



The Relationship Between Anxiety, Resilience, and Posttraumatic Growth of the Medical Students in COVID-19 Pandemic in Iran

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Received 2021 April 17; Revised 2021 December 04; Accepted 2022 December 06.

Abstract

Background: Medical students serve as frontline individuals to COVID-19 patients, and their mental health affects the quality and safety of the provided services.

Objectives: The present study aimed to identify the relationship between anxiety, resilience, and posttraumatic growth of medical interns during COVID-19 pandemic.

Methods: This descriptive-correlational study was conducted in Kerman and Isfahan, Iran, from June to September 2020. The socio-demographic questionnaire, Beck Anxiety Inventory (BAI), Connor-Davidson Resilience Scale (CD-RIS), and Posttraumatic Growth Inventory (PTGI) were completed by 235 medical students. Pearson correlation test and descriptive statistics were used to analyze the data.

Results: The mean and standard deviation scores of anxiety, resilience, and posttraumatic growth were 10.49, 1.08, and 50.60, as well as 13.39, 65.70, and 15.90, respectively. The results showed no significant relationship between anxiety and resilience ($r = 0.16$ and $P = 0.057$). A positive and significant correlation was observed between resilience and posttraumatic growth ($r = 0.42$ and $P = 0.000$). Furthermore, a significant negative correlation was found between anxiety and posttraumatic growth scores ($r = -0.20$ and $P = 0.002$).

Conclusions: In sum, the more resilient and less anxious a person was, the greater his/her posttraumatic growth became. Therefore, it was recommended that appropriate psychological interventions be designed and implemented to improve the mental health of medical interns.

Keywords: Anxiety, COVID-19 Pandemic, Medical Student, Posttraumatic Growth, Resilience

1. Background

COVID-19 originated in Wuhan, China, in December 2019 (1), and the first case was diagnosed in Iran on February 19. Pathogenicity, rate of spread, and high mortality rate from COVID-19 have led the World Health Organization (WHO) to declare it as a public health emergency (2). Then, on March 11, 2020, the WHO announced it as a pandemic (3). COVID-19 affected all important economic, political and social aspects of countries, and many people around the world were affected by the psychological problems triggered by it. Students were also affected by psychological problems during the COVID-19 pandemic due to the closure of universities, inability to socialize with

friends, restrictions on traveling, and self-quarantine due to fear of being infected with the disease. Ghazawy et al. found that more than half of the Egyptian students experienced symptoms of depression, anxiety, and stress during the COVID-19 pandemic (4). In addition, medical students experienced the unknown nature and high prevalence of the COVID-19 (1) because they were engaged in the frontline care in some countries, like Iran, during the epidemic (5). Several studies reported that the rates of anxiety caused by the COVID-19 in medical students of China, UAE, and Iran were 17.1% (6), 50% (7), and 38.1% (8), respectively.

COVID-19-induced anxiety can be reduced by some factors, one of which is the resilience, that has been found to play an important role in controlling and preventing anx-

ity in medical students during the COVID-19 pandemic (8, 9). If medical students' anxiety is not controlled, it can negatively affect the quality of patient care and lead to poor effectiveness in treating patients (10). Resilience is the ability to adapt successfully in the face of stress and adversity, maintain proper functioning, and prevent the return of essential stressors in life (11). Resilience, in other words, is the ability to cope with life changes and stress, which is not only useful for surviving life's challenges but also provides an opportunity to develop people's learning and growth in difficult situations (12).

In addition to resilience, sometimes difficult and stressful situations such as COVID-19 provide a good context for people to progress and achieve higher levels of psychological function, as well as facilitate the occurrence of positive psychological changes called posttraumatic growth. Posttraumatic growth is achieved in the face of hardship or traumatic events and adaptation to anxiety (13, 14). A review of the literature has shown that most studies have addressed the negative consequences of the COVID-19 outbreak, including anxiety, depression, and posttraumatic stress disorder in medical students and insufficient information is available about the positive consequences of the COVID-19 pandemic such as resilience and posttraumatic growth in medical students. Medical students, as an important part of the healthcare team in hospitals, play a crucial role in maintaining and promoting community health and are now providing medical care to patients with COVID-19. In addition, their mental health affects the quality and effectiveness of patient treatment, care, and safety (15). To our experience, medical students faced a number of psychological challenges in treating patients with COVID-19 which sometimes manifested themselves as an inability to stay in medicine. Our study results reflected the mental health of medical students during the COVID-19 pandemic. In addition, our results provided a theoretical basis to perform psychological interventions for medical students.

2. Objectives

The present study aimed to determine the relationship between anxiety, resilience, and posttraumatic growth in medical interns in the face of COVID-19 pandemic in Kerman and Isfahan, Iran.

3. Methods

3.1. Study Design and Setting

A descriptive-correlational study design was used. Since this study was performed during the COVID-19 pandemic, the quarantine measures demanded less face-to-

face communication. Therefore, self-administered electronic questionnaires were used on the web-based platform called "Porsall."

3.2. Sample Size and Sampling

A web-based, convenience sampling method was adopted to select the samples. A total of 600 students serving as medical interns at selected hospitals affiliated to Kerman and Isfahan Universities of Medical Sciences were selected. The sample size was determined to be 235 students based on an alpha of 0.05 error level, power of 0.80, and confidence level of 0.95. The inclusion criteria were willingness to participate in research, engagement in the frontline care during the COVID-19 pandemic, having no mental disorders such as major depression and anxiety, and having no addiction to narcotics and psychotropic drugs based on self-report.

3.3. Measurements

In the present study, four questionnaires, including demographic information (i.e., age, sex, marital status, having children, native/not native, type of service, and type of ward, as well as questions about the type of sources used to obtain information about the COVID-19, adequacy of information on the diagnosis, prognosis, and treatment of the COVID-19), Beck Anxiety Inventory (BAI), Connor & Davidson Resilience Scale (CD-RIS), and Posttraumatic Growth Inventory (PTGI) developed by Tedeschi & Calhoun were used.

3.4. Beck Anxiety Inventory

The Beck Anxiety Inventory (BAI) is a self-report questionnaire designed to measure the severity of anxiety in adolescents and adults. This 21-item inventory is rated on a four-point Likert scale ranging from 0 to 3, including not at all, mild (it did not bother me much), moderate (it was very unpleasant, but I stand it), and severe (I could rarely stand it). Subject scores are between zero and 63. Scores 0 - 7 indicate no or minimal anxiety, 8 - 15 indicate mild anxiety, 16 - 25 indicate moderate anxiety and 26-63 indicate severe anxiety. Content, concurrent, construct, diagnostic, and factor validities were assessed for this questionnaire, all of which indicated the high efficiency of this instrument in measuring anxiety intensity (16). Kaviani and Mousavi examined the psychometric properties of this test in the Iranian population and reported a reliability coefficient of about 0.92 (by internal consistency method) and a test-retest reliability coefficient of 0.83 one month later (17).

3.5. *Conor and Davidson Resilience Scale*

This scale has been prepared by reviewing research sources related to resilience in crisis and psychological stress. The psychometric properties of this instrument were evaluated in six groups, including the general population, patients referred to the primary care ward, psychiatric outpatients, patients with generalized anxiety disorder, and two groups of patients with posttraumatic stress disorder. This scale can distinguish resilient and non-resilient individuals in clinical and non-clinical groups and can be used in research and clinical situations. *Conor and Davidson Resilience Scale (CD-RISC)* contains 25 items, which are rated on a five-point Likert scale and range from 0 (not true at all) to 4 (true nearly all the time). Therefore, possible scores range from 0 to 100, with higher scores indicating more resilience of the subject (18). Derakhshanrad et al. measured CD-RISC in Iran psychometrically and, after confirming the validity, reported reliability of 0.89 for this questionnaire using Cronbach's alpha coefficient (19).

3.6. *Posttraumatic Growth Inventory*

This 21-item questionnaire was designed by Tedeschi and Calhoun (1996) to assess the positive psychological outcomes of people who have experienced traumatic events in their lives. The inventory is rated on a six-point Likert scale ranging from 0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis). In addition, the scores of the subject range from zero to 105, with a higher score reflecting the higher rate of posttraumatic growth in the subject (20). Heidarzadeh et al. reported the reliability of 0.87 for the whole scale using Cronbach's alpha coefficient, and it was between 0.55 to 0.75 for its subscales (21).

3.7. *Data Collection and Analysis*

The electronic questionnaires were designed by the Press Line software and then, the relevant link was provided to the fourth and fifth authors, who uploaded it to the WhatsApp and Telegram groups of medical students. Those interested in participating in the study then completed the questionnaires on the "Porsall" platform. Questionnaires could only be submitted if all items were answered. Data collection lasted from June to September 2020.

SPSS was used to analyze the data (version 18, SPSS Inc., Chicago, IL, USA). Descriptive statistic (frequency, percentage, mean and standard deviation) was used to describe the demographic characteristics and the mean scores, and Pearson correlation coefficient was used to determine the relationship between variables.

4. Results

4.1. *Study Population*

The mean age of participants was 23.5 (5.79). The majority of participants were female (56.6%), single (68.5%), childless (88.1%), were studying in public universities (68.5%), and had mandatory services (56.6%). In addition, most of them were living with their parents (34.9%), working in the medical department (49.8%), using social networks as the main source of information about the COVID-19 (47.2%), and they believed that the available information sources on the COVID-19 were sufficient (50.6%) (Table 1).

The results showed that the mean and standard deviation of the anxiety were 10.49 and 1.08, which were lower than the midpoint (score = 31.5). In addition, the mean and standard deviation of the resilience were 50.60 and 13.39, which were higher than the midpoint (score = 50). The mean and standard deviation of the posttraumatic growth were 65.70 and 15.90, which were higher than the midpoint (score = 52.5) (Table 2).

Pearson correlation test showed no significant relationship between anxiety and resilience scores ($r = 0.16$ and $P = 0.057$). A positive and significant relationship was found between resilience and posttraumatic growth scores ($r = 0.42$ and $P < 0.001$). In addition, there was a significant negative correlation between anxiety and posttraumatic growth scores ($r = -0.20$ and $P = 0.002$) (Table 3).

5. Discussion

The present study examined the relationship between anxiety, resilience, and posttraumatic growth in medical interns during the COVID-19 pandemic in Kerman and Isfahan, Iran.

The results of the present study showed no significant relationship between anxiety and resilience in medical interns. One study on the general Chinese population during the COVID-19 pandemic showed a significant negative relationship between anxiety and resilience (22). The results of this study were inconsistent with our study results due to the differences in methodology and instruments used for measuring anxiety. The Beck Anxiety Inventory was used in our study to measure anxiety, while Generalized Anxiety Disorder-7 (GAD-7) was used in the recent study. In addition, resilience is a complex concept in the review of literature, whose relationship with other variables can not be easily expressed by any particular model. Items such as different behavioral and personality dimensions, adaptation mechanisms, and cultural and social conditions are involved in resilience (23).

Results of the study showed a positive and significant relationship between resilience and posttraumatic growth

Table 1. Demographic Information of the Participants (N = 235)

Variables	No. (%)
Gender	
Female	133 (56.6)
Male	102 (43.4)
Marital status	
Single	161 (68.5)
Married	74 (31.5)
Having child	
Yes	28 (11.9)
No	207 (88.1)
Paying fee for education	
Yes	74 (31.5)
No	161 (68.5)
Type of service provision to COVID-19 patients	
Mandatory	133 (56.6)
Voluntarily	102 (43.4)
Who do you live with?	
None	21 (8.9)
Parents	82 (34.9)
Other family members	20 (8.5)
Friends	60 (25.5)
Wife & children	48 (20.4)
Others	4 (1.7)
The ward in which care is provided to patients with COVID-19	
Medical	117 (49.8)
Emergency	79 (33.6)
Infectious	39 (16.6)
Source of COVID-19 information	
Website of the Ministry of Health	46 (19.6)
Website of WHO	46 (19.6)
Social media	111 (47.2)
Other	32 (13.6)
Adequacy of available information about the COVID-19	
Yes	119 (50.6)
No	116 (49.4)

in medical interns, meaning that the higher the posttraumatic growth, the higher the rate of resilience. Resilience is believed to be a process of recovery that potentially leads to posttraumatic growth (23). Resilience and posttraumatic growth both lead to positive adaptation after an unpleasant event. It is assumed that to achieve an accept-

able level of posttraumatic growth, one must first have resilience and return to healthy functioning before trauma to grow and move toward more effective performance. Ahmadi and Mehrabi studied the relationship between social support, resilience, and posttraumatic growth in women with trauma in Isfahan and reported a positive and significant relationship between resilience and posttraumatic growth (24). The results of these two studies were consistent with our study results, which confirmed a positive and significant relationship between resilience and posttraumatic growth after adverse events such as stressful conditions of an epidemic, war, and even emotional trauma.

The results of the study showed a significant negative relationship between anxiety and posttraumatic growth in medical interns, meaning that the higher the posttraumatic growth, the lower the level of anxiety. The COVID-19 pandemic not only causes physical health problems but also affects mental health and leads to anxiety. At the same time, people can feel some positive psychological changes in themselves. The present study did not examine the mechanism that justified the relationship between anxiety and posttraumatic growth. One study found that positive beliefs in the world and those around us could facilitate posttraumatic growth and reduce the effects of stress during the COVID-19 pandemic. These beliefs both prevented negative consequences such as anxiety and paved the way for posttraumatic growth (25).

The results of the present study showed that the students' level of anxiety was mild. Pandey et al. showed that the mean score of anxiety in medical students was mild during the COVID-19 pandemic and direct care for patients with COVID-19 did not increase anxiety significantly in medical students (26). In addition, a study in Beijing and Wuhan found that 95.4% of medical students experienced normal and mild anxiety levels during the pandemic (6). The results of these two studies were consistent with the results of the present study. Although medical students are at risk of infection with COVID-19, their anxiety level is mild because they have a high perception of the prognosis and transmission of COVID-19. According to our study results, the majority of medical interns believed that the available sources of information about COVID-19 were sufficient (50.6%).

Furthermore, our study results showed that the resilience of medical students was above average. The average level of resilience might be more likely to result in successful experiences of coping with and recovering from adversities, including the pandemic (27). This finding could also explain the low level of anxiety in the students. One study aimed to identify the effects of COVID-19 on students in Asia, Europe, and North America and found that the resilience of approximately 50% of the students did not

Table 2. Distribution of Anxiety, Resilience and Posttraumatic Growth in Participants (N = 235)

Variables	Mean ± SD	Min	Max
Anxiety	10.49 ± 1.08	0	63
Resilience	50.60 ± 13.39	0	100
Posttraumatic growth	65.70 ± 15.90	0	105

Table 3. Correlation Among the Anxiety, Resilience and Posttraumatic Growth in Participants (N = 235)^a

Variables	1	2	3
1. Anxiety	-		
2. Resilience	0.16 (0.057)	-	
3. Posttraumatic growth	-0.20 (0.002) ^b	0.42 (< 0.001) ^b	-

^a Data were presented as Pearson's correlation coefficient.

^b P < 0.05 was considered significant.

change compared with that estimated before the COVID-19 pandemic (27). It seemed that in our study, like the recent study, the resilience remained unchanged, and it was at an acceptable level.

The results of the study showed that the level of post-traumatic growth in the studied students was above average. Posttraumatic growth occurs over time (13). Since sampling had been performed approximately five months after the onset of the COVID-19 epidemic in Iran, the moderate score of posttraumatic growth was not unexpected. It was a bit difficult to compare the results because no studies had been conducted in this regard due to the emerging prevalence of this disease.

The present study had several limitations. First, it was a cross-sectional study, which could not determine the causal relationship between the variables. Second, self-report questionnaires were used to assess the psychological consequences of COVID-19, and medical records related to anxiety disorder were not used, which may have affected the study results. Third, senior students were selected as the study sample. Therefore, the results may have been generalized to all medical students with caution.

5.1. Conclusions

It was concluded that with increasing posttraumatic growth rate, resilience increased and anxiety decreased in medical interns. Therefore, it was suggested that psychological interventions be designed and implemented to promote posttraumatic growth in medical students. These interventions had the potential to improve the mental health of students and increase the quality of the provided services and patient safety in crises such as the COVID-19 pandemic.

Footnotes

Authors' Contribution: Conceived and designed the study: F.G-H, F.L; Acquired the data: F.R-S-N, S.S; Performed statistical analysis: F.G-H; Wrote the manuscript: F.G-H, F.L, N.T; Revised the manuscript: F.G-H, S.S, N.T. All authors read and approved the final manuscript.

Conflict of Interests: The authors declare that they have no conflict of interest.

Ethical Approval: The present study was performed after the acquisition of the code of ethics from the Ethics Committee of Kerman University of Medical Sciences (code: IR.KMU.REC.1399.169; link: ethics.research.ac.ir/EthicsProposalView.php?id=136039).

Funding/Support: The authors did not receive any financial support for the publication of this study.

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