

## **Post-traumatic stress disorder in patients recovered from COVID-19 infection: A cross-sectional study**

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### **Abstract**

**Objective:** Post-traumatic stress disorder (PTSD) is usually caused by exposure to a traumatic event. The

present study aimed to examine PTSD in patients recovering from COVID-19 infection.

**Methods:** This was a cross-sectional study on 200 patients who recovered from COVID-19 infection in two hospitals of Ahvaz, Iran. Data collection tools were a demographic questionnaire and the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5). To analyze the data, descriptive statistical methods were used.

**Results:** 200 patients with a previous diagnosis of COVID-19 infection were enrolled in this study of whom 170 (85%) had PTSD. The total score of PTSD was  $51.6 \pm 11.27$ . Compared to males, females were 9.4 times more likely to suffer from PTSD. The rate of PTSD among those who had children was 3.8 times higher than that of patients without a child. Also, patients who had suffered the loss of their relatives due to COVID-19 were 11.44 times more likely to develop PTSD.

**Conclusion:** Results of this study may be of help to mental health professionals in identifying patients at a higher risk and in need of immediate intervention. This can help to prevent possible upsurges of PTSD during future outbreaks of infectious disease.

**Keywords:** 'COVID-19', 'Post-traumatic Stress Disorder', 'recovered patients'

## Introduction

In late December 2019, a number of reports were made about unknown cases of pneumonia in Wuhan, China, which the World Health Organization (WHO) identified as the new COVID-19 and then named it as SARS-CoV-2. The virus has spread so fast that the WHO has identified it as a pandemic with an estimated mortality rate between 4% - 11% (Rasmussen et al. 2020). Also, the mortality rate due to Covid-19 in Iran is estimated at 8/63 (Ghasemi et al. 2021).

In addition to physical problems, emergence of infectious diseases bring about mental health problems in the affected people, and one of the most common health problems in this respect is post-traumatic stress disorder (PTSD)(APA 2013). This disorder has a great impact on a person's life and disrupts a person's mental life, social functioning and psychological health (Herold et al. 2016). People with PTSD have characteristics such as low self-esteem, high violence, low correlation with family and community, and high

## Materials and methods

### Study design and participants

This was a cross-sectional study conducted between May and September 2020. Using

$$n = \frac{\left(z_{1-\alpha/2} + z_{1-\beta}\right)^2 + (SD_1^2 + SD_2^2)}{(\mu_1 - \mu_2)^2}$$

$$z_{1-\alpha/2} = 1.96$$

$$z_{1-\beta} = 1.96$$

$$SD_1 = 17.4$$

levels of conflict (Rezapour Mirsaleh, Behjat Manesh, and Tavallaei 2016) . According to the results of a systematic review, the pooled prevalence of PTSD during the COVID-19 pandemic was 21.94%(Cénat et al. 2021). This prevalence has been reported to be 8.5% in public general population of Iran during the Covid-19 outbreaks (Simani et al. 2021). PTSD was highest among patients admitted to the intensive care unit (ICU) and treated for a serious illness(Tedstone and Tarrier 2003). In particular, hospitalization is generally recognized as a risk factor for developing PTSD(Sareen 2014).

Previous studies have mainly dealt with patients admitted to ICU. However, the present study targeted patients admitted to non-intensive care units regarding PTSD. Therefore, the present study was aimed to investigate PTSD in patients recovering from COVID-19 infection.

Med Calc and following a previous study, the sample size was calculated to be 200, with a power of 90% and 95% confidence interval(Gul et al. 2012).

$$SD_2 = 11.6$$

$$\mu_1 = 66.4$$

$$\mu_2 = 73.5$$

## Setting

Data collection was done in two university hospitals, namely Razi and Sina, which were designated for admission of COVID-19 patients. In this study, after obtaining ethical code (please mention the ethical code), the researcher received a list of patients recovered and discharged from COVID-19 infection from the hospitals' medical records. According to the recorded information, one of the researchers made a

## Measures

Data collection was done via telephone and social media using a demographic questionnaire and the PTSD questionnaire. The former contained questions about age, gender, education, job, (not) having a child, and loss of relatives due to COVID-19.

The PTSD questionnaire (PCL-5) designed according to the criteria of DSM-V for diagnosis of this disorder. It is a 20-item self-report tool that perfectly complies with PTSD diagnostic criteria based on DSM-5. The instrument includes a five-point Likert scale (0 to 4) and the total score range from 0 to 80, with the cut-off of  $\geq 33$  indicating positive PTSD (Verhey et al. 2018). PCL-5 consists of five subscales including nuisance (criterion B), avoidance (criterion C), negative mood

phone call with patients and briefed them on the purpose of the study.

Inclusion criteria were as follows: age between 15-60 years, at least two months passed from the patient's discharge, basic literacy, no history of hospitalization. Exclusion criteria were as follows: history of mental disorders, pregnancy, ICU admission at the time of hospitalization, having chronic diseases such as diabetes and hypertension, and recurrence of COVID-19 infection.

swings (criterion D), excessive arousal (criterion E), and emotional anesthesia (F). The Cronbach's alphas obtained for the English and the French versions of PCL-5 have been reported to be 0.95 and 0.94, respectively (Ashbaugh et al. 2016). The reliability of the Persian version of this tool was checked by Varmaghani et al. in Iran using Cronbach's alpha method. Cronbach's alpha coefficient for the whole scale calculated to be 0.92 and for the subscales of disturbance (B), avoidance (C), negative changes in cognition and mood (D), arousal and restlessness (E), and emotional anesthesia (F) were reported 0.90, 0.67, 0.74,

0.70, and 0.85 respectively (Varmaghani, Fathi Ashtiani, and Poursharifi 2018).

In order to reduce their exposure to infection during the pandemic, data were collected in two ways from patients. For some patients, the questions were read by the researcher over the phone and the patient's responses were recorded. For some other patients, the

### **Ethical approval**

An approval from the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences

### **Statistics**

STATA version 11 was used to analyze the data. In order to check the normal distribution of data, the Shapiro-Wilk test was used. Descriptive statistical methods such as frequency estimation as well as mean  $\pm$  SD were used to describe the data. To determine the risk factors associated with PTSD

### **Result**

A total of 200 patients with a previous diagnosis of COVID-19 infection have participated in this study. The participants' average age was  $32.3 \pm 11.9$  years (max: 59, min: 15). The minimum and maximum length of hospitalization was one and 28 days and the average was  $5.94 \pm 3.29$  days. The minimum and maximum time interval between diagnosis of COVID-19 infection and participation in the present study was 2-6 months (average:  $3.1 \pm 1.1$ ). Table 1. Shows the patients' demographic characteristics. Half of the

questionnaire was sent online (Through apps like WhatsApp and Telegram) and completed by the patient himself. Sampling was continued until the sample size was completed.

(IR.AJUMS.REC.1399.080) was obtained prior to the commencement of the study. Due to lack of face-to-face access to patients, informed consent was obtained verbally from all participants.

caused by the COVID-19 outbreak, linear regression analysis was carried out. Covariates such as gender, death of relatives due to coronavirus, education, and having children were entered into the linear regression. The alpha level was set to be less than 0.05.

participants (100 patients) were male and the other half were female (100 patients). In terms of education level, the highest frequency (48.5%) was related to 6-12 years of education and 40% of the patients had a university degree. More than half (53%) of the participants had children, and the majority of them (84%) had not suffered loss of relatives due to COVID-19 disease (Table 1).

Table 1: Patient characteristics

Gender	female	100(50%)
	male	100(50%)
Education (years)	<6	23(11.5%)
	6-12	97(48.5%)
	>12	80(40%)
Having a child	Yes	106(53%)
	No	94(47%)
Job	unemployment	12(6%)
	employee	27(13.5%)
	worker	21(10.5%)
	student	53(26.5%)
	housewife	46(23%)
	Other cases	41(20.5%)
death of relatives due to coronaviruses	Yes	32(16%)
	No	168(84%)

Data are expressed as mean  $\pm$  Std or n (%).

The highest mean score obtained by the emotional dimension ( $16.28 \pm 3.14$ ) and the lowest mean score was obtained by the avoidance dimension

( $4.005 \pm 1.76$ ). The average total PTSD score was  $51.6 \pm 11.27$ . Also, according to the results, the majority of patients (85%) had PTSD (Table 2).

Table 2: scores of different dimensions and total PTSD score

		min	max
Disturbance*	9.86±3.63	1	17
Avoidance*	4.005±1.76	00	8
Negative attitude*	11.29±2.57	2	16
Arousal*	10.17±2.99	1	16
Emotional*	16.28±3.14	5	20
PTSD-Total*	51.6±11.27	12	74
PTSD positive**	170 (85%)		

\*: Data are expressed as mean ± Std

\*\* PTSD positive score of higher  $\geq 33$  And data is expressed as frequency (%)

Table 3 illustrates the effect of independent variables on the participants' score of post-traumatic stress disorder using linear regression. Compared to males, females were 9.4 times more likely to suffer from PTSD ( $p < 0.001$ ). The rate of PTSD among those who had children was 3.8 times higher than that of patients without a

child ( $p = 0.028$ ). Also, patients who had suffered the loss of their relatives due to COVID-19 were 11.44 times more likely to develop PTSD ( $p < 0.001$ ). Finally, the PTSD score of people with primary school education and lower was higher than that of other participants, but the difference was not significant.

Table3: Determining the effect of independent variables on PTSD score

PTSD	Coef	Std. err	$\beta$	P
Gender(female)*	9.40	1.31	.4182312	<.001
Having child(no)**	-3.8	1.71	-.1687603	.028
death of relatives due to coronavirus (no) ***a	-11.44	1.73	-.3731635	<.001
Education**b				
6-12	-2.64	2.264	-.1173223	.245
>12	-2.56	2.266	-.1117216	.259

**Coef:** coefficient, **std. errs:** Standard error,  **$\beta$ :** Standard of coefficient, and the results are assumed to hold the other variables constant.

\*: compared to male

\*\*: compared to yes

\*\*\*a: compared to yes

\*\*\*b: compared to <6 years

## Discussion

The aim of the present study was to investigate the prevalence of PTSD and its associated factors in Covid-19 patients after discharge from hospital. According to the results of this study, the majority (85%) of patients had PTSD.

The most important factors affecting the mental health of Covid-19 patients include the increasing prevalence of this disease, the lack of any effective drug against it, and the mortality from this disease (Xiang et al. 2020; Lima et al. 2020; Bo et al. 2020).

The emerging COVID-19 infection is not only an important public health issue but also a major threat to human life which brings about a significant psychological impact on community health (Wang, Horby, et al. 2020; Kang et al. 2020). The COVID-19 pandemic is very likely to promote PTSD(Jiang et al. 2020). Numerous studies have reported an increase in the prevalence of PTSD in the general population, patients, and even healthcare providers during the coronavirus pandemic. According to Wang et al., 53.8% of the general population believed that the psychological impact of the disease was moderate to severe(Wang, Pan, et al. 2020). Another study on 396

teenagers aged 8–18 years during the Covid-19 pandemic and reported that 22.0% of these individuals had developed anxiety disorders, and 10.4% were diagnosed with major depression (Zhou et al. 2020). Lai et al. reviewed 1257 healthcare staff from hospitals equipped with fever clinics or wards for COVID-19 and found that a significant number of their participants complained of symptoms of depression, anxiety, insomnia, and distress(Lai et al. 2020).

Compared to other patients, patients suffering from COVID-19 have a low psychological endurance capacity, and given the current condition of this disease around the globe, these patients are very susceptible to psychological disorders such as anxiety, fright, depression, and negative thoughts(Yao, Chen, and Xu 2020). A study conducted by Zhou et al compared hospitalized patients who had been diagnosed with COVID-19 and had mild symptoms with identical controls that were COVID-19 negative in terms of their mental condition and inflammatory markers. According to their results, the former revealed higher levels of depression, anxiety, and post-traumatic stress symptoms ( $P < 0.001$ )(Guo et al. 2020). In the study of Bo et al., on a sample of hospitalized patients with a positive COVID-19 and clinical symptoms showed that the prevalence of posttraumatic stress symptoms due to COVID-19 infection before discharge was 96.2%(Bo et al. 2020). A systematic review and meta-analysis study conducted by Salehi et al. showed that there could be

a significant increase in the prevalence of PTSD when outbreaks of infectious diseases occur(Salehi et al. 2021). According to our results, 85% of people with coronavirus developed PTSD after recovery and discharge from hospital, which indicates that the prevalence of PTSD was very high.

In the study by Cheng et al , the prevalence of PTSD was 20.3% in patients with COVID-19 who were discharged after a full recovery following treatment(Chang and Park 2020). The results of our study are consistent with the above-mentioned studies, however, our results indicated an increased prevalence of PTSD in patients with corona virus disease after discharge from the hospital.

The reason for this high prevalence can be attributed to the critical situation of Ahvaz city in terms of infection and high mortality rate due to coronavirus and its synchronization with the sampling of the present plan. At that time, the people of Ahvaz city were suffering from a lot of fear and panic and there was no support institution to solve the psychological problems caused by the coronavirus.

According to the results of our study, women experience higher levels of PTSD than men. Also, participants with children, a family history of coronavirus death, and an education of fewer than 6 years had a higher score of PTSD. In a study conducted by Wang et al, anxiety risk was higher in women compared to males; moreover, in people with a bachelor's degree was a higher anxiety risk



compared to people with a master's degree or above group (Wang, Di, et al. 2020). besides, a recent meta-analysis showed that low levels of education and Results of this study may be of help to mental health professionals in identifying patients at a higher risk and in need of immediate intervention. This can help to prevent possible upsurges of PTSD during future outbreaks of infectious disease. These results can also help health providers to maintain the physical as well as mental health of patients recovering from serious illnesses such as COVID-19 infection.(Nuriddin et al.

### Limitations

PTSD was rated in real time, but the rating was subjective and therefore may reflect bias. online assessments could has reduced the representativeness and reliability of the results.

### Conclusion

The results of this study showed the high prevalence of PTSD in hospitalized patients who recovered from

### Conflict of interest

Authors declare that they do not have any conflict of interest.

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**Authors' contributions:** SA, PA, PDA, HB, MB and HB were involved in designing of this research.

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gender (female) are predictors of PTSD (Tang et al. 2017).

2018). The high prevalence of stress in the participants in our study can be due to factors such as unknown disease, lack of definitive treatment, high contagion, poor economic status, lack of access to vaccine, closure of training centers, business closures, quarantine, and high prevalence of deaths due to coronavirus in Iran.

the disease. Our results may be beneficial to mental health professionals to identify people who are at a higher risk and most in need of intermediation, to prevent a possible rise of high post-traumatic stress.

### Ethical Considerations

The protocol of this study was approved by the ethics committee of Ahvaz Jundishapur University of Medical Sciences (IR.AJUMS.REC.1399.080).

SA, MB and HB collected the data. SG analyzed the data. PA and HB were involved in the data interpretation. SA was responsible for writing and finalizing the manuscript. All authors have read and approved the manuscript.

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