



# Prevalence of Post-Traumatic Stress Disorder among COVID-19 Survivors: A 6-Month Follow-up Study in a Few Referral Hospitals of Tehran, Iran

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## Abstract:

**Background:** COVID-19 has significantly impacted individuals globally, leading to heightened levels of stress and psychological distress. COVID-19 hospitalized patients experience social exclusion, physical pain, and survival anxiety. This study aims to screen recovered COVID-19 patients for Post-Traumatic Stress Disorder (PTSD) and assess its correlation with psychosocial factors for six months.

**Methods:** In this descriptive-analytical cohort study, 401 patients aged 18-80 years were hospitalized in hospitals related to Tehran University of Medical Sciences due to COVID-19 from March 1 to May 31, 2021, and were followed for six months. Recovered patients completed electronic PCL-5 and demographic questionnaires to be screened for PTSD and other psychiatric comorbidities. The data were analyzed utilizing multivariate logistic regression models.

**Results:** Based on the PCL-5, PTSD was diagnosed in 6.4% of the samples. 10.2% of the samples received a subthreshold PTSD diagnosis. 46.2% of the samples with a PTSD diagnosis had a positive past psychiatric history. Results demonstrated that a previous positive psychiatric diagnosis has a statistically significant relationship with PTSD ( $p < 0.05$ ). This research did not reveal any significant association between PTSD symptoms and demographic features.

**Conclusion:** PTSD and subthreshold PTSD rates in COVID-19 patients after hospital discharge are significant. A positive past psychiatric history was recognized as a contributing factor contributing to the onset of PTSD. COVID-19 survivors should be screened for PTSD during follow-up examinations.

**Keywords:** COVID-19, Hospitals, Stress disorder

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**Received:** 16 Feb 2024

**Accepted:** 13 May 2024

## Citation to this article

Sharafi SE, Pourgharib Shahi MH, Vatankhah V. Prevalence of Post-Traumatic Stress Disorder among COVID-19 Survivors: A 6-Month Follow-up Study in a Few Referral Hospitals of Tehran, Iran. *J Iran Med Counc.* 2025;8(1):87-95.

## Introduction

The Coronavirus disease 2019 (COVID-19) has ravaged the globe for years and has significantly affected people's lives (1,2). The onset of a new pandemic represents a crisis that exceeds individual control and can potentially induce fear and stress within the affected population or organization (3). Additionally, patients may encounter stress associated with COVID-19, which can encompass physical symptoms such as headaches, indigestion, nausea, palpitations, sleep disturbances, heightened anxiety, feelings of anger, and the recollection of distressing memories (4). The pandemic limitations and accompanying public health measures, such as countrywide or regional lockdowns, have been linked to more stressful situations and fewer social ties, which might result in a range of mental health problems, including anxiety, sadness, and Post-Traumatic Stress Disorder (PTSD) (5).

Regarding the impact of COVID-19 in Iran, it is essential to note that upon its arrival in early 2020, stringent cleanliness and safety protocols, including increased social distancing measures and quarantine practices, were promptly implemented. While these measures were undoubtedly effective in reducing the transmission of the virus and lowering mortality rates, they also precipitated a notable increase in social isolation and depression among individuals (6). The enforced separation from loved ones, disruption of daily routines, and prolonged periods of isolation inherent in these measures contributed to heightened levels of psychological distress within the population. Therefore, it's imperative to recognize that alongside the tangible benefits of disease control, there were consequential mental health ramifications stemming from these preventive strategies (7,8). The existing body of literature underscores the significance of anxiety and depression in the context of hospitalization as potential risk factors for the emergence of PTSD symptoms. To illustrate, a recent investigation conducted by Hatch *et al* revealed that over 50% of patients who had undergone treatment in an Intensive Care Unit (ICU) for severe illness exhibited noticeable anxiety and depression symptoms, which were assessed using the Hospital Anxiety and Depression Scale. Notably, these patients also disclosed a heightened vulnerability

to experiencing post-traumatic stress symptoms (9). People who experience a traumatic event may get PTSD. At the outset of the COVID-19 crisis, a significant portion of the affected population in China, comprising 53.8%, experienced various levels of psychiatric distress. Specifically, mild to severe symptoms of depression were noted in 16.5% of individuals, anxiety symptoms in 28.8%, and stress symptoms in 8.1% of cases. In the hardest-hit region, Hubei Province, China, the screening for PTSD using the Post-Traumatic Stress Checklist-5 (PCL-5) indicated a PTSD prevalence of 7%. Throughout the course of the pandemic, studies conducted on general populations in various countries, such as China, Spain, Italy, Iran, the United States, and Turkey, have reported varying incidences of PTSD, ranging from 7-53.8% (10,11). Some factors make people more susceptible to PTSD, like being in a natural disaster or having a severe accident. People who have been threatened with death, sexual violence, or severe injury are also at higher risk (12). Many people who have been through a traumatic event show signs of PTSD in the days after the event. Having good social support can reduce the possibility of anxiety disorders following the occurrence of disasters. PTSD, anxiety disorders, and depressive disorders have been the most common psychiatric disorders in the long-term evaluation of SARS patients (13).

The psychological outcome of COVID-19 may be associated with the seriousness of the illness. Among individuals with more severe COVID-19 symptoms, there is a notably heightened prevalence of PTSD. Specifically, patients who necessitate admission ICUs for the treatment of acute COVID-19 are at a heightened risk of experiencing post-traumatic symptoms. It is well-established that traumatic events that unexpectedly expose individuals to mortality, life-threatening situations, or threats to their physical and mental well-being can result in challenges related to the regulation of emotional states and the management of negative emotions (14,15). The utilization of the PCL-5 in the present study to assess PTSD is consistent with prior research that has demonstrated its effectiveness in COVID-19 patients. For instance, Gilles Rival *et al* conducted a study on COVID-19 hospitalized first-wave survivors. They found that the PCL-5 exhibited strong specificity

and sensitivity in identifying PTSD, bolstering its suitability for screening and diagnostic purposes (16). Additionally, Liu *et al* conducted research specifically on COVID-19 patients in China and reported compelling evidence of the PCL-5's efficacy in assessing PTSD symptoms. These findings support the present study's decision to employ the PCL-5 as a reliable instrument for evaluating PTSD in the study (10,16). In this study, it was decided to screen recovered COVID-19 patients for PTSD and its correlation with other potentially influential factors.

## Materials and Methods

### Subjects

The objective of the current investigation, which was conducted as a single-arm descriptive-analytical cohort study, was to evaluate the mental health of COVID-19 patients. The target population in this study was patients aged 18-80 years who were hospitalized in hospitals related to Tehran University of Medical Sciences due to COVID-19 from March 1 to May 31, 2021, and more than six months had passed since the improvement of COVID-19 patient's symptoms. This study defined exposure as follows: All people who have been confirmed to have COVID-19 and have recovered from this disease.

In this study, a list of individuals affected by COVID-19 who had recovered from the disease and whose contact numbers are available from the Tehran University of Medical Sciences (TUMS) were obtained. The admission criteria were only moderate to severe COVID-19 cases whom were hospitalized in referral hospitals in Iran (17). At the time of the study, comprehensive and consistent data on COVID-19 severity across the patient population was limited. Variability in medical record keeping and reporting practices among different healthcare facilities made it challenging to classify patients accurately into distinct severity categories, especially in this multi-center study. Furthermore, stratifying a large sample into multiple severity categories may have led to smaller subgroups, potentially limiting the statistical power of the analysis. Small sample sizes in each category could result in unreliable or non-generalizable findings. Then, 401 people were randomly selected. After selecting individuals, they were contacted, and after clarifying the study's

objectives and securing written consent to participate, questions were sent to patients in the form of an EPOLL electronic questionnaire through SMS or social networks. In order to expedite the collection of samples over one month (to make the data consistent and to eliminate environmental conditions and global information in the field of COVID-19 that can affect the level of anxiety), it was decided to collect data in the form of online questionnaires. Also, demographic information such as age, gender, education, and other influential factors was listed in the table of variables entered by the EPOLL software. Twenty questions of the PCL-5 questionnaire, for which there was a self-report feature, were also added to the variables.

It should be noted, at the beginning of the questionnaire in epoll, if PTSD symptoms are high, you will be contacted again for help with treatment. Finally, potential patients were referred to the psychosomatic clinic of Imam Khomeini Hospital or government medical centers in their city of residence.

### Instruments

#### **Details of data collection tools and how to collect:**

1- Post-traumatic stress disorder list questionnaire PCL-5: In the DSM-5, there are five criteria for PTSD, which are Exposure to Actual or Threatened Death (Criterion A), Intrusion Symptoms (Criterion B), Avoidance Symptoms (Criterion C), Negative Alterations in Cognition and Mood (Criterion D), and Alterations in Arousal and Reactivity (Criterion E). PCL-5 questionnaire is a self-report tool that was translated into Persian by Sadeghi *et al* in 2016, and its validity and reliability have been examined in the Iranian population (18). The PCL-5 questionnaire, according to DSM-5 criteria, consists of 20 questions, each graded on a scale from zero to four. Severity scores for PCL-5 are determined by summing the scores of items within four clusters: cluster B (items 1-5), cluster C (items 6-7), cluster D (items 8-14), and cluster E (items 15-20), yielding a score range of zero to 80 (19,20). The PCL-5 questionnaire does not address Criterion A of PTSD as defined in the DSM-5, which pertains to the traumatic event that serves as the basis for a PTSD diagnosis. Instead, the PCL-5 evaluates the symptoms individuals may manifest following exposure to such an event (21).

The internal consistency of the PCL-5 questionnaire, as measured by Cronbach's alpha coefficient, is 0.92. This scale's scores have a positive convergent validity correlation of 0.74 with the MCCP scores and a positive divergent validity correlation of 0.74 with the resilience scores (0.46). The cut-off score for the PCL-5 can vary according to cultural and population differences (22). Authors considered the study's specific population, its cultural characteristics, and the expected variation in PTSD symptoms based on previous studies in similar populations in their choice of cut-off score. Finally, PCL-5 as a tool is entirely consistent with the DSM-5 recommended for PTSD assessments. Cut-off point 47 has been reported to diagnose PTSD (23,24).

2- Demographic questionnaire: This questionnaire includes demographic information such as age, sex, education, marital status, job status, the presence of a deceased person with COVID-19 in relatives, and the presence of emotional support in the family. The assessment of past psychiatric history was based on patients' self-reports in the general questionnaire.

### Statistical analysis

Analysis of all data was performed using Statistical Package for Social Science (SPSS) version 25. Sample numbers (n), percentages, median with interquartile range (IQR), and frequency have been computed for each variable. Patients were compared in two groups; those with PTSD and those without PTSD, using a univariate approach. The Shapiro-Wilk Test ( $p$ -value  $>0.05$ ) was used, which suggested that the data were non-normally distributed. The Mann-Whitney test was utilized for continuous data, while the chi-square test was utilized for categorical data. A  $p$ -value below 0.05 was deemed statistically significant.

In this study, effect sizes to quantify the differences between COVID-19 patients with and without PTSD were computed. For categorical variables, eta-squared ( $\eta^2$ ) was used, while non-parametric measures like rank-biserial correlation were employed for continuous variables due to non-normal data distribution. Eta-squared values were interpreted as small (0.01), medium (0.06), and large (0.14) effect sizes. The rank-biserial correlation coefficient ( $r$ ) was interpreted using Cohen's guidelines: small (0.1), medium (0.3), and large (0.5) effect sizes.

Binary logistic regression was employed to analyze the relationship between independent variables and the binary outcome of having PTSD (yes/no). All demographic and clinical variables, such as age, gender, marital status, education level, and past psychiatric history, were entered into the model. The backward method to avoid overfitting and improve model interpretability was used. Furthermore, Spearman's Rank Correlation was used to assess the correlations between five PTSD scales based on DCM-5 criteria with Clinical and Therapeutic Characteristics in PTSD Subgroups.

### Results

All 401 patients enrolled in the study were eligible and fulfilled the inclusion criteria; no one was excluded. During six-month follow-ups, utilizing a cut-off PCL-5 score of 47, 6.5% of the samples ( $N=26$ ) and 10.2% of the samples ( $N=41$ ) had PTSD and subthreshold PTSD diagnoses, respectively, by using the PCL-5.

Table 1 presents a comparison of demographic and clinical characteristics among COVID-19 patients with and without PTSD. While there were no significant differences in demographic factors (age, gender, education, marital status, job status), results from the multivariate logistic regression model indicated that positive past psychiatric history was significantly more prevalent in the PTSD group (46.2 vs. 77.1%). Other clinical variables and therapy-related factors did not show significant differences between the two groups.

### Discussion

This research was conducted in response to concerns that were raised about our mental health system. In the COVID-19 pandemic, a significant number of patients experiencing anxiety was observed. These observations occurred in a context where health authorities had implemented measures to isolate the population and restrict visits to hospitalized patients. At the same time, daily reports were being issued regarding the increasing number of hospitalizations and deaths due to coronavirus infection in Iran. During this challenging period, the hospital's medical and surgical units underwent reorganization, and the staff worked tirelessly to accommodate the surge of

**Table 1.** Demographic, clinical, and therapeutic characteristics in the entire sample and PTSD subgroups

	All samples (n=401)	PTSD (n=26)	No PTSD (n=375)	p-value PTSD vs. No PTSD	Effect size ( $\eta_p^2$ )
Male n(%)	223(55.6%)	11(42.3%)	212(56.5%)	0.114	0.028
Female n(%)	178(44.4%)	15(57.7%)	163(43.5%)		0.028
Age	54.03	46.46	54.56	0.23	
Age $\geq$ 50	214(53.4%)	7(26.9%)	207(55.2%)	0.056	
Education $\geq$ Diploma	111(27.7%)	8(30.8%)	103(27.5%)	0.760	
Marital status (Married)	373(93%)	24(92.3%)	349(93.1%)	1.000	0.024
Job status (Unemployed)	153(38.2%)	13(50%)	140(37.3%)	0.462	0.010
Positive past psychiatric history	301(75.1%)	12(46.2%)	289(77.1%)	0.001	0.070
Positive substance history	368(91.8%)	24(92.3%)	344(91.7%)	0.637	0.000
Past medical history	203(50.6%)	12(46.2%)	191(50.9%)	0.394	0.077
Positive familiar Psychiatric history	23(5.7%)	2(7.7%)	21(5.6%)	0.449	0.009
Good social support	282(70.3%)	19(73.1%)	263(70.1%)	0.473	0.000
ICU admission	75(18.7%)	6(23.1%)	69(18.4%)	0.355	0.002
Grief due to COVID-19	124(30.9%)	7(26.9%)	117(31.2)	0.416	

COVID-19 patients. Additionally, psychiatrists from our institution were called upon by both patients and the doctors in the COVID-19 units to provide support during this period.

People who have been through terrible events in their lives may get PTSD. As studied, individuals who have been hospitalized for COVID-19 are more prone to experiencing PTSD symptoms compared to those who were not hospitalized. Interestingly, hospitalization is notably linked with clusters of intrusive recollections and heightened arousal, indicating that the hospitalization experience tends to be relived, resulting in a state of heightened vigilance accompanied by issues such as insomnia, irritability, and reduced concentration. Moreover, existing literature also reports elevated rates of posttraumatic symptoms among individuals who are clinically stable and have been discharged from the hospital after recovering from COVID-19 (25). This discovery underscores the significance of paying specific attention to the mental health and well-being of this particular group of patients. Therefore, in this study, PTSD was measured after six months among

survivors of COVID-19 who were discharged from hospitals related to the Tehran University of Medical Sciences. To the best of the authors knowledge, this is one of the first published studies with a high statistical population to report the prevalence of PTSD after at least a 6-month in patients admitted for COVID-19 in the largest hospitals in Iran and the Middle East, which was considered a wide range of clinical and therapeutic characteristics.

Recent studies have shown that 5-17% of patients rescued from COVID-19 who were admitted to the ICU had symptoms of PTSD, which was measured by the PCL-5 questionnaire (26-33). According to the present study findings, roughly 6% of COVID-19 survivors experienced PTSD. To elucidate the low PTSD rate, several hypotheses were put forward. First and foremost, in line with McNally *et al*'s suggestion, a significant proportion of individuals exposed to trauma will undergo stress reactions that subside within three months of the traumatic event (34). Secondly, it may be attributed to the greater emotional support received by COVID-19 patients, possibly due to the stronger family ties in Iranian

culture. Thirdly, a higher cut-off point for PCL-5 was employed, influenced by cultural considerations, resulting in fewer PTSD diagnoses. In this research, PTSD is related to a positive past psychiatric history. This finding aligns with existing research, which indicates that individuals recovering from COVID-19 tend to experience heightened levels of anxiety and depression. These factors contribute to an elevated likelihood of developing PTSD (35). No significant relationship was seen between PTSD symptoms and demographic features in this research.

In this study, patients for long COVID were not examined. Houben-Wilke *et al* demonstrated that a significant portion of long-term COVID-19 patients exhibited clinically significant symptoms of PTSD, anxiety, and depression. These symptoms manifested three months after the initial onset of COVID-19-related symptoms and maintained their elevated levels during the six-month follow-up period (36).

Studies have shown that depression and panic disorder are two of the most frequent psychiatric symptoms in patients who were hospitalized in the ICU (37). In the most recent cohort study, ICU admission was recognized as a severity criterion among PTSD survivors. In the present study, 81.3% of patients were not admitted to the ICU. Also, PTSD in COVID-19 survivors of ICUs was only 23.1%, being different from other studies' results, which may be related to various factors such as the PTSD follow-up duration, measuring techniques, research area, and study quality among studies (38).

In the present study samples, contrary to other studies on ICU survivors, the male sex was not a significant protective factor against PTSD (39). In general, PTSD is more likely to affect women than men; this study also got a similar result (40).

This study's leading risk factor for PTSD was a positive past psychiatric history. A positive history of mental disorders was shown to be a risk factor for PTSD in ICU patients who were discharged (37,41). The authors hypothesized that individuals hospitalized for COVID-19 infection would feel more threatened if they had a positive prior mental history. Future studies are needed to investigate perceived life danger and its related factors in COVID-19 patients. One of the problems of the present study was the non-cooperation of the recovered people to enter

this research or answer the questions and try to be encouraged to participate in this study. Also, to increase cooperation, at the beginning of the questionnaire, if the score of PTSD symptoms was high, the person who has recovered would be contacted again to seek help from medical services. Finally, the possible sufferers were referred to the psycho-physical clinic of Imam Hospital or government medical centers in their city. We conducted a subsequent analysis to compare the characteristics of the respondents and non-respondents. This analysis shows no significant difference in demographics, clinical profiles, or other relevant factors between the two groups. So, the study's findings are less likely to be biased by the non-response.

### **Strengths and limitations:**

This study possesses significant strengths, but it also has objective limitations that need to be considered. To the authors knowledge, this study represents one of the initial investigations in Iran examining the psychological repercussions of COVID-19 among a group of individuals who have successfully recovered from the disease. Additionally, noteworthy strengths of this study include the substantial sample size and the utilization of an established questionnaire that has found extensive application in the scientific literature, showcasing excellent psychometric reliability in the context of this study.

Regarding the study's limitations, an online survey that relied on self-reported data was employed. This approach was necessitated by the social distancing measures implemented to mitigate the spread of the virus. While the questionnaires demonstrated strong reliability and internal consistency, there is the potential for social desirability bias, which may lead to inaccuracies in respondents' responses. Also, only PTSD in COVID-19 patients who were hospitalized, and the results of the study in COVID-19 patients who are treated on an outpatient basis may differ, were investigated. Furthermore, authors did not have access to the patients' information during hospitalization, such as the severity of the COVID-19 disease, the type of medications, and the use of ventilators, which could affect the study's results. In this regard, upcoming research will center on examining the distinct effects of various hospitalization protocols on the emergence

of post-traumatic symptoms in individuals who have recuperated from COVID-19.

## Conclusion

As a result, at a 6-month follow-up, PTSD was identified in 6.5% of patients hospitalized due to COVID-19. Positive past psychiatric history was regarded as statistically significant related to PTSD in recovered people from COVID-19. The findings of this study underscore that public health authorities and healthcare systems should recognize the mental health impact of the COVID-19 pandemic,

particularly among patients with a favorable past psychiatric history.

## Acknowledgement

The research obtained ethical approval from the Ethics Committee of Tehran University of Medical Sciences, Tehran, Iran (Ethical code: IR.TUMS.MEDICINE.REC.1399.720). This study did not receive dedicated funding from any particular grant-giving organization.

## Conflict of Interest

There was no conflict of interest in this manuscript.

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