

# Assessment of Depression, Anxiety, Stress, and Posttraumatic Stress Disorder in Iranian Medical Students during Outbreak COVID-19

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## ABSTRACT

**Aims** With the announcement of the coronavirus pandemic by the World Health Organization, many people experienced many waves of panic. The disease was a major threat to individuals' physical and mental health because of the rapid spread and severe mortality. The continued development and changes in the educational process can affect student's mental health. This study aimed to investigate the frequency of posttraumatic stress disorder, anxiety, depression, and stress in students of Rafsanjan University of Medical Sciences during the coronavirus outbreak in 2020.

**Materials & Methods** This cross-sectional descriptive study was conducted on students of Rafsanjan University of Medical Sciences. The sample size was 351 individuals selected by the convenience sampling method. Data were collected by DASS-21 and IES-R. Data were analyzed by SPSS18 using the chi-squared and Fisher's exact tests.

**Findings** The majority of students had moderate anxiety (33.6%) and posttraumatic stress disorder (26.2%). Depression (38.5%) and stress (55.3%) were not common in most students. Analysis of logistic regression showed a significant correlation between anxiety, stress, depression, and Posttraumatic stress disorder ( $p < 0.05$ ).

**Conclusion** The results suggest mental health problems among medical students. Therefore, it is recommended to implement psychological counseling programs to reduce these cases.

**Keywords** COVID-19; Students; Anxiety; Depression; Stress; Posttraumatic stress disorder

## CITATION LINKS

[1] Novel Coronavirus disease 2019 ... [2] Worldometers.info ... [3] Mental health problems and social media ... [4] Mental health care for medical ... [5] Mental health services for older ... [6] Post-traumatic stress disorder ... [7] Mental health problems of Syrian ... [8] Validation of ICD-11 PTSD and complex ... [9] High risk of infection caused posttraumatic ... [10] Prevalence and predictors of PTSS ... [11] Magnitude and impact of comorbidity ... [12] The global burden of anxiety disorders ... [13] Effects of stress on immune function ... [14] Mental health status of doctors and nurses ... [15] The mental health of neurological ... [16] Mental health survey of medical staff in a tertiary ... [17] The psychological impact of the COVID-19 ... [18] PTSD in the DSM-5: Reply to Brewin ... [19] Work stress among Chinese nurses ... [20] Depression and other common mental ... [21] Depression in Iran: A systematic review ... [22] Generalized anxiety disorder, depressive ... [23] Psychological crisis intervention for ... [24] Middle east respiratory syndrome ... [25] Closure of universities due to Coronavirus ... [26] Impact of Sars-Cov-2 and its reverberation ... [27] Exploring the determinants of perceived ... [28] Assessing the pandemic potential of MERS ... [29] Assessment of depression, anxiety, and ... [30] Anxiety, depression and academic performance: A study ... [31] Prevalence of depression symptoms in U.S. ... [32] Anxiety and depression symptoms, and lack of ... [33] Post-traumatic stress symptoms among Iranian parents ... [34] Post-traumatic stress and growth among CPR survivors ... [35] Psychometric properties of the impact ... [36] The depression anxiety stress scales (DASS): Normative ... [37] Effects of applying progressive muscle relaxation ... [38] Depression and anxiety among Iranian medical ...

## Introduction

China informed World Health Organization about unusual pneumonia at the beginning of the New Year 2020, a new type of coronavirus, and the cause of a new respiratory disease [1]. According to WHO, there have been 2,602,371 deaths from COVID-19 with more than 1,689,692 confirmed infections in Iran since June 8, 2020 [2]. It is noteworthy that these trends are increasing. The new coronavirus, scientifically known as SARS-CoV2, and the resulting disease, COVID-19, have caused great concern and panic among people worldwide [1].

The disease poses a great threat to life and physical health, especially the mental health of the public, and causes psychological problems because of the rapid spread of the COVID-19, severe infection, mortality in severe cases, and lack specific drugs [3]. The continued development and changes in the educational process are predicted to affect students' mental health [4, 5]. Physical traumas can be treated and rehabilitated with medical care, but their socio-psychological pressures last for several weeks, months, years, or even throughout life [6].

Posttraumatic stress disorder (PTSD) means one's anxiety after any traumatic event [7]. PTSD consists of three symptoms: re-experiencing the trauma, avoiding traumatic reminders, and persistent feelings of current threat [8]. Lung Sun reported that the prevalence of PTSD in the main Chinese population during the corona epidemic was 4.6% [9]. Another study in China found that the rate of PTSD in Wuhan, China was 7% one month after the onset of the disease [10].

Anxiety and stress are common human responses, which can occur in men and women with different cultural backgrounds [11]. Anxiety has a protective function, and stress helps motivate people in practice. However, such responses can be detrimental when they exceed a certain time and level and negatively affect the quality of life and cause disability [12, 13]. A study in China found that 16.0% of the nurses and physicians suffered from anxiety, and the prevalence of psychological distress was 15.9% [14]. Chen reported a mean anxiety score of 41.33 in nurses and physicians; women's anxiety was higher than that of men [15]. In a study in China, 23.04% of the health care staff reported anxiety [16]. Cao *et al.* found that 0.9% of the Chinese medical students suffered from severe anxiety, 2.7% of them suffered from moderate anxiety, and 21.3% reported mild anxiety [17]. High stress is a risk factor for many mental disorders such as depression [18]. A study at the COVID-19 Pneumonia hospitals in China found a stress rate of 39.27% [16]. Mo *et al.* studied job stress among nurses and reported a stress score of 39.91 [19].

Depression is a common mental disorder globally, which according to the World Health Organization, affected more than 300 million people worldwide in 2017 [20]. In Iran, Depression is the third health

problem, major depressive disorder in women is in second place, and that of men is in seventh place [21]. Huang and Zhao reported a depression rate of 20.1% in China during the COVID-19 epidemic [22]. In a study, the mean depression score of the Chinese neurosurgeons and neurological nurses during the COVID-19 outbreak was 41.96, significantly associated with the age under 40 [15]. Liu also reported a depression rate of 34.6% in physicians and nurses [14].

Stress and anxiety caused by this pandemic, disability, fear caused by lockdown and isolation in the city, boredom, and irritability caused by a long stay at home greatly impact students [23] psychologically. They also have caused tremendous stress among students, which may have adverse effects on their learning and mental health [24, 25]. Many graduate students experience anxiety and panic caused by the countless consequences in their homework, seminars, and dissertation defense meeting. About half of the college students and about three-quarters of the university students are currently experiencing insecurity, fear, and mood loss [26]. Many journals have reviewed articles about hospital staff and residents. However, only a few studies have examined the psychological stress of health students during the prevalence of MERS-CoV [27]. MERS-CoV is associated with severe acute coronavirus syndrome (SARS-CoV), which appeared in 2002-03 [28]. Like health care staff, medical students were exposed to stressors during the outbreak, but this group is often overlooked despite the adverse effects on their academic achievement [24].

In pre-COVID-19 studies, a study was conducted in India in 2018. It showed that depressive, anxiety, and stress symptoms among medical students were respectively 32 %, 40.1%, and 43.8% [29].

Another study in Portugal compared anxiety and depression among medical and non-medical students. The results showed that medical students showed more anxiety symptoms. They found that 23.6% of medical students had Anxiety symptoms [30]. In studies before and after COVID-19, a study in America's prevalence of depressive symptoms was assessed before and during the COVID-19 pandemic. The results showed that the prevalence of depressive symptoms during the COVID-19 pandemic was 3-fold higher than before [31].

Another study looked at the symptoms of anxiety and depression in people before and during the COVID-19 pandemic. The results showed that people were at greater risk of anxiety and depression symptoms during the COVID-19 pandemic [32].

Universities should provide guides for students to effectively and efficiently regulate emotions in emergencies and prevent losses caused by the crisis. Therefore, it is necessary to examine the mental state of the students in epidemics. Given the psychological

effects of this pandemic on different people and the fact that no detailed studies have been done on the mental health of Iranian students, the present study aimed to determine the frequency of PTSD, anxiety, depression, and stress in medical students during the coronavirus outbreak.

## Materials and Methods

This cross-sectional descriptive study was conducted on students of Rafsanjan University of Medical Sciences (N=390) during the outbreak of corona from March to April 2020. The sample size was considered to be 322 individuals based on type I error  $\alpha=0.5$ ,  $P=0.7$ , and  $d=0.05$  according to similar studies [14]. Twenty-eight individuals were added for certainty (N=350). Samples were selected by convenience sampling method from all faculties affiliated to Rafsanjan University of Medical Sciences. Samples were randomly selected based on the population covered by each faculty. Students who had a chronic physical illness, and known mental illness, and they were didn't complete the questionnaire up to 5%, were excluded.

Demographic questionnaire, IES-R to measure PTSD, and depression anxiety stress scale (DASS-21) were used. Demographic information includes students' characteristics, age, gender, religion, number of semesters, number of semesters in bedside, internship period in hospital, economic status, sleep quality, living place, use of supplement medicines, living in the dormitory, fear of corona, corona testing, history of corona infection, family history of the corona, history of physical illness, and family history of mental illness. The IES-R is a 22-item self-report measure designed by Marmar & Weis in 1997. The scale includes three dimensions: Intrusion (8 items), avoidance (8 items), and hyperarousal (6 items), which are graded on a 5-point Likert scale (0: Never experienced to 4: Experienced several times). Individuals with total scores  $\geq$  of 33 have PTSD. In the study of Iranmanesh *et al.*, the scale reliability coefficient was 0.87 [33]. In addition, Seyed Bagheri *et al.* have used this scale in their study and mentioned its reliability coefficient as 0.83 [34]. In the study of Creamer *et al.*, the IES-R demonstrated high internal consistency (Cronbach's  $\alpha=0.96$ ) and about subscales intrusion: 0.94; avoidance: 0.87; hyperarousal: 0.91 was reported [35]. The DASS is a 21-item instrument for measuring anxiety, stress, and depression. Lovibond first proposed this scale in 1995 and confirmed its validity and reliability [36]. The final score for each of these dimensions is obtained by summing the scores of the relevant items. A four-point Likert scale was used ranging from 0 to 3, with options never, rarely, sometimes, always. Since this scale is a short form of the 42-item one, the obtained scores are doubled. Scores above 14 would be considered moderate depression, scores above ten would be considered moderate anxiety,

and scores above 19 would moderate stress. Ghaffari has used this scale and confirmed its validity and content validity. The reliability of the dimensions of depression, anxiety, and stress was  $r=0.79$ ,  $r=0.71$ , and  $r=0.74$ , respectively, and the reliability of the whole instrument was  $r=0.91$  [37].

The ethics committee of Rafsanjan University of Medical Sciences approved the study. Informed written consent was received from students. The necessary information about the research, its objectives, and importance was provided, and participants were ensured that their participation was voluntary and their information would be completely confidential. Face-to-face access to students was not possible due to the prevalence of corona and the university closure at the time of this study, so an online questionnaire was used. Questionnaire link was sent to students via SMS, and the research objectives were explained to them in the designed questionnaire; the participants were asked to put a checkmark on the section related to their consent, and then the relevant questions were provided to the students.

Data were analyzed by SPSS 18 using the mean $\pm$ SD, Chi-squared and Fisher's exact for Compare ratios, and Logistic regression test for investigate the association between depression, stress and anxiety with PTSD.

## Findings

The questionnaire was sent to 390 students and 351 students completed and returned the questionnaire. According to demographic results, the mean $\pm$ SD age of the students was  $21.17\pm1.6$ , and the majority of participants were women (65.5%), 20-25 years old (55.8%), and single (88.3%). Most of them were living in urban regions (92.8%).

According to the results, the mean $\pm$ SD scores of depression, anxiety, stress, and PTSD were  $11.92\pm7.76$ ,  $11.23\pm5.8$ ,  $14.76\pm7.08$ , and  $26.94\pm30.10$ , respectively. Most of the students had moderate anxiety (33.6%), and 26.2% had PTSD. Depression (38.5%) and stress (55.3%) were not observed in the majority of students (Table 1).

**Table 1** Frequency DASS and PTSD in Medical students (numbers in parenthesis are in percent)

Variables	Normal	Mild	Medium	Severe	Very intense
Depression	135 (38.5)	65 (18.5)	104 (29.6)	34 (9.7)	13 (3.7)
Anxiety	100 (28.5)	56 (16)	118 (33.6)	44 (12.5)	33 (9.4)
Stress	194 (55.3)	68 (19.4)	57 (16.2)	28 (8.0)	4 (1.1)

The chi-squared test showed that 60.0% of the individuals with poor sleep quality had severe depression, so depression was significantly associated with economic status, sleep quality, fear of

corona, and family disease history. According to the chi-squared test, 40.0% of the individuals who had a very poor sleep quality or 50.6% of the individuals who had a family disease history had moderate anxiety, so anxiety was significantly associated with sleep quality, fear of corona, and family disease history. The results showed that the frequency of stress differs significantly only in terms of sleep

quality and fear of corona (Table 2).

The results showed that 53.8% of the individuals who had a poor economic status or 67.6% of the individuals who had a poor sleep quality suffered from PTSD. Therefore, PTSD is also significantly associated with gender, economic status, sleep quality, physical illness, mental illness, and family illness history (Table 3).

**Table 2)** Frequency of depression, anxiety, and stress in students according to demographic characteristics (n=351)

Variables		Normal	Mild	Medium	Severe	Very intense	Chi-square test		
							p	X <sup>2</sup>	df
Depression									
Economic status	Good	1 (1.1)	4 (4.5)	24 (27.0)	15 (16.9)	45 (50.6)	0.001	27.63	4
	Average	9 (3.6)	27 (10.8)	77 (31.0)	48 (19.3)	89 (35.7)			
	Bad	3 (23.1)	3 (23.1)	4 (30.7)	2 (15.4)	1 (7.7)			
Sleep status	good	1 (0.6)	8 (5.1)	43 (27.5)	23 (14.6)	82 (52.2)	0.0001	62.92	4
	average	7 (4.5)	16 (10.3)	46 (29.7)	40 (25.8)	46 (29.7)			
	bad	5 (14.7)	7 (20.6)	14 (41.2)	2 (5.9)	6 (17.6)			
Fear corona	Very bad	0	3 (60.0)	1 (20.0)	0	1 (20.0)	0.043	9.82	4
	Yes	11 (6.5)	16 (9.5)	53 (31.6)	32 (19.0)	56 (33.7)			
	No	2 (1.1)	18 (9.9)	51 (27.5)	33 (18.1)	79 (43.4)			
Family COVID-19 history	Yes	4 (4.6)	7 (8.0)	39 (44.9)	16 (18.4)	21 (24.1)	0.003	6.87	4
	No	9 (3.4)	27 (10.2)	65 (24.6)	49 (18.6)	114 (43.2)			
Stress									
Sleep status	Good	1 (0.6)	4 (2.5)	22 (14.0)	32 (20.4)	98 (62.5)	0.0001	45.37	4
	Average	1 (0.6)	13 (8.4)	25 (16.1)	33 (21.3)	83 (53.6)			
	Bad	2 (5.9)	10 (29.4)	8 (23.5)	3 (8.8)	11 (32.4)			
	Very bad	0	1 (20.0)	2 (40.0)	0	2 (40.0)			
Fear corona	Yes	4 (2.4)	13 (7.7)	29 (17.3)	42 (24.4)	81 (48.2)	0.016	12.25	4
	No	0	15 (8.2)	28 (15.4)	26 (14.3)	113 (62.1)			
Anxiety									
Sleep status	good	7 (4.5)	14 (8.9)	49 (31.2)	33 (21.0)	54 (34.4)	0.002	31.58	4
	average	18 (11.6)	20 (12.9)	57 (36.8)	21 (13.5)	39 (25.2)			
	bad	8 (23.5)	8 (23.5)	10 (29.5)	2 (5.9)	6 (17.6)			
	Very bad	0	2 (40.0)	2 (40.0)	0	1 (20.0)			
Fear corona	Yes	25 (14.3)	21 (12.5)	55 (32.7)	21 (12.5)	47 (28.0)	0.035	10.34	4
	No	9 (4.9)	23 (12.6)	63 (34.6)	34 (18.7)	53 (29.2)			
Family disease history	Yes	5 (5.7)	7 (8.0)	44 (50.7)	7 (8.0)	24 (27.6)	0.001	17.96	4
	No	28 (10.6)	37 (14.0)	74 (28.0)	49 (18.6)	76 (28.8)			

**Table 3)** Frequency of PTSD in students according to demographic characteristics by chi-square test (n=351)

Variable		Yes	No	p-value
Gender	man	40 (33.1)	81 (66.9)	0.034
	woman	52 (22.6)	178 (77.4)	
Economic situation	good	19 (21.3)	70 (78.7)	0.044
	average	66 (26.5)	183 (73.5)	
	bad	7 (53.8)	6 (46.2)	
Sleep status	good	25 (15.9)	132 (84.1)	0.0001
	average	41 (26.5)	114 (73.5)	
	bad	23 (67.6)	11 (32.4)	
	very bad	3 (60.0)	2 (40.0)	
Physical History disease	yes	14 (46.7)	16 (53.3)	0.008
	no	78 (24.3)	243 (75.7)	
Family history disease	yes	33 (37.9)	54 (62.1)	0.004
	no	59 (22.3)	205 (77.7)	
Psychology History disease	yes	5 (62.5)	3 (37.5)	0.018*
	no	87 (25.4)	256 (74.6)	

\* Fisher's exact

Logistic regression analysis was performed to determine the effect of independent variables on the dependent variable of PTSD; the variables of anxiety, depression, and stress were analyzed. The results of

this analysis showed a significant correlation between anxiety (p=0.026), depression (p=0.0001), stress (p=0.017), and PTSD. For every one-unit increase in the depression score, the risk for PTSD

increases by 1.854 folds; for every one-unit increase in the anxiety score, the risk for PTSD increases by 1.41 folds, and every one-unit increase in the stress score, the risk for PTSD increases by 1.076 folds.

## Discussion

This study showed that 26% of the students with moderate anxiety had PTSD, and most students were normal in terms of depression and stress.

The present study results showed that the majority of students did not report any signs of depression, but 13.4% of them suffered from severe and very severe depression. Huang and Zhao in China reported a depression rate of 20.1% during the COVID-19 epidemic [19]. The study was conducted on the Chinese people, which is consistent with the present study done on Iranian students. The mean±SD score of depression in all participants of the present study was 11.92±7.76, and depression was significantly correlated with economic status, sleep quality, fear of corona, and family history of the disease. Chen *et al.* examined the mental health of psychiatrists and psychiatric nurses in China during the COVID-19 outbreak. The mean depression score was 41.96, and attitudes toward corona were not correlated with depressive symptoms [15]. The results of this study do not support the present study. In the present study, fear of corona is associated with depression, which was not mentioned by Chen. Liu reported a depression rate of 34.6% in physicians and nurses. Gender had no significant relationship with depression, and staff working in infectious disease hospitals had higher depression [14]. This study is consistent with the present study except for gender. In the present study, the mean±SD score of students' anxiety during the corona disease was 11.0±5.8, and 33.7% of the participants had moderate anxiety, and 31.9% of them had severe and very severe anxiety. Chen reported a mean anxiety score of 41.33 in nurses and physicians, which was higher in women than in men. Symptoms of anxiety were higher in medical staff and younger nurses, and attitudes toward corona were not associated with depressive symptoms [15]. This study does not support the current study in terms of the factors affecting anxiety. The reason for this difference can be a different statistical population. Another study in China reported an anxiety rate of 23.04% in the health care staff [16]. This study is consistent with the present study, but the research population is different. Huang and Zhao examined generalized anxiety disorder, depressive symptoms, and sleep quality during the COVID-19 epidemic in China. The prevalence of anxiety disorders was reported to be 35.1% [19]. The results of this study are consistent with that of the present study. A study in China reported an anxiety rate of 16% in nurses and physicians, and gender was not significantly associated with depression [14]. The results of this study do not support the present study

except for gender. The possible reasons for this discrepancy may be related to the young participants in the present study. Cao *et al.* reported an anxiety rate of 0.9 percent, a moderate anxiety rate of 2.7 percent, and a mild anxiety disorder of 21.3% in Chinese medical students. In addition, living in urban areas and the stable family income were protective factors against anxiety, while gender was not a significant factor affecting anxiety [17]. Like the present study, gender was not a factor affecting anxiety. Unlike the current study, urban and rural living and economic status have been protective factors against anxiety. Huang *et al.* found that living in the city and close contact with COVID-19 patients caused more anxiety [19]. The results of this study are in line with that of the present study.

In the present study, the mean±SD stress score of students was 14.76±7.08, 53% of the participants did not report any stress, and 35.7% reported mild-moderate stress. The results showed that sleep quality and fear of corona were among the factors associated with stress. Similar to the present study, a study was conducted to determine the mental health of medical staff at COVID-19 pneumonia hospitals in China, with a stress rate of 39.27% [16]. Mo *et al.* reported a job stress score of 39.91 among nurses [19]. In the present study, the mean±SD PTSD score was 26.94±30, and 26% of the students had PTSD. Gender, sleep quality, physical illness, mental illness, and family illness influenced PTSD. Sun found that the prevalence of PTSD during the corona epidemic in China was 4.6 percent. The most important variables that played a role as risk factors included gender and poor sleep quality [9]. This study is inconsistent with the present study in terms of infection statistics, but it is consistent with the present study regarding gender and sleep quality. Liu *et al.* examined the prevalence of PTSD in several regions of China. PTSD was reported to be 7% in Wuhan, China, one month after the onset of the disease. Most people with PTSD were female, and better sleep quality reported less PTSD [10]. In the present study, gender and sleep quality are also factors influencing PTSD. However, males had a higher PTSD score in the present study. Zhang also reported increased PTSD and decreased sleep quality during the COVID-19 outbreak. He, like the present study, found a relationship between sleep quality and PTSD [9]. Huang *et al.* reported higher PTSD in women than in men [16].

In a study, Depression and Anxiety symptoms were assessed before and during the COVID-19 pandemic among Iranian Medical Students. Depression and anxiety in Iranian medical students before and after were not significantly different [38].

Since the present study was conducted only on medical students, it cannot be generalized to the entire student population and the general population. The self-report was another limitation of the study,



so further studies on other social classes are recommended using interviewing and qualitative studies. Another limitation is convenience sampling. In the next studies, Random sampling must be done. The results of this study were provided to university officials to make the necessary decisions. Interventions such as psychologists, family counselors, and psychiatric nurses are recommended for high-risk students. Other solutions include holding counseling classes and training courses for students during crises.

## Conclusion

The results suggest mental health problems among medical students.

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**Ethical Permissions:** This study has a code of ethics no. IR.RUMS.REC.1399.016 from the ethics committee of the research deputy of Rafsanjan University of Medical Sciences.

**Conflict of Interests:** The authors declare no conflict of interests.

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