Perceived Challenges Caused by Covid-19 Outbreak in Students of Medical Sciences

Abstract

Background: Students of medical sciences are a highly vulnerable group during COVID-19 pandemic who may experience a wide range of challenges and stresses. The aim of this study was to investigate the perceived challenges caused by COVID-19 outbreak in students of medical sciences. **Materials and Methods:** A qualitative study was carried out based on conventional qualitative content analysis following Graneheim and Lundman from December 2020 to February 2021. The participants were 17 students of medical sciences and data gathering was done through semistructured interviews. **Results:** Data analyses revealed 5 categories and 12 subcategories. The extracted categories were perceived fear of contracting coronavirus, social limitation, changes in education, neglecting health protocols, and worrying news and information overload. **Conclusions:** The findings indicated that students of medical sciences had been facing challenges and the COVID-19 had affected the psychological, social, and academic functioning of the health-care students. It is important to take measures to improve their mental health. These measures can prevent medical complications in these students, especially during clinical internship.

Keywords: *COVID-19, medical, psychological, qualitative research, stress, students*

Nayereh Baghcheghi[1], Hamid Reza Koohestani[1], Mahmood Karimy[1], Mohammad Hasan Keshavarzi[2], Ali Asghar Ghorbani[3]

[1]Social Determinants of Health Research Center, Saveh University of Medical Sciences, Saveh, [2]Clinical Education Research Center, Shiraz University of Medical Sciences, Shiraz, [3]Department of Medical Records, School of paramedical Sciences, Mazandaran University of Medical Sciences, Sari, Iran

Introduction

The Coronavirus disease (COVID-19) pandemic has highlighted the issue of mental health of the population affected by the disease.[1-3] The limitations caused by COVID-19 pandemic imposed limitations on normal activity of businesses and schools. Social distancing has a deep effect on personal and social lives and creates uncertainty, isolation, and feeling no motivation, meaning, and self-worth.[4] Studies have shown that more than 50% of family members feel the stress of COVID-19 pandemic to some extent.[5] There have been several studies on mental health issues caused by COVID-19 infection; still, the majority of them have been focused on health-care personnel, patients, children, and the general population.[6-8] Regardless of a few research works, however, there is a paucity of evidences of the psychological or mental health effects caused by the pandemic on university students who are among the vulnerable groups.[1-3] The results of a study showed that college students developed stress and anxiety caused by

COVID-19 after the pandemic began.[9] A study in the United States indicated that COVID-19 has significantly worsened mental health of university students; so that these individuals have to deal with a great deal of psychological pressures like anxiety, depression, posttraumatic stress disorder, and eating problems.[10]

College students can be a vulnerable population in terms of mental problems due to the problems caused by the transition to adulthood and financial hardships.[11] In general, students of medical sciences, compared to students in other fields, feel a higher level of stress.[12,13] Medical students are considered as a highly vulnerable group during disease outbreaks due to the higher risk of infection in their clinical training.[14] High levels of anxiety have been reported by medical students in clinical internship during COVID-19 pandemic.[14] Still, recent studies in China on medical school undergraduates have shown that a small group of these students had a moderate (2.7%) or severe anxiety (0.9%). It is notable that the timing of the data gathering process is not clear.[2]

Address for correspondence:
Dr. Hamid Reza Koohestani, Social Determinants of Health Research Center, Saveh University of Medical Sciences, Saveh, Iran.
E-mail: koohestanihr@ savehums.ac.ir

The effects of COVID-19 outbreak on students of medical sciences' mental health have been examined by studies based on quantitative methods. Still, there is a paucity of qualitative studies on the experiences of these students of COVID-19 stress. Qualitative studies are among the best ways to study experiences,[15] and because this method is used to describe and conceptualize participants' experiences, it can improve our knowledge and attitudes toward human experiences.[16] Therefore, the present qualitative study was an attempt to explore perceived challenges caused by COVID-19 outbreak in students of medical sciences.

Materials and Methods

A qualitative study was carried out based on a conventional qualitative content analysis from December 2020 to February 2021 at Saveh University of Medical Sciences, Saveh, Iran. Conventional content analysis is usually recommended when existing theory on a phenomenon is limited. In this approach, categories emerge out of the analysis rather than through theoretical perspectives being imposed on the data.[17]

The study population consisted of 17 students of medical sciences. To select the participants, purposive sampling method and snowball technique were used. In the case of snowball technique, we asked the selected students to introduce other information-rich students who might participate in the research. Sampling was continued until no new code appeared and all concepts of the study were well developed and described (data saturation). To make sure that the richest and most diverse group of students is selected, the participants were selected with the widest diversity as to gender, discipline, and semester. The inclusion criteria were students of medical sciences (included nursing, midwifery, operative room technology, and anesthesia students), at least one academic semester passed, and desire to participate. The exclusion criteria were inability to participate in the study, unwillingness to talk about the research topics, and reluctance to continue participation. Data gathering was done through face-to-face (by observing the COVID-19 health protocols such as physical distancing and using facial mask) and semistructured interviews with the students. Each participant was interviewed once about the coronavirus-related stress. Each interview would be started with an open-end question like "Can you give me an example of the challenges you faced during the COVID pandemic?" or "What is your experience of a coronavirus-related stress" or "Can you give an example of the stress you experienced during the coronavirus pandemic?." In addition and to achieve a deeper insight into the concept, follow-up questions were asked depending on the information given in the interview. The interviews took between 30 and 45 min on average and audio recorded. The first author transcribed the interviews verbatim after completion and data analysis was done along with data gathering.

Data analysis was done using the approach recommended by Graneheim and Lundman (2004).[18] Frist, the interviews were transcribed verbatim and read for several times to achieve a sense of the whole. Then, the important text parts were divided into meaning units. Afterward, the units were condensed and labeled and subcategories were extracted. Then, based on similarities and differences, the categories were determined as the key features of content analysis. Eventually, the latent meaning of the text was extracted known as themes. As to trustworthiness, Guba's criteria were followed.[19] To make sure of credibility, the interviews were performed in a cooperative atmosphere and interactions with the participants were facilitated. Moreover, data credibility was supported using member checking (checking interpretations with the students), memos, field notes, and external checking (peer debriefing). In addition, dependability was improved using a complete description of the study process to make it easy for audit. To improve confirmability, cross-checking was done by other three members of the research team. To make sure that the primary results are a credible interpretation of the participants' responses, the research team members discussed the results. In addition, the participants were diverse in terms of demographics and experiences (highest variation) and this improved transferability of the results.

Ethical considerations

This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board and the Ethics Committee of Saveh University of Medical Sciences, Saveh, Iran (No. IR.SACEHUNMS.REC.1399.022). All participants were informed about the study objectives and their freedom to participate in or withdraw from the investigation. All participants provided informed consent before participation. Data files were only available to the research team. In addition, the recorded research data were deleted after the final analysis.

Results

The mean age of the students in the study was 22.76 (0.61) and 58.82% ($n = 10$) of the participants were female. All the participants were unmarried. Demographics of the participants are presented in Table 1.

Data analysis revealed 122 primary codes, which were then lowered to 88 through mixing and removing overlaps. Then, using similarities and differences, the codes were compared and categorized as 5 categories and 12 subcategories [Table 2].

These categories and subcategories are further explained in the following sections based on the participants' comments.

Perceived fear of contracting coronavirus

This category refers to the students' fear of COVID-19 infection by themselves and their relatives. The students

Table 1: Demographic characteristics of participants in the study

Participant	Age (years)	Gender	Discipline	Semester of the course
P1	19	Female	Nursing	3
P2	21	Female	Nursing	5
P3	20	Male	Operative room technology	5
P4	20	Male	Nursing	5
P5	28	Female	Midwifery	2
P6	21	Male	Anesthesia	7
P7	28	Female	Midwifery	2
P8	21	Male	Nursing	7
P9	19	Female	Nursing	3
P10	29	Female	Midwifery	4
P11	30	Female	Midwifery	4
P12	21	Female	Anesthesia	7
P13	20	Male	Anesthesia	5
P14	20	Male	Nursing	3
P15	20	Male	Operative room technology	3
P16	21	Female	Operative room technology	7
P17	29	Female	Midwifery	4

Table 2: Categories and subcategories

Categories	Subcategories
Perceived fear of contracting coronavirus	Fear of contracting coronavirus in clinical setting
	Fear of contracting coronavirus in society
	The fear of transmitting the disease to families
Social limitations	Limitations of interactions with friends and instructors
	Lockdown limitations
Changes in education	Challenges of online education
	Challenges of online exams
	Delay in education process
Neglecting health protocols	The way of implementing health protocols in society
	The way of educating health protocols in academic and clinical settings
Worrying news and information overload	Too many worrying news from the mass and social media
	Learning about coronavirus infection in classmates and other students

highlighted this fear from several viewpoints, which were categorized in three subcategories, namely, the perceived fear of contracting coronavirus in the clinical setting, the perceived fear of contracting coronavirus in society, and the fear of transmitting the disease to relatives.

Fear of contracting coronavirus in the clinical setting

The students' experiences showed that their main stress during COVID-19 pandemic was the fear of infection during internship in clinical settings. The majority of them noted that internship at hospitals and providing care to patients during the pandemic was one of the main stressors for them due to the high risk of COVID-19 infection. A participant mentioned: Hospitals are among the places where observing social distancing is not "*possible and the risk of infection is high. To provide care to patients, we have to be closer to them, and we do not know if they have COVID-19 or not…. And we are constantly afraid of getting coronavirus*" (P9).

Another student talked about the fear of COVID-19 infection at hospital: "*Internship, being in clinical centers, and working with patients during COVID-19 pandemic is very stressful. It is true that our internship was not in a COVID-19 ward, still, I think hospitals are highly contaminated places as to COVID-19. Every patient can be infected with COVID-19*"…. (P3).

These statements showed that one of the main stressors in medical students was the fear of COVID-19 infection in clinical settings.

Fear of contracting coronavirus in society

In addition to the fear of infection in clinical settings, the fear of COVID-19 infection in crowded places in society was another major stressor in the participants. "*I live in a dormitory and have to go downtown to run some errands every day. The fact that I have to be in crowded places to do necessary jobs is a great source of worry for me because of the risk of infection*" (P14).

As the students expressed, the fear of contracting coronavirus in society was another challenge for students, especially for non-native students.

The fear of transmitting the disease to their families

This subcategory refers to the students' stress about the risk of transmitting the disease to family members. This was stronger in local students who lived with their families. One comment in this regard is as follows: "*I have to go to the hospital to complete my internship. When I return home, my biggest concern is my family and the risk of transmitting the disease to them. I even wanted to move to a dormitory during the internship, but the family did not allow that*"(P8).

This quote shows that the fear of transmitting the disease to relatives is one of the concerns and challenges for students.

Social limitations

Like many countries, the Iranian government introduced traffic limitations in cities and between cities following the outbreak of COVID-19. Along with the positive effects of strategies like this, they also have negative impacts. This category showed that social limitations caused by COVID-19 including traffic limitations between cities prevented students from going to their university and having access to their instructors. A participant mentioned:"*To complete my internship, I have to travel,*

and due to COVID-19 limitations, it was very hard for me to go to the hospital. Many of us cannot afford a car….." (P13).

Because of the closures and replacement of ordinary classes with virtual education, students have lost the chance of having face-to-face interactions in the classroom and enjoying its energetic and friendly environment. What remained is the cold virtual contact and the lack of easy access to instructors has become one of the stressors for students. One participant said: "*In absence of face-to-face contact with instructors, some research and educational projects have been interrupted. It is true that online classes have solved the problems to some extent; however, we still need actual face-to-face consultation for some of the educational and research work* (P13).

These statements indicate the educational consequences of traffic limitation within and between cities.

Changes in education

This category refers to the educational problems and consequences caused by COVID-19 pandemic. There are three subcategories of challenges, including virtual education, challenges of online exams, and delay in education process.

Challenges of virtual education

Virtual education has been indispensable during COVID-19 pandemic so that it has been practiced by the majority of universities. Still, it is not free of problems and these problems are among the stressors of COVID-19 in students of medical sciences. Taking into account the efficacy of the online world, online education is one of the ways to improve productivity. Termination of physical classes has reduced a great deal of intra-city travels by students. This education form is new and surely there are drawbacks and shortcomings of which some are solved and some need more work. Some of the students had experienced different problems in online education depending on their specific situation. "*Poor internet connection and low speed is a major problem in online classes. I lost my connection several times during the class just at the moment that I wanted to answer a question*…." (P11).

Online education problems at home due to more distractions were also mentioned as a challenge by the participants. "The fact that I need to remind my family members to be quiet while I am in an online class and things like that is a stressor for me and my family members. In addition, I cannot concentrate on the subjects discussed in online classes as I do in face-to-face classes (P16)..

Another key problem was not having a laptop, tablet, or smartphone so that given the surging prices of these items in Iran, many were not able to buy one. A participant noted: "*I have three siblings, two of us are university students*

and two other go to school. There are two smartphones at home and we share them. However, sometimes our class schedules overlap and things become complicated. Recently, my parents bought two other smartphones and I didn't feel good about this" (P17).

Challenges of online exam

This category refers to the worries and stresses of students about online exams. Holding online exams has its own advantages and disadvantages. Online exams have positive points like no physical and time limitations, no need to attend classroom, and announcement of exam results in a short time; still, it was one of the major stressors for the students. A participant said: "*The final exams are stressful and the fact that now they are online adds to the stress. For instance, I am always worried about internet connectivity or power outage*…." (P3).

Another study mentioned the specific rules and limitations of online exams as a key stressor: "*The rules of online exams are very stressful for me; for instance, time limitation to answer each question and the fact that I cannot return to previous questions to alter the answers. These are great stressors for me*" (P5).

Delay in education process

One of the stresses associated with COVID-19 disease was delays in educational processes such as graduation time. Some comments in this regard are as follows: "*Any delay in the internship course at hospital delays our graduation and this is the major concern given that it ruins my plans*" (P6).

"*For a while, some wards in the hospital stopped working and thus our internship in those wards was delayed, which surely created problems for us*" (P12).

These quotes show that following the changes in the educational system of colleges, students have faced various stresses and challenges in the field of education.

Neglecting health protocols

This category refers to the public failure to follow health protocols so that many might think that the problem is solved. Neglecting public lockdown and health protocols were one of the stressors in the students. A participant said: "I am shocked and worried that almost everyone knows that wearing facial masks and observing protocols are the only ways to cut COVID-19 transmission chain and protect peoples' lives and still a large group of individuals refuse to do so. Seeing people who do not wear facial masks is highly stressful for me"(P3).

Another student said: "*Some patients and their companions do not wear facial masks at the hospital. Working at a hospital is very stressful and seeing these patients adds to our stress*" (P10).

These comments indicate that people's resistance against observing health protocols and negligence in respecting

these protocols especially at educational hospitals are among the major stressors of students.

Worrying news and information overload

This category refers to overload of information and news and frequent worrying news that negatively affects individuals. In general, some of the students believed that learning about COVID-19 news and feeling a specific level of stress and anxiety is required to convince the public to follow health protocols. On the other hand, information overload and excessive worrying news are considered as stressors. One of the participants noted: "*The fact that they are broadcasting news about COVID-19 everywhere including the TV and social media is a great stressor for me. I agree that these news are essential to specific levels; however, I do not like information bombardment. News overload hurts me emotionally….*" (P10).

Another student mentioned that learning about his classmate and other students' infection was one of COVID-19-caused stressors. "*I felt a great deal of stress, when I learned that one of my classmates in the internship course had COVID-19 and he was not good. We asked the officials to stop our internship the same day*" (P11).

These comments show that information and news overload had overwhelmed the participants' mind and following the bad news created a great deal of stress in them. They believed receiving news was enough only to learn about the situation in society.

Discussion

Paying attention to the mental health of students of medical sciences is essential particularly during COVID-19 pandemic. As far as the authors know, this is the first study with a qualitative approach to examine the perceived challenges caused by COVID-19 outbreak in students of medical sciences. It was shown that the majority of students in the study had several mental and psychological problems and COVID-19 had a notably negative effect on them in terms of well-being, education, social life, and lifestyle.

Other studies have also reported a high level of psychological distress in students of medical sciences during COVID-19 pandemic. For instance, Sirti Nir *et al.*[20] showed that the level of stress caused by COVID-19 in students was higher than that in health personnel. A study by Suryadevara *et al.*[21] in India showed that 19% of pharmaceutical students had a high level of stress during COVID-19 pandemic.

One of the main stresses in the students was the fear of COVID-19 infection or transmitting the disease to relatives. This finding is consistent with other studies on students and health personnel.[1,22] Another study found that medical students in Turkey were highly worried about being infected with COVID-19.[23] Taking into account that

students of medical sciences, despite non-medical students, have to attend medical centers and provide care to patients, a higher level of stress in these students is expectable. The fear of COVID-19 infection increases anxiety and stress in healthy individuals and intensifies the symptoms of psychological distress in them.[24] The fear and anxiety caused by the risk of infection is destructive and can lead to mental and psychological disorders.[1] Providing personal protection equipment and holding mental and psychological support educational courses can help individuals to decrease and control their anxiety and fears.[22]

Given the unexpected longer duration and severity of the outbreak of COVID-19 disease, students' concerns need to be further understood and solutions should be found and implemented to reduce these problems. There are several ways to protect and preserve students' mental health. Some methods such as preparing booklets containing information about the psychological effects of the COVID-19 pandemic and counseling and psychotherapy services have been effective in reducing the psychological disorders of health-care staff.[25] Therefore, the implementation of such programs is also recommended for students. It is suggested to pay more attention to the issue of stress and crisis management in the curriculum of health-care disciplines during the pandemic. This helps the students to face and cope with the stressful conditions of the pandemic through individual and professional preparation. Understanding coping strategies plays an important role in controlling and managing stress.[26] Therefore, teaching students about the effective use of coping strategies can be helpful.

A large percentage of the students stated that the social lockdown following COVID-19 pandemic has created several stresses in them in terms of education and traveling. They highlighted issues like limitations of face-to-face contact with friends and instructors and traffic limitations as well. In Ref.[1], authors showed that a decrease in social interactions due to social distancing was one of the stressors in students during COVID-19 pandemic.[1] Negligence in adhering health protocols by people in society and even patients and their companions were other stressful experiences of the students. Other studies have shown that people are not that concerned about preventive recommendations about COVID-19.[27] Neglecting these recommendations increases the risk of infection in society. It is important to inform people about acceptance of social responsibility toward others' health and also give them health guidelines based on behavior-changing theories.[22]

Despite other studies that have introduced e-learning and mobile-learning as a supplementary educational method for students of medical sciences,[28-30] relying merely on online education methods has created problems for these students. This was one of the categories extracted from the experiences of the participants. The majority of studies

have highlighted challenges like the Internet disconnection, low concentration during online education because of special conditions at home, financial load of procuring equipment needed for online education, concerns about online exams, and probable delay in educational processes like graduation. A study with a quantitative approach in Libya showed that the majority of medical students (64.7%) believed that e-learning was not easy to implement during COVID-19 pandemic and students had to deal with several problems.[31]

Another category in this study was the overload of worrying news. Other studies have shown that individuals who follow COVID-19 news tend to feel more anxiety.[5] A specific level of stress and worry is quite healthy and can be helpful in the face of the everyday challenges of life. However, when stress, worry, and anxiety are intensified for a long period of time, they become unnatural and a medical complication that triggers several physical, cognitive, emotional, and behavioral reactions.[32]

Based on these findings, we can design and implement more efficient interventions and plans for clinical setting, practical educations, and online education. Taking into account the importance of continuing clinical education for medical students, to supply human resources of the future, these students should have a priority in receiving COVID-19 vaccine. Therefore, in addition to practical and theoretical education for students of medical sciences, their mental health should be taken into account to enable them to fulfill their professional role in the future. High stress of students of medical sciences can have a negative effect on their clinical performance and patient care. Understanding factors contributing to students' stress would help to take measures to improve their mental health and empower students in the clinical setting. Our findings highlighted the urgent need to develop preventive interventions and strategies to improve mental health in students of medical sciences.

This study, similar to other qualitative studies, has limitations in the generalizability of the results. The findings are not generalizable to a larger population but may be transferable to similar environment. The results of this study can be used as baseline data for researchers, teachers, and policymakers in the field of education. More studies on different groups of students, schools, and countries are necessary to address these issues further.

Conclusion

Experiences of students of medical sciences in this study highlighted a great deal of mental disorders experienced by these students. The sources of these stresses were the fear of infection and transmitting it to family members and relatives, social limitations, from disruption to recovery in education, negligence in observing health protocols by the public, and negative news overload. The results showed that contagious disease not only creates concerns about physical health but also affects mental health of students of medical sciences. Therefore, during the high-risk period of the pandemic, there is a need to screen students vulnerable to psychological disorders and help them by adopting proper psychological and supportive interventions.

Conflicts of interest

Nothing to declare.

References

1. 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:e21279.

2. 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 Res 2020;287:1-5.

3. Wang C, Zhao H. The impact of covid-19 on anxiety in Chinese university students. Front Psychol 2020;11:1168.

4. Williams SN, Armitage CJ, Tampe T, Dienes K. Public perceptions and experiences of social distancing and social isolation during the COVID-19 pandemic: A UK-based focus group study. BMJ Open 2020;10:e039334.

5. Nasirzadeh M, Akhondi M, Jamalizadeh Nooq A, Khorramnia S. A survey on stress, anxiety, depression and resilience due to the prevalence of covid-19 among Anar city households in 2020: A short report. J Rafsanjan Univ Med Sci 2020;19:889-98.

6. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, *et al*. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open 2020;3:e203976.

7. Xie X, Xue Q, Zhou Y, Zhu K, Liu Q, Zhang J, *et al*. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei province, China. JAMA Pediatr 2020;174:898-900.

8. Nelson BW, Pettitt A, Flannery JE, Allen NB. Rapid assessment of psychological and epidemiological correlates of COVID-19 concern, financial strain, and health-related behavior change in a large online sample. PLoS One 2020;15:e0241990.

9. Marcén-Román Y, Gasch-Gallen A, Vela Martín de la Mota II, Calatayud E, Gómez-Soria I, Rodríguez-Roca B. Stress perceived by university health sciences students, 1 year after covid-19 pandemic. Int J Environ Res 2021;18:5233.

10. Fura D, Negash S. A study on the living experiences of people during the covid-19 pandemic: The case of Wolisso town home-stayed university students. J Psychol Psychother 2020;10. doi: 10.35248/2161-0487.20.10.384.

11. Auerbach RP, Mortier P, Bruffaerts R, Alonso J, Benjet C, Cuijpers P, *et al*. WHO World Mental Health Surveys International College Student Project: Prevalence and distribution of mental disorders. J Abnorm Psychol 2018;127:623-38.

12. Koohestani H, Baghcheghi N, Rezaei K, Abedi A, Seraji A, Zand S. Occupational violence in nursing students in Arak, Iran. Iran J Epidemiology 2011;7:44-50.

13. Baghcheghi N, Koohestani HR, Rezaei K, Seraji A, Abedi AR. Prevalence needlestick/sharps injuries among nursing student and related factor. Iran Occup Health 2011;7:32-9.

14. Saddik B, Hussein A, Sharif-Askari FS, Kheder W, Temsah MH, Koutaich RA, *et al.* Increased levels of anxiety among medical and non-medical university students during the covid-19 pandemic in the United Arab Emirates. Risk Manag Healthc Policy 2020;13:2395-406.

15. Vosoghi N, Fallahi-Khoshknab M, Hosseini M, Ahmadi F. Nursing care challenges of child violence victims: A qualitative study. Iran J Nurs Midwifery Res 2021;26:430-6.

16. Creswell JW, Poth CN. Qualitative Inquiry and Research Design: Choosing among Five Approaches. London: Sage Publications; 2016.

17. Hsieh H-F, Shannon SE. Three approaches to qualitative content analysis. Qual Health Res 2005;15:1277-88.

18. Graneheim, U. H., & Lundman, B. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. Nurse Education Today, 2004;24:105-12.

19. Guba EG. Criteria for assessing the trustworthiness of naturalistic inquiries. Educ Technol Res Dev 1981;29:75-91.

20. Sirati Nir M, Karimi L, Khalili R. The perceived stress level of health care and non-health care in exposed to covid-19 pandemic. Iran J Psychiatry Behav Sci 2020;26:294-305.

21. Vidyadhara S, Chakravarthy A, Kumar AP, Harsha CS, Rahul R. Mental health status among the South Indian Pharmacy students during Covid-19 pandemic's quarantine period: a cross-sectional study. MedRxiv. 2020.

22. Galehdar N, Kamran A, Toulabi T, Heydari H. Exploring nurses' experiences of psychological distress during care of patients with COVID-19: A qualitative study. BMC Psychiatry 2020;20:489.

23. Torun F, Torun SD. The psychological impact of the COVID-19 pandemic on medical students in Turkey. Pak J Med Sci 2020;36:1355-9.

24. Ornell F, Schuch JB, Sordi AO, Kessler FHP. "Pandemic fear" and COVID-19: Mental health burden and strategies. Braz J Psychiatry 2020;42:232-5.

25. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, *et al.* The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. Lancet Psychiatry 2020;7:e14.

26. Ashktorab T, Baghcheghi N, Seyedfatemi N, Baghestani A. Psychometric parameters of the Persian version of the BriefCOPE among wives of patients under hemodialysis. Med J Islam Repub Iran 2017;31:20.

27. Barari S, Caria S, Davola A, Falco P, Fetzer T, Fiorin S, *et al.* Evaluating COVID-19 public health messaging in Italy: Self-reported compliance and growing mental health concerns. MedRxiv. 2020.

28. Koohestani HR, Arabshahi SKS, Ahmadi F, Baghcheghi N. The experiences of healthcare professional students about the educational impacts of mobile learning. Qual Rep 2019;24:1593-609.

29. Sohrabi Z, Koohestani HR, Baghcheghi N, Delavari S, Rezaei Shahsavarloo Z. The effects of group blogging on the attitude towards virtual education in nursing students. Med J Islam Repub Iran 2017;31:132.

30. Koohestani HR, Arabshahi SKS, Ahmadi F. The paradox of acceptance and rejection: The perception of healthcare professional students about mobile learning acceptance in Iran University of Medical Sciences. Q Res Educ 2018;7:144-69.

31. Alsoufi A, Alsuyihili A, Msherghi A, Elhadi A, Atiyah H, Ashini A, *et al.* Impact of the COVID-19 pandemic on medical education: Medical students' knowledge, attitudes, and practices regarding electronic learning. PLoS One 2020;15:e0242905.

32. Nooraei S, Entezari M, Hushmandi K, Raei M. Stress and anxiety caused by covid-19 in the communities. J Mar Med 2020;2:65-6.