RJ, Morganstein JC, Kurosawa M, Benedek DM. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: mental health consequences and target populations. *Psych Clin Neurosci*. 2020;32:1-41.
2. Martins-Filho PR, Araújo AAS, Góes MAO, et al. COVID-19 mortality and case-fatality rates in Sergipe State, Northeast Brazil, from April to June 2020. *Front Public Health*. 2021;9:581618. doi: 10.3389/fpubh.2021.581618
3. Farnoosh G, Alishiri G, Hosseini Zijoud SR, Dorostkar R, Jalali Farahani A. Understanding the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease (COVID-19) based on available evidence—a narrative review. *J Mil Med*. 2020;22(1):1-11.
4. Tai DY. Pharmacologic treatment of SARS: current knowledge and recommendations. *Ann Acad Med Sing*. 2007;36(6):438.
5. Bo X. Open access epidemiological data from the COVID-19 outbreak. *Lancet Infect Dis*. 2020;2:19.
6. Ogłodek EA. Ochrona zdrowia psychicznego w COVID-19 [Mental health protection associated with COVID-19]. *Pol Merkur Lekarski*. 2021;49(291):235-237. PMID: 34218247.
7. WHO. *Novel Coronavirus (2019-nCoV) Situation Report-15*. February 4, 2020. Accessed February 4, 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200204-Sitrep15ncov.pdf?sfvrsn=88fe8ad6-2
8. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese center for disease control and prevention external icon. *JAMA*. 2020;2:24. doi: 10.1001/jama.2020.2648
9. Fischhoff B. *Speaking of Psychology: Coronavirus Anxiety*. 2020. https://www.apa.org/research/action/speaking-of-sychology/coronavirus-anxiety
10. Li X, Fang X, Wang L, Geng X, Chang H. Relationship between emotional intelligence and job well-being in Chinese Registered Nurses: mediating effect of communication satisfaction. *Nurs Open*. 2021;8(4):1778-1787. doi: 10.1002/nop2.820. PMID: 33656788; PMCID: PMC8186701.
11. Li L, Wan C, Ding R, Liu Y, Chen J, Wu Z. Mental distress among Liberian medical staff working at the China Ebola Treatment Unit: a cross sectional study. *Health Qual Life Outcomes*. 2015;13(1):156.
12. Woods CD. Self-reported mental illness in a dental school clinic population. *J Dent Educ*. 2003;67(5):500-504.
13. Bajema KL, Oster AM, McGovern OL. *Persons Evaluated for 2019 Novel Coronavirus —United States*. MMWR Morbidity and Mortality Weekly Report. February 7, 2020. doi: 10.15585/mmwr.mm6906e

14. Heiat M, Heiat F, Halaji M, et al. Phobia and fear of COVID-19: origins, complications and management, a narrative review. *Ann Ig*. 2021;33(4):360-370. doi: 10.7416/ai.2021.2446. PMID: 33908601.
15. Goriuc A, Sandu TM, Luchian I. The impact of the COVID-19 pandemic on dentistry and dental education: a narrative review. *Int J Environ Res Public Health*. 2022;19:2537. doi: 10.3390/ijerph19052537
16. Lobo A, Pérez Echeverría MJ, Artal J. Validity of the scaled version of the General Health Questionnaire (GHQ-28) in a Spanish population. *Psychol Med*. 1986;1116:135-140.
17. De Weerdt M, Rossi G. The Bar-On Emotional Quotient Inventory (EQ-i): evaluation of psychometric aspects in the Dutch speaking part of Belgium. *Psychol Sel Pap*. 2012;9:145-171.
18. Silva WAD, de Sampaio Brito TR, Pereira CR. COVID-19 anxiety scale (CAS): development and psychometric properties. *Curr Psychol*. 2020;11:1-10. doi: 10.1007/s12144-020-01195-0. PMID: 33204058;PMCID:PMC7661558.
19. Hosseini SH, Sadeghi A, Rajabzadeh R, et al. Mental health of the students of North Khorasan University of Medical Sciences and the associated factors on 2010. *J North Khorasan Univ Med Sci*. 2011;3(2):23-28.
20. Alizadeh-Navaei R, Hosseini SH. Mental health status of Iranian students until 2011: a systematic review. *J Clin Exc*. 2014;2(1):1-10. (in Persian).
21. Stecker T. Well-being in an academic environment. *Med Educ*. 2004;38:465-478.
22. Son C, Hegde S, Smith A, Wang X, Sasangohar F. Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *J Med Internet Res*. 2020;22(9):e21279.
23. Wathelet M, Duhem S, Vaiva G, et al. Factors associated with mental health disorders among university students in France confined during the COVID-19 pandemic. *JAMA Netw Open*. 2020;3(10):e2025591.
24. Fard SA, Saffarinia M. The prognosis of mental health based on anxiety and social adhesion of coronal disease. *Res Soc Psychol*. 2019;36:129-141.
25. Veisi S, Imani S, Behrouz B, Imani S. The assessment of psychometric properties of reduced measure of fear of coronavirus (COVID-19) disease. *New Adv Behav Sci*. 2020;5(42):1-10.
26. Alipoor A, Ghadami A, Alipoor Z, Abdollahzadeh H. Initial validity of the measure of corona-related anxiety in an Iranian population. *Sci J Health Psychol*. 2019;4(32):163-175.
27. Rees CS, Maclaine E. A systematic review of videoconference-delivered psychological treatment for anxiety disorders. *Aust Psychol*. 2015;50(4):259-264.
28. García-Lizana F, Muñoz-Mayorga I. Telemedicine for depression: a systematic review. *Perspect Psych Care*. 2010;46(2):119-126.
29. Turgoose D, Ashwick R, Murphy D. Systematic review of lessons learned from delivering teletherapy to veterans with post-traumatic stress disorder. *J Telemed Telecare*. 2018;24(9):575-585.
30. Li W, Yang Y, Liu Z-H, Zhao Y-J, Zhang Q, Zhang L. Progression of Mental Health Services during the COVID-19 Outbreak in China. *Int J Biol Sci*. 2020;16(10):1732.
31. Xiang YT, Yang Y, Li W, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry*. 2020;7(3):228-229. doi: 10.1016/S2215-0366(20)30046-8. PMID: 32032543; PMCID: PMC7128153.
32. Liu S, Yang L, Zhang C, Xiang YT, Liu Z, Hu S. Online mental health services in China during the COVID-19 outbreak. *Lancet Psychiatry*. 2020;7(4):e17-e18.
33. Shadmehri M, Ramak N, Sangani AR. The assessment of the role perceived psychological pressure in the health status of individuals suspicious of COVID-19 disease. *J Milit Med*. 2020;22(2):115-121.

How to cite this article: Tonkaboni A, Razi-Avarzamani A, Sadrzadeh-Afshar M-S. Effects of COVID-19 epidemic on mental health of dental students of Tehran University of Medical Sciences in 2020. *J Dent Educ*. 2022;1-7.
https://doi.org/10.1002/jdd.13095