



Factors Determining Perceived Stress among Medical Students during the Covid-19 Pandemic

Amirreza Faraji¹ , Farhad Ahmadpour² , Armin Aslani¹ , Azita Fathnezhad-Kazemi³

¹ Student Research Committee, Tabriz Medical sciences, Islamic Azad University, Tabriz, Iran

² Assistant Professor, Department of Internist, Faculty of Medicine, Tabriz Medical sciences, Islamic Azad University, Tabriz, Iran

³ Ph.D. of Reproductive Health, Women's Reproductive and Mental Health Research Center, Tabriz Medical Sciences, Islamic Azad University, Tabriz, Iran

*Corresponding author: Azita Fathnezhad-Kazemi, Women's Reproductive and Mental Health Research Center, Tabriz Medical Sciences, Islamic Azad University, Tabriz, Iran. E-mail: kazemi56@iaut.ac.ir

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Abstract

Introduction: All viral epidemics are a global health problem and a threat to mental health. Medical sciences students are especially prone to mental health disorders and hence could be more vulnerable to the impact of the COVID-19 pandemic. The aim of the study was to evaluation of perceived stress and its related factors in medical students.

Methods: A cross-sectional web-based study was conducted in December 2020 at Islamic Azad University Tabriz Medical sciences. 434 students participated in the study willingly. Socio-demographic characteristics, the level of fear of COVID-19, and perceived stress were collected and analyzed.

Results: The results showed that the mean (SD) of fear of COVID-19 and perceived stress were 20.45 (5.52) and 24.70 (7.90), respectively. There was a significant and positive relationship between fear of COVID-19 and perceived stress in students and this effect was moderate ($r = 0.465$, $P < 0.001$, medium). According to the findings, fear of COVID-19 solely has the capacity to explain 24.6% of the changes related to perceived stress in students ($\beta = 0.496$, $SE = 0.003$, $P < 0.001$). Additionally, multivariate regression analysis revealed that fear of COVID-19, employment state, and academic year capable to explain 25.3% of stress changes in students.

Conclusions: In this study, there was a positive relationship between fear of COVID-19 disease and perceived stress. It is essential to care and plan in order to reduce the negative influence of COVID-19 on mental health and there is a requirement for proper interventions by specialists in order to maintain mental health, particularly for the medical students who are exposed to the disease.

INTRODUCTION

The spread of a new coronavirus with a scientific name as SARS-Cov-2, a potentially life-threatening respiratory disease, has created a significant public health problem and a threat to the health of millions of people around the world [1, 2]. The virus was first reported on December 31, 2019, with symptoms of pandemic pneumonia in Wuhan, China [3]. But it was spread quickly around the world and became pandemic, and the sixth principal cause of public health emergency

state around the world [4, 5]. Currently, the main epidemiological risk factors for COVID-19 include travel to high-prevalence places and close contact with infected individuals within 14 days of the start of symptoms [6]. Early symptoms of COVID-19 include pneumonia, fever, muscle aches, and fatigue. According to the latest report of the World Health Organization, approximately 4 million people have been contaminated with the disease and it has caused to die more than 259

thousand people [7]. Increasing the number of developing and spread of the virus around the world has caused prominent concern and panic among the people of the world, and the only way to prevent the disease and control the infection is to observe the principles of hygiene by the general public [6, 8, 9]. This epidemic not only has had a risk of death; but also, has created intolerable psychological pressure on people around the world [4]. Researchers conclude that the way to cope with and control this virus is to plan and take control and preventative measures for the formation of human aggregates and quarantine [9, 10]. Quarantine means separating and limiting the movement of people who are potentially exposed to the infectious disease in order to reduce the spread of the disease and decrease the risk of infecting others [11]. Most of the research has been conducted on the psychological and physical effects of hospital quarantine on the medical personnel, particularly nurses [12, 13]. Nevertheless, staying in quarantine and keeping a large population at home would not be without psychological, social and economic effects [9]. The meta-analysis mentioned the effects of quarantine on medical personnel and other sections of society as symptoms of post-traumatic stress, confusion, and anger by reviewing 96 papers [14]. The results of this study additionally indicate that psychological stressors such as the anxiety of prolonging quarantine, ambiguity in the future, fear of developing into the disease, boredom, and dullness, insufficient facilities, incorrect and insufficient information, and financial and economic losses are created as a result of long-term quarantine [11]. University students may be particularly vulnerable to mental health problems [15]. Khodabakhshi refers in a qualitative study by examining students' psychological problems to four main themes, which include; "growth of negative emotions, confusion, and pessimism", "growth of obsessive-practical obsessions about the body and washing", "thoughts about threatening family health", "economic worries and fear of the future of Corona relief" [9]. The progressive spread of the epidemic has led to severe separation and the closure of schools and universities, which can influence the student's mental health [12]. Earlier studies show that the negative impact of epidemic/pandemic on the mental health are higher in healthcare workers and medical sciences students are especially prone to mental health disorders and hence could be more vulnerable to the impact of the pandemic [16]. Methods of guiding students to control their emotions in emergencies and prevent losses due to critical events are an essential urgency for universities [17]. Evaluating students' mental status can provide comprehensive understanding and awareness of the psychological consequences of staying in home quarantine for executive decision-makers, health care personnel, and mental health professionals.

Accordingly, we designed this study in order to assess the mental state, particularly in terms of perceived stress and fear of COVID-19 in medical sciences students during the COVID-19 outbreak.

METHODS

This cross-sectional study was conducted in December 2020 at Islamic Azad University Tabriz Medical science during the coronavirus disease outbreak. The statistical population of this study is all medical sciences students of Tabriz Azad University who are about 1200 people. Different fields of medical sciences consisted of medicine 532 people, midwifery 204 people, nursing 264 people and laboratory sciences 200 people. The inclusion criteria were studying in one of the fields of medical sciences of Tabriz Azad University while studying and participating in semester classes and Being a member of class groups. An online survey was distributed using Non-probability convenient sampling to students from different levels studying in Islamic Azad Medical Science University. This survey was conducted based on the web and through social networks (WhatsApp and Telegram). The Google Forms platform was employed to design the questionnaire and was provided to students through class social networks. The contents and aim of the study were well informed in advance to the participants and data privacy considered without a name but to participate in the study, students had to mention the student code. Then the electronic consent forms were signed by the voluntary participants without gifts or money as incentives and the smartphone electronic questionnaires were collected. As a reminder, the questionnaire link was shared three times in groups once a week.

The sample size was estimated at 371 cases according to the study of Saraswathi et al. [16]; considering an acceptable error of 18% around the prevalence of stress (24.9%) in medical college students, 95% confidence interval, 80% statistical power using the formula for calculating the proportions of sample size, and the final sample size was estimated 445 participants with considering the 20% sample attrition.

$$n = \frac{(Z_1 - \frac{\alpha}{2})^2 \times p(1-p)}{d^2}$$

Data collection tools in this study included three parts. The first part of the questionnaire was Demographic characteristics checklist including age, gender, the field of study, academic year, employment status. The second part included Cohen Perceived Stress Questionnaire, this questionnaire has been designed by Cohen et al. (1983) and has 4, 10, and 14 question forms that are applied to measure general perceived stress in the past month. Thoughts and feelings about stressful events measure control, coping, getting along with stress, and experienced stress. This scale additionally examines the

risk factors in behavioral disorders and indicates the process of stressful relationships [18]. Cohen et al. (1983) studied the questionnaire in a sample of 332 students and the confirmatory factor analysis indicated that the 14-item structure was proper and the PSS test-retest reliability has been equal to 0.85 and the internal consistency of this test has been calculated from 0.84 to 0.86 [19]. In this study, a form of 14 questions was used. Items are scored on a Likert scale from 0 (none) to 4 (high). The range of scores is different from 0 to 56 and the higher scores of the subjects in this scale show the high level of perceived stress [20]. The consistency coefficient of the items of this questionnaire has also been confirmed in the Iranian population and Cronbach's alpha has been reported to be 0.84 [2]. Additionally, Maroufizadeh et al. In Iran in a sample of 106 adults reported that the confirmatory factor analysis indicated an acceptable fit, and Cronbach's alpha coefficient was achieved 0.9 [21]. Scores higher than 30 are considered high perceived stress. The third part was the Fear of COVID-19 Questionnaire. This questionnaire has been psychometric assessed by Ahorsu et al. [22] in Iran and includes 7 questions that are expressed applying a five-option Likert scale. Answers include "Highly disagree", "disagree", "neither agree, nor disagree", "agree", and "highly agree". The minimum possible score for each question is 1 and the maximum is 5. The total score can be calculated by adding the scores of each question (from 7 to 35). A higher score shows a higher fear of the coronavirus. In this study, the reliability of the questionnaires was tested by conducting a test on 20 students eligible individuals, twice with a 14-day interval. Twenty students who entered the study to evaluate the reliability of the questionnaires of the present study were excluded from the study and did not enter the analysis of demographic information and information related to fear of COVID-19 and ICC (confidence interval) and Cronbach's alpha coefficient for fear of COVID and perceived severity and perceived stress were [0.93 (0.91–0.95), and 0.82] and [0.89 (0.84–0.91) and 0.79], respectively.

Written informed consent will be obtained from each participant. This study was approved by the Ethics Committee of the Islamic Azad University of Medical Sciences, Iran (code number: IR.IAU.TABRIZ.REC.1399.120).

SPSS version 22 was used to analyze the data. Descriptive statistics including frequency as well as central and dispersion indices such as mean, standard deviation were used to describe social demographic characteristics, fear of COVID-19 and perceived stress. Independent t-test, analysis of variance and their parametric equivalent (Mann-Whitney and Kruskal-Wallis), and Spearman correlation were applied to examine the relationship between variables. Independent variables were entered into a multivariate

linear regression model with $P \leq 0.05$. The normality of the quantitative data was examined based on the Kolmogorov-Smirnov test. Since the perceived stress score had no normal distribution, this value was first converted to a normal variable using the natural logarithm (Ln) and the variables were then entered into the linear regression model applying the Inter method. A significance level of $P < 0.05$ was considered. All tests were 2-sided.

RESULTS

A total of 434 students participated in the web-based study that included approximately 36-37% of all medical sciences students after three times reminder. Participants included 53.2% male, 46.8% of women had a mean (SD) age of 22.96 (3.59) and a range of 18-44 years that nearly three-quarters of students had the age between 20-29 years old. 209 people (69.7%) were native. The majority of participants were in their fourth year of university and 36.4% were medical students. Table 1 shows the information on demographic characteristics. Examining the relationship between demographic characteristics and perceived stress indicated a statistically significant relationship between the academic year and employment status and perceived stress. Additionally, there was a statistically significant relationship between the field of study and the academic year and the fear of COVID-19 so that the fear of COVID-19 was higher among nursing and midwifery students. The results explained that although the level of stress in women was higher than in men (25.27 vs. 24.06), this difference was not significant. Also, there was no difference between the two sexes in terms of fear of COVID-19. Furthermore, despite the fact that perceived stress was higher in the 40-year-olds and the fear of COVID-19 was higher in the ages younger than 20 years old compared to other age groups. Notwithstanding, this difference was not statistically significant (Table 1).

The results have been summarized in Table 2 through the COVID-19 Fear Questionnaire and Perceived Stress Questionnaire for all students. In summary, the mean of fear of COVID-19 and perceived stress were achieved at 20.45 and 24.70, respectively, and approximately one fifth of participants had high levels of stress. Spearman correlation analysis indicated a direct and moderate relationship between the two variables and this relationship was statistically significant ($r = 0.465$, $P < 0.001$) (Table 2).

Analysis by simple linear regression in model 1 showed that the applied model has the capability to explain 24.6% of the changes related to perceived stress in students so that the degree of stress is increased to 0.496 standard deviations by increasing a standard deviation in the COVID-19 fear variable. But in model 2, the results using multiple linear regression indicated that the

two variables included in the model are able to explain 25.3% of stress changes in students. In this model, the stress degree is increased by 0.504 and 0.082 standard deviation, respectively by increasing a standard

deviation in the COVID-19 fear variable. Furthermore, despite unemployment, the perceived stress degree is increased by 0.027 of standard deviation. (Table 3).

Table 1. Individual-Social Characteristics and their Relationship with Perceived Stress (n = 430)

Variable	Number (Percent)	Perceived Stress Mean (SD)	P-value	Fear of COVID-19 Mean (SD)	P-value
Gender				0.052*	0.110***
Male	231 (53.2)	24.06 (7.69)		20.90 (5.42)	
Female	203 (46.8)	25.27 (8.05)		20.05 (5.60)	
Age (year)				0.972**	0.777****
>20	31 (7.1)	25.19 (7.58)		21.29 (4.98)	
20-29	358 (88.7)	24.68 (7.94)		20.36 (5.59)	
30-39	15 (3.5)	24.06 (7.99)		21.13 (5.42)	
≤40	3 (0.7)	25.33 (9.81)		19.67 (4.04)	
The field of study				0.804**	0.001****
Medical	158 (36.4)	24.69 (7.73)		19.61 (6.07)	
Nursing	141 (32.5)	25.15 (8.49)		21.74 (4.95)	
Midwifery	72 (16.6)	24.46 (8.56)		21.00 (4.84)	
Laboratory sciences	63 (14.5)	24.06 (6.46)		19.26 (5.41)	
Residency status				0.148*	0.869***
Native	315 (72.6)	24.95 (7.44)		20.48 (5.42)	
Non-native	119 (27.4)	24.04 (9.00)		20.38 (5.81)	
Academic year				0.009**	0.014****
First	89 (20.5)	24.42 (9.5)		20.81 (5.87)	
Second	96 (22.1)	25.21 (6.31)		20.35 (5.18)	
Third	85 (19.6)	26.25 (9.09)		21.74 (5.33)	
Fourth	101 (23.3)	23.58 (6.81)		20.09 (5.18)	
Fifth	21 (4.8)	28.23 (8.26)		19.62 (8.01)	
Sixth	10 (2.3)	23.40 (7.08)		22.00 (4.49)	
Seventh	32 (7.4)	21.50 (5.45)		17.50 (4.42)	
Employment status				0.026*	0.785***
Employed	81 (18.7)	23.34 (7.74)		20.94 (5.50)	
Unemployed	353 (81.3)	25.01 (7.92)		20.34 (5.53)	

* Mann-Whitney U

** Kruskal-Wallis

*** t-test

**** ANOVA

Table 2. Fear of COVID-19, Perceived Stress and Its Levels from the Viewpoints of Participant (n=434)

Variable	Mean (SD)	Minimum	Maximum
Fear of COVID-19	20.45 (5.52)	7	35
Perceived stress	24.70 (7.90)	0	51
Perceived stress levels	Number (Percentage)		
Low	350 (80.60)		
High	84 (19.40)		

Table 3. Results of linear regression analysis for perceived stress

Predictors	Unstandardized Coefficient, β	SE	Standardized Coefficient, β	95% CI for β	P-Value	R ²	Adjusted R ²
Model 1							
Fear of COVID-19	0.031	0.003	0.496	0.026- 0.037	0.001<	0.246	0.245
Fear of COVID-19	0.032	0.003	0.504	0.027- 0.037	0.001<	0.253	0.258
Employment status (employed)	-	-	-	-	0.012	0.253	0.258
Model 2					0.012	0.253	0.258
Unemployed	0.006	0.009	0.027	- 0.012 – 0.023			
Academic year	0.094	0.037	0.106	0.021- 0.168	0.525		

DISCUSSION

Coronavirus epidemic in 2019 has had negative effects on public health and the global economy, as well as profound psychological influences on various divisions

of society. There is evidence that public health emergencies have had many psychological effects on students, and that students are at higher risk for mental health problems. One of the psychological aspects of the

COVID-19 pandemic is fear, which in turn can influence mental health status [23]. Our study hypothesis was that there was a relationship between fear of COVID-19 and stress. According to the research finding, there was a moderate, direct, and significant relationship between these two variables, and factors such as fear of COVID-19 and employment status were predictors of stress perception in students so that increasing scores of fear of the COVID-19 and unemployment affect negatively the perceived stress.

We recognized in this study that the average score of fear of COVID-19 disease in medical students is higher than 20, which is different from other conducted studies so that the study on pregnant women and their husbands, the mean score of fear of COVID-19 had been 16 and 18 respectively [24]. Also, the mean score was reported 17 in another study conducted on the adult population and people older than 18 years old, [25]. But in a study conducted in the general population in Bangladesh, the mean COVID-19 fear score was virtually similar to our study [26]. The difference between the studies can be due to the differences between the studied groups, and it appears that the level of fear of COVID-19 in medical students can be due to the fact that they are more probable to be higher exposed due to participate in educational wards. Furthermore, differences in the prevalence of the disease in different cities can be involved in this difference. However, the results of previous studies also indicate that epidemics such as SARS and COVID-19 have caused negative emotional reactions such as fear [27, 28]. Furthermore, there was a significant relationship between the field of study and academic year and fear of COVID-19 in this study, but there was no relationship between gender and employment status and fear, which is relatively similar to the results achieved by the study conducted by Mohammadpour et al. [25]. Gender and age were not predictors of COVID-19 fear. Despite this difference, the research population should be considered in this case. Medical students were not different in terms of gender and age in terms of fear of COVID-19 due to their activity in the clinic and hospital in our study.

According to another finding in this study, more than 19% of students have perceived higher stress. Nevertheless, the mean score was moderate. This finding is in agreement with other studies [16, 29, 30]. Surveys conducted at different points during the first outbreak of COVID-19 have indicated that most respondents considered the psychological effect of the outbreak as moderate or severe [12, 15]. For instance, a survey conducted in China showed that 16.5 percent reported moderate to severe depression, 28.8 percent reported moderate to severe anxiety, and 8.1 percent reported moderate to severe stress symptoms [12]. Studies conducted in Iran have also reported

psychological effects such as stress, depression, and high anxiety [31, 32]. Other findings explain an increase in anxiety and stress not only in the general population but also in a study conducted by Saraswathi et al. [16] in India on students who reported that more than 20% of students have experienced high stress. Ultimately, based on the findings of our study, factors such as fear and employment status were perceived as a predictor of stress, which is similar to other studies. People are exposed to a common virus due to the spread of the disease around the world and have not yet been capable to find vaccines and treatments, which in turn has caused a general fear of the disease, which has resulted in more negative emotions such as anxiety, depression, and anger in people and increases stress in them. It has been confirmed that students are at higher risk for developing mental health disorders during their studies [33] that other factors involved in stress, such as worrying about the future of the profession, along with stressors such as disease outbreaks, can make it challenging to deal with problems, particularly for students who have higher levels of depression, anxiety, and stress from the beginning [16].

One of the constraints of the study is the inability to express the cause-and-effect relationship. Additionally, the dynamic nature and variability of research variables in the epidemic and performing part of the web-based sampling are other constraints of this study.

CONCLUSION

Overall, the levels of stress and fear of Covid-19 were moderate to high in medical students and there was a positive relationship between fear of COVID-19 disease and perceived stress. Also, fear of Covid-19 and employment status were as predictors of perceived stress. In general, these data can be applied to develop targeted or preventive education programs to help defeat COVID-19 fear and decrease mental health problems, especially for medical students. It should be regarded that the mental and physical health of different groups of the population requires more attention in the presence of health challenges such as the COVID-19 pandemics. In the circumstances of epidemics, specialists should provide proper interventions in order to maintain health and reduce the vulnerability of society, especially the medical students who are exposed to the disease.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICAL CONSIDERATIONS

Written informed consent will be obtained from each participant. This study was approved by the Ethics Committee of the Islamic Azad University of Medical Sciences, Iran (code number: IR.IAU.TABRIZ.REC.1399.120)

AUTHORS' CONTRIBUTION

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