Psychological Well-being and the Prevalence of Anxiety among Medical Students during COVID-19: An Online Survey

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Abstract

Background: The COVID-19 pandemic has caused international health concerns. University students, especially medical students, considered to experience higher anxiety levels. This high level of anxiety may lead to many challenges and unfavorable consequences.
Objectives: This study aimed to assess psychological well-being and the prevalence of anxiety among medical students of Kerman University of Medical Sciences during the COVID-19 pandemic.
Methods: An online cross-sectional survey was conducted on Kerman University of Medical Sciences medical students from April to June 2021. The participants were asked to complete Corona Disease Anxiety Scale (CDAS), Goldberg and Hiller's General Health Questionnaire (GHQ-28), and a demographic information questionnaire. Data were analyzed by statistical package for social sciences (SPSS) for windows, version 24, at the significance level of p <0.05 and highly significant level of p<0.001. The multivariate analysis of covariance (MANCOVA) and multiple regression were employed as Statistical tests.
Results: A total of 201 medical students participated, 60.3% being female. The adjusted mean score of COVID-19 anxiety was 11.05 (1.91), and the mean scores obtained for GHQ28 subscales, including somatic, anxiety, social dysfunction, and depression symptoms, were 5.82 (4.41), 7.75 (3.18), 4.49 (5.14), and 10.12 (7.25), respectively. Different factors, including gender and educational level, significantly affected the components of these two questionnaires. Based on linear regression model, anxiety/Insomnia and depression subscales of GHQ28 questionnaire increased COVID-19 anxiety levels.
Conclusion: The COVID-19-related anxiety level of medical students was mild. Female students and students with higher educational levels experienced more anxiety attributable to COVID-19. The general anxiety and depression levels were mild. These data highlight that in critical circumstances such as the COVID-19 pandemic, university authorities need to consider medical students' psychological well-being.
Keywords: COVID-19, Anxiety, Medical Student, Mental Health

Background

The COVID-19 pandemic has caused international health concerns. In December 2019, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was discovered in Wuhan, China. It caused an outbreak of unusual viral pneumonia known as COVID-19 (1). On Mar 11, 2020, World Health Organization (WHO) announced the coronavirus outbreak as a pandemic. This disease has spread rapidly throughout the world. According to official statistics from WHO, to date (Sept 15, 2021), there have been 225,024,781 confirmed cases of COVID-19 and 4,636,153 deaths. In Iran, the first official coronavirus case was reported on Feb 19, 2020,

in the Qom province, and this disease quickly spread all across the country. In Iran, 5,318,327 people have been infected, and 114,759 people have lost their lives (2).

The COVID-19 pandemic compelled global governments to impose nationwide quarantines and ban all kinds of gathering (3). These decisions have caused disruptions in businesses, employment, and education, thereby negatively impacting well-being with consequences such as panic and substance use (4, 5). Stress and anxiety are expected during COVID-19 and other similar pandemics, but no definitive treatment and preventive measures exist for COVID-19-related anxiety and stress (6).

Anxiety is generally characterized by a persistent and excessive feeling of worrying that would not relieve even in the absence of a stressor (7). Anxiety can lead to mild, moderate, or severe adverse health issues (8). This global pandemic has increased anxiety worldwide, which can, in turn, attenuate the immune system and make it vulnerable to infectious diseases (9). However, most researchers have focused on the COVID-19 patients' stress, even though the fear of infection, death, and disruption of daily activities can also cause anxiety in healthy individuals (10).

The rate and severity of mental health issues among university students, particularly medical students, are increasing, and they are reported to experience higher anxiety levels (11). The psychological stress caused by outbreaks can lead to adverse outcomes in terms of learning and the overall psychological health of students (12). Multiple stressors have been identified to increase students' stress, anxiety, and negative thoughts. They include the closure of universities, staying at home, not meeting friends, not exercising, not traveling, fear of getting infected or infecting loved ones, attending online classes instead of participating in the university classrooms, and lack of face-to-face learning and clinical/practical or training lessons (3). Arnout et al. conducted a study in Iraq to determine the effects of the COVID-19 pandemic on individuals. Based on the results, the levels of mental problems had increased. Additionally, this study showed differences in psychological issues based on demographic characteristics (13).

Moreover, recent studies worldwide reported that medical students experienced pandemic-related adverse psychological impacts. Medical students experience higher levels of anxiety compared to the general population. This increased stress levels may adversely affect their academic performance, physical health, psychosocial well-being, and quality of life (14, 15). A study reported that globally, one-third of medical students, especially in the Middle East and Asia, suffered from anxiety (16). Ghafari et al. reported that 56% of students suffered from mental disorders and commented that social support might improve their mental health, especially during the stressful era of the COVID-19 pandemic (17). Al-Rabiaah et al. conducted a study in Saudi Arabia to assess MERS-COV-related stress in medical students in Saudi teaching hospitals. According to their result, establishing psychological support programs for medical students during infectious disease outbreaks is critical (12).

Objectives

According to our searches, COVID-19 anxiety has not been measured among the students of this university.

Therefore, the current study aimed to assess the prevalence of COVID-19 anxiety in terms of psychological well-being and demographic characteristics indicators among medical students of Kerman University of Medical Sciences during the COVID-19 era. These findings can be used to implement health-promoting programs for the improvement of the psychological health of medical students.

Methods

Study Design

This descriptive-analytical cross-sectional study investigated psychological well-being and anxiety levels among Kerman University of Medical Sciences medical students from April to June 2021. Data was collected by convenience sampling method. All individuals who met the inclusion criteria were included in the study. Individuals with the exclusion criteria were excluded from the study.

Sample and Setting

In this study, the measurement of the sample size was based on the mean and standard deviation of a pilot study with a sample size of 40 participants. Gpower software was used to estimate the levels of corona-related anxiety at a significant level of 5%, an absolute error of 1%, and a non-response rate of 5% for MANCOVA tests. Data were collected according to the convenience sampling method. The Inclusion criteria included students who studied at the Kerman University of Medical Sciences and could read and understand Persian. The exclusion criteria were lack of informed consent, using psychiatric drugs, and having been diagnosed with psychological disorders.

Measures

Data were collected using a demographic information questionnaire, Goldberg and Hiller's General Health Questionnaire (GHQ-28), and the Corona Disease Anxiety Scale (CDAS).

A) Demographic Information Questionnaire: The demographic information questionnaire included information about students' demographic characteristics such as age, gender, educational level (basic science, physiopathology, pre-internship, and internship), and history of using psychiatric drugs.

B) The Goldberg and Hiller's General Health Questionnaire-28 (GHQ-28): In this research, the Persian version of Goldberg and Hiller's General Health Questionnaire-28 questionnaires was used to measure psychological well-being. This 28-item questionnaire includes four subscales about a person's psychological well-being in the last month. Each subscale contains seven questions. Questions 1-7 are related to somatic

symptoms, questions 8-14 are related to the scale of anxiety/insomnia, questions 15-21 are related to the scale of social dysfunction, and questions 22-28 reflect depression symptoms. To score this questionnaire, a 4-point Likert scale was used (not at all = 0, slightly = 1, very = 2, and extremely = 3). The highest and lowest scores that could be obtained by the respondents are between 0 and 84 (18). For each subgroup with 7 questions, the highest score is 21, and the lowest is 0 (19). In this tool, a lower score indicates better mental health. Taghavi et al., in a study on Shiraz University college students, calculated the reliability coefficients in three methods: test-retest, spilt half, and Cronbach alpha, which were reported as 0.70, 0.93, and 0.90, respectively. Additionally, Cronbach's alpha coefficients were obtained as (α = 0.76) for the somatic symptoms, (α = 0.84) for anxiety/insomnia, (α = 0.61) for social dysfunction, and (α = 0.88) for depression symptoms. The concurrent validity of the questionnaire was measured by Middlesex Hospital Questionnaire and was reported 55 ($p < 0001$). Moreover, the subscale-total GHQ28 questionnaire correlation was reported from .72 to .87. Four questionnaire factors were analyzed by varimax rotation based on the Skree test, covering over 50 percent of the total variance (20).

C) The COVID-19 Disease Anxiety Scale (CDAS):

The COVID-19 Disease Anxiety Scale (CDAS) questionnaire is developed and validated to measure COVID-19 anxiety during the coronavirus outbreak in Iran. The final version of the questionnaire has 18 items and two factors or subscales. Items 1-9 measure psychological anxiety symptoms, and items 10-18 measure physical anxiety symptoms. This tool is scored on a 4-point Likert scale (never = 0, sometimes = 1, most of the time = 2, always = 3); Therefore, the highest and lowest scores obtained by the respondents are between 0 and 54. High scores in this questionnaire indicate a higher level of anxiety. A score of 0-16, 17-29, and 30–54 shows none or mild anxiety, moderate anxiety, and severe anxiety, respectively. In the subscales of psychological anxiety symptoms, scores 0-5, 6-19, and 20-27 indicate mild, moderate, and severe psychological symptoms, respectively. Moreover, in the physical anxiety symptoms subscale, scores 0-1, 2-9, and 10-27 are considered as none or mild, moderate, and severe physical symptoms, respectively. Alipour et al. assessed the validity and reliability of this questionnaire in an Iranian sample (8).

The reliability of this tool was obtained by calculating Cronbach's alpha coefficient as (α = 0.879) for the first factor, (α = 0.861) for the second factor, and (α = 0.919) for the whole questionnaire. Moreover, the value of Guttman's $\lambda 2$ was obtained as (λ = 0.882) for the first factor, and (λ = 0.922) for the whole questionnaire (8). CDAS questionnaire has good reliability and validity in the Persian translation and can be used to measure Corona-related anxiety in the Iranian population (8).

Data Collection

Due to the special conditions of society and the limitations of social communication, an online questionnaire was designed by online software for data collection. The link access to this questionnaire was distributed via social media (i, e. Telegram, and WhatsApp). After reading the study description and consent, students completed the online questionnaire. A link to a Gmail address was also added to the online questionnaire so students could ask questions. The respondents' information was only used for this article and was not disseminated elsewhere.

Ethical Issues

This study was approved by the Kerman University of Medical Science Research Ethics Committee (IR.KMU.AH.REC.1400.142). Before information collection, informed consent was obtained from all subjects (before participating in the study). All gathered information remained wholly confidential and anonymous.

Statistical Analysis

Data analysis was performed using SPSS software version 24. Descriptive statistics such as frequency, percentage, and mean (SD) were calculated for each item of the demographic variables. For statistical analysis, a multivariate analysis of covariance (MANCOVA) was used to measure the effect of demographic variables on physical and mental anxiety and mental health dimensions, and multiple regression was used to measure the impact of mental health on physical and psychological anxiety by adjusting demographic factors. A significance level of 5% was considered in all tests.

Results

A total of 201 medical students participated in this study. Nine participants did not completely fill out the questionnaires. The response rate was 96 %. The mean age was 22.74±2.34 years, with women (60.3%) constituting the majority of the study participants. Nearly half of the medical students were at the basic science level (48.8%). The remaining half of the questionnaires were distributed among medical students at the physiopathology level (3.3%), externs (undergraduate medical students) (22%), and interns (25.8%).

According to CDAS, the lowest, highest, and mean (SD) of the physical anxiety symptom score were

0.26, and 8.39 (3.73), respectively. These scores for psychological anxiety symptoms were 0.27, and 2.06 (5.02). The mean and standard deviation scores obtained for GHQ28 subscales, including somatic, anxiety, social dysfunction, and depression, were 5.82 (4.41), 7.75 (3.18), 4.49 (5.14), and 10.12 (7.25), respectively.

Based on the demographic variables, the mean (SD) of the GHQ28 subscales questionnaires is given in Table 1. In this regard, the multivariate analysis indicated that several factors, including age (P = 0.021), sex (P = 0.021), and educational level (P = 0.021), had a significant effect on the subscales of CDAS and GHQ28

questionnaires. Univariate ANCOVA post hoc tests revealed that with increasing age, the somatic symptoms decreased (P = 0.021). Additionally, the mean score of somatic symptoms in men was significantly lower than in women (P = 0.018). The mean score of psychological anxiety symptoms among women was higher than among men (P = 0.005). The scores of anxiety symptoms (P = 0.026) and somatic symptoms (P = 0.037) were different in varying educational levels. As a result, age, sex, and academic level were likely confounding variables.

Table 1. The Effects of Demographic Factors on the General Health Questionnaire-28 (GHQ-28)

Variables		Somatic Symptoms	P	Anxiety/Insomnia Symptoms	P	Social dysfunction Symptoms	P	Depression Symptoms	P
		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Gender	Men	5.67(3.62)	0.015	6.6(4.62)	0.583	8.12(3.26)	0.159	4.47(5.42)	0.96
	Women	6.8(2.9)		6.98(4.27)		7.5(3.12)		4.52(4.97)	
Education Level	Basic sciences	6.27(3.19)	0.033	6.71(4.09)	0.011	7.79(3.43)	0.425	4.96(5.14)	0.651
	Physiopathology	6.71(4.39)		4.14(4.18)		7.71(3.04)		4.57(5.09)	
	Clerkship	7.37(3.44)		8.43(4.73)		8.28(3.12)		3.98(5.01)	
	Internship	5.39(2.81)		5.87(4.39)		7.17(2.66)		4.02(5.39)	

The effects of demographic variables and different subscales of GHQ28 on COVID-19 anxiety are presented in Table 2. A linear regression model was used to measure the impact of these variables on COVID-19 anxiety. The adjusted mean score of COVID-19 anxiety was 11.05 (1.91). The model revealed that anxiety/insomnia (P < 0.001) and depression (P = 0.001) increased COVID-19 anxiety levels. Somatic symptoms affected the levels of physical anxiety symptoms (P = 0.001). Moreover, somatic symptoms (P < 0.001) and social dysfunction symptoms (P = 0.012) were associated with psychological anxiety symptoms; therefore, it can be concluded that somatic symptoms and social dysfunction symptoms led to higher and lower levels of

psychological anxiety symptoms, respectively. The COVID-19 anxiety in men was significantly lower than in women (p = 0.032). The results indicated that medical students with varying educational levels experienced different levels of COVID-19 anxiety. The medical students from basic science (p = 0.042) and physiopathology (p = 0.028) levels had lower COVID-19 anxiety levels than medical externs and interns. Levels of COVID-19 anxiety were not significantly different between medical students in basic science and physiopathology stages (p = 0.521). Also, medical externs and interns had comparable COVID-19 anxiety levels (p = 0.311) (Table 2).

Table 2. Effect of Demographic Factors on COVID-19 Anxiety

Variables	Subclasses	Coefficient	Std. Error	95% CI		P
				Lower bound	Upper bound	
	Intercept	11.05	1.91	7.31	14.79	<0.001*
	Men	-1.24	0.17	-1.57	-0.91	0.032*
	Women		Reference			
	Age	0.18	0.13	-0.07	0.43	0.088
	Basic sciences	-3.41	0.97	-5.31	-1.51	0.042*
	Physiopathology	-3.99	1.09	-6.13	-1.85	0.028*
	Clerkship		Reference			
	Internship	-1.78	1.59	-4.90	1.34	0.265
GHQ28 Subscales	Somatic Symptoms	0.18	0.13	-0.07	0.43	0.322
	Anxiety/Insomnia Symptoms	0.91	0.92	-0.89	2.71	<0.001*
	Social/dysfunction Symptoms	0.64	0.01	0.62	0.66	0.662
	Depression Symptoms	0.06	0.13	-0.19	0.31	0.001*

*Statistically Significant at p=0.05

Discussion

The current study aimed to assess the psychological well-being and anxiety levels among Kerman University of Medical Sciences medical students during the COVID-19 pandemic. Results obtained in our study showed that medical students experienced mild COVID-19-related anxiety during the pandemic. This might be due to conditions such as fear of illness, a sense of loneliness at home, and educational issues (21). These medical education issues could be poor interactions, difficulty adjusting learning styles, having to perform responsibilities at home, canceling exams, no access to technologies, canceling in-person clinical skill sessions and OSCEs, being uncertain about exam dates, shortening of the training periods, inability to explore specialties, and suspending away rotations (22-24). Moreover, the need for social distancing and the long-time closure of medical universities negatively impacted the quality of psychological well-being of medical students.

Although temporary emergency medical schools' closure has reduced exposure to infected people during the peak periods of the disease, this issue has put more psychological pressure on students due to the extended study period and online education (25, 26).

The current study found that the anxiety and depression scores of GHQ28 were low in medical students. Additionally, the mean scores of GHQ28 indicated that the students didn't have crucial problems in daily personal and social functions. These findings could be attributed to the fact that the time of data collection was several months after the official announcement of the COVID-19 outbreak in Iran, and possibly over time, the ability of people to adapt to the pandemic had increased.

Our results showed that corona-related anxiety was mild among medical students. Some studies have indicated that mild levels of COVID-19 anxiety could be due to the perception of the disease and effective preventive measures (5).

Evidence from previous observations indicates that they are in agreement with our findings in that COVID-19 caused mental health issues among medical students. A study in the United Arab Emirates showed that medical students reported mild or severe anxiety levels (5). Miri et al. (2021) study, conducted in Hamadan, Iran, showed that after the pandemic, about 28.4% of students reported depression, and 21.8% reported anxiety (28). A study by Halperin et al. (2021) in the United States demonstrated that among those surveyed, 30.6% and 24.3% of medical students had anxiety or depression, respectively. Also, this study reported 61%

higher anxiety and 70% higher depression rates during the COVID-19 outbreak, which indicates a mental health risk for medical students (29). The variation in the prevalence of depression and anxiety could be related to differences in socio-cultural conditions, the instruments used, and the study's timing. The results of some studies contradict ours. For example, Nakhostin-Ansari et al. (2020) showed that the prevalence of mild to severe anxiety and depression among medical students was 38.1% and 27.6%, respectively. But their result also indicated that the anxiety and depression in medical students were not changed before and after the COVID-19 pandemic at Tehran University of Medical Sciences in Iran (30, 31). Regardless of the coronavirus disease, there is evidence indicating that medical students' levels of anxiety and depression are higher compared to their peers and the general population (21, 32).

In this study, we found that female students experienced more anxiety than their male counterparts during the pandemic. This result is in accordance with the results of several other studies (27, 33). There are several possible explanations for this, including factors such as biological influences and behavioral, cognitive, and environmental factors (34). In addition, the female reproductive cycles are proposed as an explanation for higher rates of mental disorders among them (35). In contrast to earlier findings, some studies reported no gender differences among students regarding their anxiety levels. Apparently, male and female students' psychological health were equally affected by the COVID-19 pandemic (36-38).

It has been observed that anxiety levels are different in various academic stages. Our results showed that students in higher academic levels experienced more corona-related anxiety. This was especially true among students attending practical courses in hospital settings.

This finding was also reported by Saddik et al. (2020) (27). It seems plausible that these results may be due to the participation of medical students in clinical sessions in hospitals at the early stages of the COVID-19 outbreak when there was colossal panic and concerns about the spread of the disease (29). Conversely, in some other studies, it was observed that medical students in later academic years and those who worked with COVID-19 patients had lower anxiety than those in earlier academic years who had never visited patients (30, 39). This can be explained by the fact that higher knowledge of the disease, medical skills, and prevention measures awareness among later academic year medical students can alleviate panic (30, 31).

Generally, the results of the present study showed that anxiety and depression among students were not at

an alarming level. However, psychological support and counseling services should be available to students to improve their mental health and reduce anxiety levels. In this regard, a study by Siddiqui et al. in 2021 conducted in the United Kingdom showed that identifying and supporting the needs of healthcare professionals can significantly reduce their anxiety (40). Accordingly, the results of this study may be used for managing mental health issues and designing and implementing supportive programs for medical students in the future.

It is also suggested that further qualitative and quantitative research needs to be conducted with a particular focus on the accurate assessment of students' psychological problems and finding the fundamental causes of them during the pandemic.

The main strength of our study was using a valid corona anxiety questionnaire. Using questionnaires not designed for this purpose and measuring anxiety by general anxiety questionnaires may include anxiety from causes other than COVID-19. In addition, because of the COVID-19 pandemic restrictions, data were collected via online platforms, including Telegram and WhatsApp. This study has the following limitations. First, we did not consider the specific course and type of teaching hospitals where the students were trained. Second, the data was collected by convenience sampling, which may not be generalizable to the broader populations of medical students. Third, in the present study, we used self-reporting tools that may have influenced the results. Fourth, the study was conducted in only one medical school. Therefore, the findings may not be generalizable to students of other medical schools. Fifth, due to the study's cross-sectional nature, this anxiety level cannot be exclusively attributed to the corona pandemic, and other factors may have also played a role.

Conclusion

According to our results, the levels of COVID-19 anxiety, general anxiety symptoms, and depression symptoms were mild among medical students. Factors including age, sex, and educational level significantly affect the subscales of CDAS and GHQ28 questionnaires. The findings of this study emphasized that medical schools should consider this issue with more focus on female students and students with higher educational levels. Also, it is recommended that the psychological states of medical students should be considered, and supportive and adaptive strategies should be included in educational policies to effectively overcome the COVID-19 pandemic mental health consequences.

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