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The predictive role of personality traits and demographic features on post-traumatic stress disorder in a sample of COVID-19 hospitalized patients

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Abstract

Background Hospitalized COVID-19 patients suffer from psychological and psychiatric disorders such as post-traumatic stress disorder, depression, and anxiety. Because there was no comprehensive study on psychological factors in hospitalized COVID-19 patients in Iran, we investigated the predictive role of personality traits and demographic features on post-traumatic stress disorder in COVID-19 hospitalized patients.

Results In this research method first, 160 patients selected randomly and completed relevant questionnaires, which are prepared online. We examined the multivariate linear regression between the mentioned variables. The results showed that the independent variables are able to predict changes in post-traumatic stress disorder ($P < 0.001$). The percentage of explanation of changes in dependent variables was equal to 0.77, 0.65, 0.71, and 0.68, respectively.

Conclusion People's personality traits play a key role in facing and responding to stressful environmental events for instance COVID-19 pandemic, and as a result, some personality traits such as conscientiousness protect people from stress even though, neuroticism personality trait cause instability and make people more stresses, identifying these traits and treating them is.

Keywords COVID-19, Hospitalized patients, Personality traits, Post-traumatic stress disorder

Background

For the first time, Tyrell and Bynoe introduced the coronaviruses by cultivating the virus in people with prevalent colds in 1966 [44]. The new version of virus developed in Wuhan, China, in December, and the World

Health Organization (WHO) declared a pandemic due to the spread of the virus worldwide on March 12 [3]. Clinical symptoms of the COVID-19 disease are classified from mild to severe; the symptoms of mild cases, including fever, cough, and fatigue, and the symptoms in severe cases, including sepsis, acute respiratory syndrome, and heart failure, occur in patients [54].

The conditions created by a coronavirus, such as quarantine, social distance, physical problems, side effects of medications, and fear of disease, have caused many psychological problems such as anxiety, depression, sleep problems, and post-traumatic stress disorder in people [51]. Varatharaj et al. conducted a study on people with acute COVID-19 disease; they found that 31% of people experience neuropsychiatric and neurocognitive symptoms [45]. Patients with COVID-19 under intensive

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hospital care experienced more mental health problems after discharge from the hospital; for example, depression and anxiety are reported in 67% of patients and post-traumatic stress disorder (PTSD) in 45% of patients [46].

PTSD is a mental disorder that occurs when a person is in a state of trauma and causes negative changes in cognition and mood, excessive arousal, and avoidance of incident recall [39]. PTSD may develop due to catastrophic life events such as illness moreover, being in a pandemic can be considered a trauma incident for people [52], and cause a debilitating mental state in the individual, studies have shown that 17–44% of the survivors of severe diseases experience PTSD disorder [32]. Post-traumatic stress disorder has been reported in patients with the COVID-19 disease, especially those with severe disease [11]. According to the results of a meta-analysis, 17–44% of people who survived a severe illness suffered from post-traumatic stress [32], and also studies have shown that the prevalence of PTSD in COVID-19 patients is 9.5 to 30.2% [6, 16, 43]. One of the factors that associated with PTSD is personality traits [15].

Personality traits show the difference between people's feelings, thoughts, and behaviors [25]. In the big five personality traits model, personality is defined by five factors, including neuroticism characterized by emotional instability such as anxiety, fear, and worry, and also, people respond to stressful and adverse situations with strong emotions, conscientiousness is the tendency to be responsible, purposeful, need for achievement, carefulness, and hardworking; extraversion tends to be social and be active; and people are so talkative, sociable and outgoing, and openness to experience, characterized by creativity and keen to novel situations and ideas; and finally, agreeableness is determined with characteristics such as the desire for kindness, cooperation, altruism, and be responsible [47].

Personality traits are associated with psychological disorders such as PTSD, and different personality traits show different vulnerabilities to stressful and traumatic conditions and different resistances [50]. Some studies have shown that neuroticism has a positive and significant relationship with PTSD (7). Also, other personality traits such as extraversion, openness to experience, agreeableness, and conscientiousness negatively correlate with PTSD [15]. A study was conducted on 100 men with chronic disease who experienced PTSD and found that PTSD was associated with high neuroticism and low agreeableness and extraversion [13]. In COVID-19 patients, people with neuroticism personality traits are more affected by COVID-19 and experience more psychological damage than people with extraversion, agreeableness, openness, and conscientiousness personality traits [2]. People with neuroticism personality traits turn

to risky behaviors such as drinking alcohol and smoking having unprotected sex, engaging in delinquent activities, to feel calm and escape from anxiety and stress, and the more stress there is, the more these behaviors increase [29, 49]. People with introverted personality traits experience more social support in stressful situations because they have high social relationships, and these people maintain positive psychological characteristics for a longer period of time than introverted people [1, 38]. Openness people are curious and open-minded about situations, so they experience less anxiety and stress in crisis situations. People with the conscientiousness personality trait follow the hygiene principles and rules, so the risk of infection is low in these people and also, people with high agreeableness personality trait have cordial and friendly social relationships, and this trait makes them receive more social support during a crisis [17].

Due to the importance of these variables in individuals' physical and mental health and considering that a study on these factors has not been performed on hospitalized patients with COVID-19, in this study, we examined predictive role of personality traits and demographic features on COVID-19 hospitalized patients.

Material and method

Procedure

The present research design is cross sectional type. We used multivariate linear regression analyses to determine the impact of five big personality traits with 5 subscales and demographical features on post-traumatic stress disorders with 4 subscales. For analysis data, we used stata version 14.

Participants

The statistical population includes all patients with coronavirus who were admitted to Amir Alam Hospital in Tehran in 2022 and hospitalized in the ward. First, we prepared a list of patients from the hospital, and according to the Liyanage-Don et al.'s article result [21], the rate of PTSD caused by COVID-19 was reported as 23.5% and that with the first type of error 0.05, the minimum sample size was calculated as 141 people. Then, we selected 200 people who had an odd admission number using simple random sampling. We first contacted people by phone and persuaded them to complete the questionnaires. Then, we prepared the questionnaires online and sent them to people through WhatsApp, and out of 200 people, 160 completed the questionnaires in full. Inclusion criteria are people who have been hospitalized during the mentioned months and people who can read and write. Exclusion criteria are people with underlying psychiatric disorders and severe cognitive problems such as mental retardation, to check this criteria, we asked them

that they did not have a history of referring to a psychiatrist and psychologist and taking psychiatric drugs.

Ethics code

This study received an ethics code from the ethics committee of the Tehran University of Medical Sciences IR.TUMS.MEDICINE.REC.1400.948. Before the implementation of the research project, informed consent was obtained from each participant.

Instruments

NEO Five-factor inventory questionnaire

This questionnaire consists of 60 questions to assess the five significant personality factors (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness). For each personality factor, 12 questions are assigned, which are scored on a 5-point Likert scale (completely agree to completely disagree). The study results showed that the subscales of the questionnaire have good internal consistency, and Cronbach’s alpha coefficient is reported between 0.68 and 0.86 [5]. This questionnaire was translated and standardized in Iran, and Cronbach’s alpha coefficient was reported between 0.56 and 0.87 [28].

The PTSD Checklist—Civilian Version (PCL-C)

This questionnaire contains 17 questions that measure post-traumatic stress disorder; participants show how upset and troubled they were when they were in a stressful situation over the past month. Questions were rated on a 5-point Likert scale (1 = not at all, 5 = extremely). The minimum score is 17, and the maximum score is 85. These scales have three components which include the signs and symptoms of re-experiencing a traumatic event (questions 1 to 5), signs and symptoms of emotional numbness/avoidance (questions 6 to 12), and signs and symptoms of hyper arousal (questions 13 to 17); the cut point of this question in the civilian studies was reported 35 [36]. Cronbach’s alpha for total PTSD, re-experiencing, avoidance, and hyperarousal reported 0.94, 0.85, 0.85, and 0.87, respectively [37]. This questionnaire was translated and normalized in Iran, and acceptable validity and reliability were reported [9].

Result

This study included 160 patients with COVID-19 who were in the age range of 20 to 60 years and the average age was 35.05 ± 9.31 years. In terms of marital status, 57.5% of them were married, 28.1% of them were single, 10% of them were divorced, and 4.4% of them were widows. Most of these people are female (61.3%), and in terms of education, bachelor’s education was the highest percentage (40%). In terms of jobs, most of them had freelance

Table 1 Demographic characteristics

	N	Percentage
Marital status		
Single	45	28.1
Married	92	57.5
Divorced	16	10.0
Widow	7	4.4
Gender		
Female	98	61.3
Male	62	38.8
Education		
Diploma degree	45	28.1
Bachelor’s degree	64	40
Post graduated	51	31.9
Occupational status		
employed	43	26.9
Unemployed	25	15.6
freelance job	45	28.1
housewife	40	25.0
retired	7	4.4
Duration		
2	30	18.8
3	24	15.0
4	40	25.0
5	32	20.0
6	27	16.9
7	7	4.4

Table 2 Statistical parameters obtained from the multivariate linear regression (MLR) approach for predicting response variables (n = 160)

	R ²	F	P
PTSD total	0.78	48.64	P < 0.001
PTSD re-experience	0.64	23.86	P < 0.001
PTSD emotional numbness	0.73	36.06	P < 0.001
PTSD hyper arousal	0.69	30.21	P < 0.001

and paid jobs. The highest number of days of hospitalization was 4 days (25%) and 5 days (20%) (Table 1).

According to this criteria that people who have an PTSD score above 35 experience PTSD, in the current sample, 54.4% of the hospitalized ward patients experienced PTSD [36].

According to the results of Table 2, we found that the independent variables are able to predict changes in PTSD total, PTSD re-experience, PTSD emotional numbness, and PTSD hyper arousal (P < 0.001). The percentage

of explanation of changes in dependent variables was equal to 0.78, 0.64, 0.73, and 0.69, respectively.

In the process of predicting post-traumatic stress disorder by demographic variables and personality characteristics, it was found that total PTSD decreases with increasing education ($P=0.011$). Total PTSD increased with increasing number of days of hospitalization ($P<0.001$). An increase in neuroticism increases total PTSD ($P<0.001$), and a decrease in conscientiousness increases total PTSD ($P<0.001$).

In predicting PTSD re-experience by predictive variables, PTSD re-experience increased with the increasing number of days of hospitalization. An increase in neuroticism was associated with an increase in PTSD re-experience, but with a decrease in conscientiousness, PTSD Re-experience increased.

In the continuation of the regression analysis, we saw that PTSD emotional numbness decreased with increasing education ($P=0.002$) and it increased with the increasing number of days of hospitalization ($P<0.001$). Neuroticism was also recognized as an influencing factor on PTSD emotional numbness, so that with the increase of neuroticism, we saw an increase in PTSD emotional numbness ($P<0.001$), but emotional numbness decreased with an increase in conscientiousness ($P<0.001$).

In the regression model to predict PTSD hyper arousal, we found that PTSD hyper arousal increased with increasing number of days of hospitalization ($P=0.001$) and increased with the increasing of neuroticism ($P<0.001$), but the decrease of conscientiousness is associated with the increase of PTSD hyper arousal (Table 3).

Discussion

The purpose of this study was to investigate the predictive role of personality traits and demographic characteristics on post-traumatic stress disorder in COVID-19 hospitalized patients. The statistical results showed that the personality traits of neuroticism and conscientiousness can predict PTSD in such a way that the high neuroticism personality trait caused the high PTSD in patients and vice versa, a person with a high conscientiousness experiences less PTSD. These findings are consistent with Jakšić et al.'s [15] study that showed PTSD has a positive and significant relationship with the neuroticism personality traits and a negative and significant relationship with the conscientiousness and extraversion personality traits [15], also, the study of Puechlong et al. [35] pointed to the critical role of neuroticism in the development of PTSD [35]. Madamet study showed that high neuroticism and low extraversion are related to PTSD [23], and the study

Table 3 The results of multivariate regression analysis to predict post-traumatic stress disorders

	β	STD	P
PTSD total			
Occupational status	0.02	0.63	0.970
Education	-2.26	0.88	0.011
Marital status	0.69	1.08	0.523
Duration	2.21	0.54	<0.001
Gender	1.06	1.50	0.481
Age	-0.02	0.08	0.773
Neuroticism	1.34	0.12	<0.001
Extraversion	-0.12	0.17	0.468
Openness to experience	0.18	0.17	0.300
Agreeableness	-0.03	0.15	0.832
Conscientiousness	-0.47	0.14	0.001
PTSD re-experience			
Occupational status	0.12	0.26	0.630
Education	-0.38	0.36	0.288
Marital status	-0.01	0.44	0.974
Duration	0.47	0.22	0.034
Gender	<0.01	0.61	0.997
Age	≤ 0.01	0.03	0.868
Neuroticism	0.41	0.04	<0.001
Extraversion	-0.06	0.07	0.399
Openness to experience	0.09	0.07	0.167
Agreeableness	-0.34	0.07	0.571
Conscientiousness	-0.11	0.06	0.045
PTSD emotional numbness			
Occupational status	-0.21	0.32	0.512
Education	-1.40	0.44	0.002
Marital status	0.68	0.54	0.206
Duration	1.07	0.27	<0.001
Gender	0.74	0.75	0.326
Age	-0.04	0.04	0.370
Neuroticism	0.53	0.06	<0.001
Extraversion	≤ 0.01	0.08	0.903
Openness to experience	0.03	0.08	0.693
Agreeableness	-0.02	0.07	0.751
Conscientiousness	-0.25	0.07	<0.001
PTSD hyper arousal			
Occupational status	0.10	0.23	0.641
Education	-0.47	0.32	0.139
Marital status	0.17	0.39	0.966
Duration	0.66	0.20	0.001
Gender	0.31	0.55	0.567
Age	0.02	0.03	0.531
Neuroticism	0.40	0.0	<0.001
Extraversion	-0.06	0.06	0.327
Openness to experience	0.04	0.06	0.453
Agreeableness	0.03	0.05	0.626
Conscientiousness	-0.10	0.05	0.042

of Engelhard and van den Hout (7) showed that neuroticism has a positive and significant relationship with PTSD.

Personality traits in people determine their vulnerability to mental disorders and stress and traumatic events in such a way, people with high neuroticism personality traits are vulnerable and more prone to mental disorders such as anxiety, stress, depression, and traumatic stress, and other personality traits such as extraversion, openness to experiences, agreeableness, and conscientiousness play a protective role for a person against stressful factors; also, people with high neuroticism personality traits use less coping skills in front of traumatic events and rely more on emotional coping methods, so they are more susceptible to stress and traumatic event, but people with conscientiousness personality traits use the problem-solving method in against stressful events, and as a result, they protect the person from harm, and PTSD is reduced in these people [4]. A study conducted on citizens during the COVID-19 pandemic was shown that people who have immature personality traits such as neuroticism are more likely to experience PTSD than people who have mature personality traits like conscientiousness [20], and also Metz et al. [26] study showed that PTSD had relationship with neuroticism personality traits [26]. People with neuroticism personality traits are emotionally unstable. They show a faster and more intense emotional response to stress and need more time to return to their original emotional state [31]. High neuroticism is associated with negative emotions such as anxiety, anger, and depression and is also associated with high levels of inflammation [40]. People with high neuroticism and low conscientiousness are very vulnerable to disease, and these two personality traits are associated with chronic diseases [10]. A high level of neuroticism and low conscientiousness are associated with IL-6 and c reactive protein (CRP) [41]. IL-6 is one of the critical cytokines in people with the severe acute respiratory syndrome (SARS) [53], and in many COVID-19, studies have reported an increase in IL-6 in patients which was associated with disease severity and has a negative effect on the immune system [34]. The brain can be affected by increased peripheral inflammation; thus, it can be increased the likelihood that a person will experience PTSD [14]. The study has shown that people with PTSD have high levels of pro-inflammatory) [33].

Proinflammatory factors are high in neuroticism personality traits and low in other mature personality traits [22, 27, 48], and caused weakness in immune system also, these factors are high in PTSD, so it can be expected that PTSD has an associated with high neuroticism personality traits and low other personality traits such as conscientiousness.

The results showed that among the demographic characteristics, marital status, education level, and days of hospitalization are related to PTSD, so people who have a low educational level are married and have been hospitalized for a fewer days of experiencing PTSD.

The educational level is one of the important factors in psychological resilience and protects people against stressful life situations. We consider the conditions caused by COVID-19 as a traumatic event, so people with low educational level have psychological resilience towards stressful situations; as a result, the stress experience increased in these people and thus increased PTSD experience. Also, the level of education acts as a coping skill for a person against stressful factors, so patients with high educational level can cope with traumatic event and experienced PTSD was reduced in these group of people [8], our study consists with Kowal et al.'s study that showed people with low educational level experience more stress than other people during COVID-19 pandemic [18, 19, 30].

Also, the results of our research are inconsistent with the research conducted by Ta et al. [42], they stated that the marital status of people can play a protective role against the stressful situation, but in this research, it was found that PTSD is more common in married people, and it can be said that people who are hospitalized suffer more stress and married people are more afraid that they will spread the virus to the family and this situation is more traumatic for them, and post-traumatic stress was more reported in these people. And the results showed that patients experienced more stress and PTSD because of they stay more days in hospital, which is in line with the research done by (12, 24).

Limitation

One of the limitations of the research was access to patients, the sample of this research was COVID-19 hospitalized patients, because of the mental and physical conditions caused by the disease, convincing them to cooperate was very difficult and time-consuming. The severity of inflammation may play a role in the experience of PTSD, but we could not access this part of the data due to the inclusion of this importance in the patients' files and its confidentiality in the hospital.

Conclusion

The spread of the COVID-19 virus in the world caused people feel fear and stress due to the unknown nature of this virus and its high mortality rate. Also, the quarantine and the change in people's lifestyle made people more vulnerable to mental disorders. In this research project, it was shown that the prevalence of post-traumatic stress disorder in people with COVID-19 admitted to the

hospital after discharge was very high, and also, people who had maladaptive personality traits such as neuroticism were more exposed to PTSD experience; according to the importance of personality traits in the occurrence of mental disorders, it is suggested that this factor be investigated in people and provide psychotherapy services in this people.

Abbreviations

SARS-CoV-2 Severe acute respiratory syndrome coronavirus 2
 WHO World health organization
 HCoV-OC43 Human coronaviruses-OC43
 MERS-CoV Middle East respiratory syndrome CoV
 PTSD Post-traumatic stress disorder
 PCL-C PTSD Checklist—civilian version

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Authors' contributions

NM designed the research, wrote the article, and collected the data. ME revised the paper. AM contributed to the statistical analysis of the paper. SA revised the paper and designed the research. The authors read and approved the final manuscript.

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Availability of data and materials

The data are available if requested by the editor.

Declarations

Ethics approval and consent to participate

This study received an ethics code from the ethics committee of the Tehran University of Medical Sciences IR.TUMS.MEDICINE.REC.1400.948. Before implementation of the research project, verbal consent was obtained from the patients.

Consent for publication

During the data collection, the names of the patients were not asked and we used the code for data analysis.

Competing interests

The authors declare that they have no competing interests.

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