



Coronavirus (COVID-19)- Associated Psychological Distress Among Medical Students in Iran

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Abstract

Aim

The COVID-19 was declared a pandemic in early 2020 and is associated with high public anxiety all over the world. The healthcare community is at the highest risk of infection and thereby prone to most distress. The aim of this study was to explore and evaluate the degree of depression, anxiety, and stress levels among medical college students during the COVID-19 epidemic in Iran.

Methods

A cross-sectional study was conducted in February and March 2020, 3 weeks after the first reported COVID-19 infection was identified in Iran. All medical college students who entered clinical courses were eligible for the study. Depression, stress, and anxiety were evaluated in these students using the DASS-21 questionnaire. Participants were selected by using availability sampling. All statistical analyses were performed using R version 3.5.1.

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Results

The total number of participants was 207, with 143 males and 64 females. More than half of the participants (57.97%) were married. The mean duration of working experience among students with COVID-19 infection and experience in a medical ward was 3.00 ± 1.27 days and 17.40 ± 7.26 months, respectively. The majority of students had 2 or 3 days working experience with COVID-19 infection. The mean anxiety score of participants was 28.56 ± 4.68 , the depression score was 29.36 ± 4.42 , and the stress score was 28.99 ± 4.53 . Our findings indicated that the mean scores of depression were at an “extremely severe” level, while stress and anxiety were at “severe” levels. The prevalence of “severe” symptoms of depression, stress, and anxiety was 69.57%, 60.87%, and 99.04%, respectively.

Conclusions

There is a high prevalence of anxiety and depression among medical students who were exposed to COVID-19-infected patients. Our results highlight the need to establish psychological support programs, training, and self-care for medical college students in relation to mental health. We recommend incorporation of molecular biomarker tests into an algorithm to aid in assessments and consideration of the appropriate therapeutic responses.

Keywords

COVID-19 · Coronavirus · Medical student · Depression · Anxiety · Stress · Iran

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21.1 Introduction

The global outbreak coronavirus disease 2019 (COVID-19) started with the infection of a large number of people in China in December 2019 [1]. On 19 February 2020, the first patient was diagnosed with COVID-19 in Iran. In addition to healthcare workers, most of the hospitals were supported by a number of medical students in the last years of their education who were providing voluntarily aid in managing patients with COVID-19 infections.

The absence of a comprehensive and definitive treatment or vaccination program to manage this disease has caused fear and anxiety in people [2, 3]. In the early stages of the COVID-19 outbreak, it was reported that around 29 percent of COVID-19 patients consisted of infected healthcare workers [4]. The outbreak has therefore imposed a significant psychological stress that could lead to undesirable effects on the overall psychological health of medical students attending patients with COVID-19 [5]. In line with this, Al-Rabiaah et al. reported that medical students had different levels of anxiety with most reporting minimal anxiety levels during the SARS outbreak [6]. In another study, junior medical students expressed a significantly greater degree of anxiety compared to the more senior medical students [7].

Many other studies reported psychological disorders in the aftermath of an epidemic which may not reflect the actual stress subjects felt during the actual event. Also, no studies have investigated the psychological distress of university medical students during the COVID-19 outbreak, although some studies have addressed similar

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issues among hospital workers and residents [3, 8, 9].

The aim of this study was to explore and evaluate the degree of stress, anxiety, and depression among medical students during the COVID-19 epidemic in Iran.

21.2 Material and Methods

21.2.1 Study Design

A cross-sectional survey was conducted in February and March 2020. The study was carried out in Tehran, the capital city of Iran 3 weeks after the first patient of COVID-19 was identified in Iran.

21.2.2 Participants

We conducted this survey on medical students exposed to patients with corona in Baqiyatallah Hospital. Baqiyatallah Hospital is one of the main referral centers for the diagnosis and treatment of patients with COVID-19 in Tehran. The medical students were mainly recruited from this hospital. Other centers also participated in this study, but since the number of medical students from other centers was not high enough for obtaining a separate ethics code, the dean of each center approved data collection for their respective centers. None of the participants had any physical disabilities or mental health disorders.

21.2.3 Sample Size

Cochran's sample size estimation formula was applied [10]. We used the following parameters: $\alpha = 0.05$; $\beta = 0.2$; and an assumed 50% satisfaction probability to estimate the maximum sample size. The sample size was calculated to be 87 people. According to the nature of the study and the probability of sample size dropouts, a 20% dropout rate was considered and the final sample size was 110 participants.

21.2.4 Research Tools

Demographic characteristics were collected using a questionnaire, and the parameters included age, gender, marital status, working experience in the ward, and working experience with COVID-19 patients. We focused on symptoms of depression, anxiety, and stress using this self-report questionnaire. The Depression Anxiety Stress Scale (DASS-21) was used to collect the data. This questionnaire was designed and validated by Lovibond in 1995 [11] to measure psychological distress among the community using 21 items. The items included three subscales and each subscale included seven questions.

In the translated version, each item had choices of never, little, moderate, and many. The lowest score linked to each question was 0 and the highest score was 3. In this questionnaire, the depression subscale included questions 3, 5, 10, 13, 16, 17, and 21; and questions 1, 6, 8, 11, 12, 14, and 18 assessed stress; and questions 2, 4, 7, 9, 15, 19, and 20 related to the anxiety subscale. The sum of all individual scores related to each section was multiplied by two. Validity and reliability studies of this questionnaire were carried out in Iran. The Persian version of the scale with appropriate psychometric properties was used in our study. For the total score of DASS-21, the Cronbach alpha was 0.94. The Cronbach alpha for depression, anxiety, and stress scales was 0.85, 0.85, and 0.87, respectively [12].

21.2.5 Ethical Considerations

This study was approved by the Ethics Committee of Baqiyatallah University of Medical Sciences (code IR.BMSU.REC.1398.439). In addition, the objectives of the study were explained, and informed consent was obtained from each student regarding their participation in the study. All students were assured that all of the resulting data would be treated with confidentiality.

21.2.6 Statistical Analysis

All statistical analyses were performed using R software, version 3.5.1. Categorical data (age group, gender, marital status, working experience in the ward, and working experience with COVID-19) were described with numbers and percentages, and continuous data (depression, anxiety, and stress scores) were given as means and standard deviation (SD). Differences in the mean scores of the DASS-21 subscales among groups with different sociodemographic and clinical characteristics were calculated using an independent sample t-test or one-way analysis of variance (ANOVA). All tests were two-tailed, with a statistical level set at $p < 0.05$.

21.3 Results

The total number of participants was 207, with 143 males (69.08%) and 64 females (30.82%). More than half of the participants (57.97%) were married. The mean student working experience with COVID-19 and experience in the ward was 3.00 ± 1.27 days and 17.40 ± 7.26 months, respectively. The majority of students had 2 or 3 weeks working experience with COVID-19 or in the ward (Table 21.1).

According to the results of t-tests and one-way ANOVA, the comparison of mean scores for stress, depression, and anxiety DASS-21 subscales was not statistically significant among the variables of "age," "gender," "marital status," and "working experience in ward" (Table 21.1). Furthermore, depression and stress scores were not significantly different across "working experience with corona" categories. However, the anxiety level was significantly different in terms of "working experience with COVID-19" (p -value = 0.016).

The anxiety score of participants was 28.56 ± 4.68 , the depression score was 29.36 ± 4.42 , and the stress score was 28.99 ± 4.53 (Table 21.2). Our findings indicated that the mean scores of depression were at the "extremely severe" level, while stress and anxiety levels were "severe." The prevalence of "severe" symp-

toms of depression, stress, and anxiety was 69.57%, 60.87%, and 99.04%, respectively.

21.4 Discussion

The COVID-19 outbreak in Iran and virtually all other countries and territories of the world is one of the most significant threats to national and international public health that has occurred in more than a century since the 1918 Spanish flu. The main purpose of this study was to measure the current prevalence and severity of psychological distress in Iranian medical college students during the early phase of the COVID-19 outbreak. The results confirmed that the amount of depression, anxiety, and stress was severe and extremely severe during the first days of the outbreak in medical students exposed to COVID-19 patients. The prevalence of extremely severe symptoms of depression was 69.57%. The prevalence of severe symptoms of stress and anxiety was 60.87% and 99.04%, respectively.

Anxiety is a worry about future events, and fear is a reaction to the current events. The increasing number of COVID-19 cases and its geographical expansion, the infectious cause, epidemiological characteristics, rapid transmission pattern, and insufficient preparedness has raised significant fear and anxiety about the outbreak [13]. In another study, the mean of perceived stress score in healthcare students was 18.4 and in non-healthcare students this was 19.6, which are both more than the mean community scores [14]. Nursing students had a higher level of perceived stress in comparison to other students. It has been reported that direct care of patients with SARS probably resulted in the high levels of stress in the nursing students. The causes of higher stress in the non-healthcare students were perceived as a lower opportunity for treatment and a higher risk of death from SARS. In our study, the mean scores for stress, depression, and anxiety were not significantly different due to age group, gender, marital status, or working experience in the ward. Similar to the results of our study, Wong et al. reported no dif-

Table 21.1 The mean (\pm SD) scores for psychological symptoms in terms of age group, gender, marital status, working experience with COVID-19, and working experience in ward (n = 207)

Variable		Frequency (%)	Anxiety score	Stress score	Depression score
Age	≤ 26 years	88 (42.5)	28.25 \pm 4.94	28.61 \pm 4.61	29.59 \pm 4.16
	> 26 years	119 (57.5)	28.79 \pm 4.48	29.28 \pm 4.47	29.19 \pm 4.62
p-value			0.413	0.299	0.524
Gender	Male	143 (69.08)	28.63 \pm 4.21	28.71 \pm 4.44	29.45 \pm 4.43
	Female	64 (30.82)	28.41 \pm 5.63	29.63 \pm 4.71	29.16 \pm 4.43
p-value			0.777	0.182	0.655
Marital status	Married	120 (57.97)	28.62 \pm 4.52	29.20 \pm 4.32	29.02 \pm 4.30
	Unmarried	87 (42.03)	28.48 \pm 4.92	28.71 \pm 4.82	29.84 \pm 4.57
p-value			0.840	0.446	0.187
Working experience with corona	1-day	23 (11.12)	27.22 \pm 5.14	28.70 \pm 5.06	29.30 \pm 3.84
	2-day	57 (27.55)	27.02 \pm 3.984	28.28 \pm 4.57	29.12 \pm 4.24
	3-day	60 (28.98)	29.40 \pm 4.89	29.60 \pm 4.37	28.87 \pm 4.74
	4-day	37 (17.87)	29.46 \pm 4.89	29.68 \pm 4.18	29.89 \pm 4.67
	5-day	24 (11.59)	30.00 \pm 3.91	27.92 \pm 4.88	30.17 \pm 3.38
	6-day	6 (2.89)	28.67 \pm 4.84	31.00 \pm 3.74	30.33 \pm 7.42
p-value			0.016 ^a	0.312	0.775
Working experience in ward	6-month	21 (10.14)	27.81 \pm 4.85	29.81 \pm 3.74	28.67 \pm 4.68
	12-month	67 (32.36)	29.64 \pm 3.98	28.87 \pm 4.93	29.04 \pm 3.86
	18-month	57 (27.55)	28.74 \pm 5.34	29.89 \pm 4.56	29.86 \pm 4.45
	24-month	40 (19.32)	28.01 \pm 4.18	27.75 \pm 4.30	29.70 \pm 4.58
	30-month	17 (8.21)	27.18 \pm 5.48	28.94 \pm 3.82	28.71 \pm 4.76
	36-month	5 (2.42)	24.40 \pm 1.67	27.20 \pm 4.82	30.40 \pm 4.36
p-value			0.237	0.067	0.785

^aStatistically significant

Table 21.2 Prevalence and score severity ratings of depression, anxiety, and stress among students (n = 207)

Psychological Variable		Frequency	%
Depression	Moderate	3	1.45
	Severe	144	69.57
	Extremely severe	60	28.98
	MEAN \pm SD	29.36 \pm 4.42	
Anxiety	Severe	205	99.04
	Extremely severe	2	0.96
	MEAN \pm SD	28.56 \pm 4.68	
Stress	Mild	1	0.48
	Moderate	63	30.43
	Severe	126	60.87
	Extremely severe	17	8.22
	MEAN \pm SD	28.99 \pm 4.53	

ference between perceived stress levels between genders or other groups [14]. Another study reported that female students had significantly higher mean stress levels than male students [6]. In our study, there was no difference between junior and senior medical students and the number of days they had been in the COVID-19

ward. This finding contrasts with studies of the SARS epidemic, which showed that the stress levels in medical students were higher in junior compared to senior medical students [6]. The current study showed that the anxiety score was significantly different for students with different durations of working experience with COVID-

19. This showed that anxiety scores were higher among the medical students who had worked with COVID-19 patients for higher numbers of days.

Medical students, by having more experience in hospital setting, are thought to have a realistic assessment of the infectious diseases and should be able to control their stress levels more effectively. The results of one study have shown that increased knowledge about the SARS virus led to a reduction in their stress levels about this infection [15]. Knowledge toward prevention and control of the disease is necessary among the health students as they are at a higher risk of newly emerging diseases due to increased exposure via contact with patients. Another study confirmed that medical students would benefit in this way from learning about emerging infectious diseases [5].

A possible limitation of this study is that we recruited participants by convenience sampling. Therefore, the results cannot be interpreted and generalized to all medical students. In addition, this study was conducted at the onset of the COVID-19 outbreak. Therefore it is possible that with the continuing epidemic the mental health symptoms of medical students may also change. Finally, risk factors for depression, anxiety, and stress were not assessed in this cohort of medical students. To improve the accuracy of testing, we recommend combined assessment of molecular biomarkers in readily accessible body fluids. For example, studies have shown that cortisol levels in saliva are associated with symptoms of anxiety, depression, and post-traumatic avoidance [16], and salivary amylase levels could be useful for assessment of individuals working in stressful and isolated environments [17]. Furthermore, a systematic review found that serum levels of inflammatory biomarkers such as interleukin (IL)-1 β , IL-5, and IL-6 could be used to identify individuals with panic disorder [18]. These studies help to illustrate the emerging point that mental illnesses can be characterized by biomarkers in body fluids through mind-body feed-forward and feedback systems.

21.5 Conclusions

In this study, medical college students reported severe and extremely severe psychological distress during the COVID-19 epidemic in Iran and through their experiences with patients. As it is still certain whether or not there will be a second wave of this virus, it will be critical to establish mental health intervention programs to help medical students and other healthcare workers adapt to this challenging unprecedented situation.

Acknowledgments Thanks to guidance and advice from the Clinical Research Development Unit of Baqiyatallah Hospital.

Conflict of Interest The author(s) declare no conflicts of interest with respect to the authorship and publication of this article.

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