CDJ
Chronic Diseases Journal
Chron Dis J 2026;14(4): . doi:10.34172/cdj.111
http://cdjournal.muk.ac.ir

Original Article

General Health and Posttraumatic Stress Disorder Symptoms in Patients With COVID-19 in Sanandaj, Iran: A Cross-Sectional Study

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Article history:
Received: September 7, 2026
Revised: October 27, 2026
Accepted: November 8, 2026
ePublished: Xx xx, 2026

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Abstract

Introduction: The increased number of patients infected by Coronavirus and the rising death toll due to the COVID-19 have drawn more attention to the psychological effects of the disease. The aim of this study was to determine whether general health was associated with posttraumatic stress disorder (PTSD) symptom scores in patients with COVID-19.

Methods: This descriptive-analytical, cross-sectional study was conducted among patients with COVID-19 residing in Sanandaj, Iran, in 2020. A total of 417 patients were included. Participants were randomly selected from the records of PCR-positive patients registered with the Center for Infectious Disease Management. Patients with a history of psychiatric disorders were excluded. Data were collected electronically using a demographic and clinical checklist, the PTSD Checklist for DSM-5 (PCL-5), and the 28-item General Health Questionnaire (GHQ-28). The chi-square test was used to examine associations between categorical variables and probable PTSD status, while simple linear regression was used to assess the association between GHQ-28 total scores and PCL-5 total symptom scores. Data were analyzed using SPSS version 23.

Results: General health was significantly associated with PTSD symptom scores ($t=15.28$, $P<0.001$), accounting for 36% of the variance in PTSD symptom scores ($R^2=0.36$). Significant associations were also observed between probable PTSD and sex ($P<0.001$), history of hospitalization due to COVID-19 ($P=0.028$), time since COVID-19 diagnosis ($P=0.041$), and having children ($P=0.008$). Reported adherence to protective measures was also significantly associated with probable PTSD ($P = 0.023$). No statistically significant association was observed between probable PTSD and reported economic impact of COVID-19 ($P=0.320$).

Conclusion: Poor general health status was associated with greater posttraumatic stress symptom severity in COVID-19 patients. Early identification of patients experiencing poor general health and appropriate psychological and social interventions may help address the mental health impacts caused by COVID-19. Although probable PTSD was numerically more frequent among patients reporting an economic impact of COVID-19, this association was not statistically significant ($P=0.320$).

Keywords: COVID-19, Stress disorders, Post-traumatic, Health status, Cross-sectional studies, Iran

Please cite this article as follows: Yazdanpanah H, Servatyari K, Yousefi F. General health and posttraumatic stress disorder symptoms in patients with COVID-19 in sanandaj, Iran: a cross-sectional study. Chron Dis J 2026;14(4): . doi:10.34172/cdj.111

Introduction

Epidemic and chronic diseases are significant stressors with individual, economic, social, and psychological impacts on patients, families, and the community.[1,2] posttraumatic stress disorder (PTSD) is classified in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a trauma- and stressor-related disorder. The DSM-5 diagnostic criteria for PTSD include four clusters of symptoms, including intrusion, avoidance, negative alterations in cognition and mood, and alterations in arousal and reactivity.[3,4]

The two primary domains of trauma exposure and genetic vulnerability are considered to be important risk factors for PTSD. Evidence suggests a predisposition or susceptibility for developing PTSD that is hereditary, and approximately 30% of the variance in PTSD is caused by genetics alone.[5] The lifetime prevalence of PTSD has been estimated at 7.8%, and the disorder is approximately twice as prevalent in women compared to men. The symptoms may emerge several years after experiencing the trauma, and the disorder may continue throughout the lifetime. PTSD patients often experience multiple social and psychological complications due to their symptoms, and their perceptions and symptoms may affect their familial and professional

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interactions.[6,7]

In a meta-analysis conducted in Iran, the prevalence of PTSD following different types of traumatic events, including childbirth, occupational trauma, earthquakes, war, burns, accidents, and rape, was reported to be 25%, 30%, 58%, 47%, 40%, 11%, and 74%, respectively.[8] In a study by Breslau et al, the prevalence of PTSD was reported to be 23.6%, and the lifetime prevalence was 9.2%. The main risk factors for traumatic events include low education levels, male gender, behavioral issues early in life, extraversion, family history of psychiatric disorders, and substance abuse. In addition, the primary risk factors for PTSD diagnosis are parental divorce during childhood, neuroticism, depression, anxiety, and family history of anxiety.[9] The importance of PTSD is due to its association with psychological disorders, as approximately two-thirds of individuals diagnosed with PTSD may also have at least two other psychiatric disorders.[10] Social anxiety disorder shares a common polygenic influence with panic disorder by 60%. Meanwhile, alcohol, nicotine, and drug dependence have more than 40% of genetic similarity to PTSD.[5] Some studies have shown that about 25% of individuals who experience stressful events are ultimately diagnosed with PTSD.[11] The delayed or lack of PTSD diagnosis may lead to the emergence of other psychological disorders, such as depression, drug abuse, suicide, and personality changes.[11-13]

The COVID-19 pandemic has imposed substantial psychological, social, and economic stress on individuals and communities. Patients with COVID-19 may experience additional stress related to physical symptoms, concerns about disease severity, hospitalization, uncertainty about recovery, and the potential effects of illness on their families and economic circumstances. These experiences may be associated with posttraumatic stress symptoms; however, symptoms reported on a self-report questionnaire do not, by themselves, establish a clinical diagnosis of PTSD. Studies conducted during the COVID-19 outbreak have also examined the prevalence and associated factors of posttraumatic stress symptoms.[14]

Given the potential relationship between general health and psychological distress, the present study aimed to examine the association between general health and PTSD symptom scores in patients with COVID-19 in Sanandaj, Iran.

Methods

Study design and participants

This descriptive-analytical, cross-sectional study was conducted among patients with COVID-19 residing in Sanandaj, Iran, in 2020. The target sample size was estimated to be 547 using Cochran's formula at a 95% confidence level, as reported in the original study. Of these, 130 individuals were excluded because of a history of psychological disorders that could affect the assessment of PTSD symptoms, leaving 417 participants, including 179 men (42.9%) and 238 women (57.1%). The mean age of the participants was 33.54 ± 9.37 years.

The inclusion criteria were residence in Sanandaj and a confirmed diagnosis of COVID-19 based on a positive SARS-CoV-2 polymerase chain reaction (PCR) test. Individuals who were unwilling to participate, submitted incomplete questionnaires, did not have a definitive diagnosis of COVID-19, or had a history of psychological disorders were considered ineligible for the study.

Given the epidemiological situation and concerns about SARS-CoV-2 transmission through contact with paper questionnaires, data were collected using electronic checklists and questionnaires. Electronic questionnaires were randomly sent to patients with positive PCR test results registered with the Center for Infectious Disease Management. The study objectives were explained to participants, and informed consent was obtained before questionnaire completion. Participants' full names were not recorded on the research instruments to protect confidentiality.

Ethical considerations

The study protocol was reviewed and approved by the Ethics Committee of Kurdistan University of Medical Sciences, Informed consent was obtained from all participants before they completed the study questionnaires.

Data collection instruments

Data were collected using three instruments: a demographic and clinical checklist, the PTSD Checklist for DSM-5 (PCL-5), and the 28-item General Health Questionnaire (GHQ-28).

The checklist collected demographic information, including age, sex, occupation, education level, economic status, marital status, and whether participants had children. It also recorded underlying medical conditions, including hypertension, diabetes, renal or liver diseases, thyroid disorders, cardiovascular diseases, respiratory disorders such as asthma, cancer, transplantation, and allergies. Additional information included early symptoms at diagnosis and a family history of coronavirus infection.

The PCL-5 is a 20-item self-report instrument developed by Weathers, Litz, Herman, Huska, and Keane for the National Center for PTSD in the United States. It is used to assess PTSD symptom severity and screen for probable PTSD and can serve as an aid to clinical assessment.[15] The questionnaire can generally be completed in approximately 5–10 minutes. The total score ranges from 0 to 80. In the original study, a cutoff value of 38.3 was reported for probable PTSD; because the total score is an integer, scores of 39 or higher were considered indicative of probable PTSD. The reported psychometric coefficients for the symptom clusters were as follows: Cronbach's alpha and Guttman coefficients were 0.88 and 0.86 for criterion B, 0.87 and 0.70 for criterion C, 0.87 and 0.81 for criterion D, and 0.87 and 0.90 for criterion E, respectively. Test–retest reliability was reported to be 0.80 over a two-week interval.[16] PCL-5 results were interpreted as indicating probable PTSD rather than a confirmed clinical diagnosis.

The GHQ-28 was developed by Goldberg and Hillier

in 1979.[17] It consists of 28 items divided into four seven-item subscales assessing somatic symptoms, anxiety and insomnia, social dysfunction, and severe depressive symptoms. Responses were scored on a four-point Likert scale from 0 to 3, yielding a total score ranging from 0 to 84; higher scores indicate greater psychological distress and poorer general health. The validity and reliability of this instrument have previously been evaluated, and Molavi reported a Cronbach's alpha coefficient of 0.90.[18]

Economic status and reported economic impact of COVID-19 were considered two distinct variables in this study. Economic status represented participants' socioeconomic classification and was categorized as low, medium, or high. In contrast, reported economic impact of COVID-19 was recorded as a separate binary variable (yes/no), reflecting whether participants reported experiencing an economic impact attributable to the pandemic. These variables were analyzed separately because socioeconomic status and the self-reported economic consequences of the pandemic represent different concepts.

Statistical analysis

Data were analyzed using SPSS version 23. Descriptive statistics, including means, standard deviations, and frequencies, were used to summarize the data. Pearson's chi-square test was used to examine associations between categorical variables and probable PTSD status. The expected cell frequencies were assessed to evaluate the suitability of the chi-square test. Simple linear regression was used to assess the association between the GHQ-28 total score (independent variable) and the PCL-5 total symptom score (dependent variable).

Results

A total of 417 patients with a definitive diagnosis of COVID-19 completed the questionnaires, including 179 men (42.9%) and 238 women (57.1%). The mean age of the participants was 33.54 ± 9.37 years. Among the participants, 155 (37.2%) met the study criteria for probable posttraumatic stress disorder (PTSD), whereas 262 (62.8%) did not (Table 1).

The reported clinical symptoms are summarized in (Table 2).

Chest pain was the most frequently reported symptom (351/417, 84.2%), whereas asymptomatic presentation was the least frequent (52/417, 12.5%). Other reported symptoms included headache and fatigue (260/417, 62.4% each), nausea and vomiting (185/417, 44.4%), fever (156/417, 37.4%), cough (118/417, 28.3%), and dyspnea (87/417, 20.9%).

Associations between participant characteristics and probable PTSD status are presented in (Table 3).

Table 1. Frequency of probable PTSD among patients with COVID-19

Variables	Group	N (%)
PTSD	Yes	155(37.2)
	No	262(62.8)

Based on recalculation of Pearson's chi-square tests using the frequencies reported in the table, probable PTSD status was significantly associated with gender ($P < 0.001$), history of hospitalization due to COVID-19 ($P = 0.028$), time elapsed since COVID-19 diagnosis ($P = 0.041$), having children ($P = 0.008$), and reported adherence to protective measures before COVID-19 infection ($P = 0.023$).

The proportion of probable PTSD was higher among women than men (44.1% vs. 27.9%), among hospitalized than non-hospitalized participants (52.3% vs. 35.4%), and among participants with children than those without children (42.7% vs. 30.1%). The proportion also differed according to reported adherence to protective measures: 12.5% among participants reporting low adherence, 32.1% among those reporting moderate adherence, and 41.3% among those reporting high adherence.

The proportion of probable PTSD increased across categories of time elapsed since COVID-19 diagnosis, from 25.0% among recently diagnosed participants to 35.7% among those diagnosed 1–3 months earlier and 43.5% among those diagnosed 3–6 months earlier ($P = 0.041$).

No statistically significant association was observed between probable PTSD status and the reported economic impact of COVID-19 (38.2% among participants reporting an economic impact vs. 31.9% among those who did not; $P = 0.320$). Similarly, no statistically significant associations were observed with underlying diseases ($P = 0.088$), marital status ($P = 0.420$), education level ($P = 0.127$), occupation ($P = 0.208$), economic status ($P = 0.705$), or family history of COVID-19 ($P = 0.143$) (Table 3). Age was also examined, but no statistically significant association was found between age and probable PTSD.

Simple linear regression analysis showed a statistically significant positive association between the GHQ-28 total score and the PCL-5 total symptom score ($B = 0.77$, $SE = 0.05$, standardized $\beta = 0.60$, $t = 15.28$, $P < 0.001$). The model explained 36% of the variance in PCL-5 symptom

Table 2. Frequency of clinical symptoms among patients with COVID-19

Asymptomatic	Yes	52 (12.5%)
	No	365 (87.5%)
Cough	Yes	118 (28.3%)
	No	299 (71.7%)
Fever	Yes	156 (37.4%)
	No	261 (62.6%)
Dyspnea	Yes	87 (20.9%)
	No	330 (79.1%)
Nausea – Vomiting	Yes	185 (44.4%)
	No	232 (55.6%)
Headache	Yes	260 (62.4%)
	No	157 (37.6%)
Fatigue	Yes	260 (62.4%)
	No	157 (37.6%)
Chest pain	Yes	351 (84.2%)
	No	66 (15.8%)

Table 3. Associations between participant characteristics and probable PTSD status among patients with COVID-19

Characteristic	Category	No probable PTSD, n (%)	Probable PTSD, n (%)	Total, n	*P* value
Sex	Female	133 (55.9)	105 (44.1)	238	<0.001
	Male	129 (72.1)	50 (27.9)	179	
Adherence to protective measures	Low	14 (87.5)	2 (12.5)	16	0.023
	Moderate	93 (67.9)	44 (32.1)	137	
	High	155 (58.7)	109 (41.3)	264	
History of hospitalization	No	241 (64.6)	132 (35.4)	373	0.028
	Yes	21 (47.7)	23 (52.3)	44	
Time since COVID-19 diagnosis	Recently diagnosed	42 (75.0)	14 (25.0)	56	0.041
	1–3 months	133 (64.3)	74 (35.7)	207	
	3–6 months	87 (56.5)	67 (43.5)	154	
Having children	No	128 (69.9)	55 (30.1)	183	0.008
	Yes	134 (57.3)	100 (42.7)	234	
Reported economic impact of COVID-19	No	47 (68.1)	22 (31.9)	69	0.320
	Yes	215 (61.8)	133 (38.2)	348	
Education level	Diploma or below	90 (61.6)	56 (38.4)	146	0.127
	Associate degree or bachelor's degree	128 (60.4)	84 (39.6)	212	
	Master's degree or higher	44 (74.6)	15 (25.4)	59	
Occupation	Employed or retired	87 (64.4)	48 (35.6)	135	0.208
	Unemployed or homemaker	74 (56.1)	58 (43.9)	132	
	Student	37 (63.8)	21 (36.2)	58	
	Other non-employed	64 (69.6)	28 (30.4)	92	
Marital status	Single	86 (65.6)	45 (34.4)	131	0.420
	Married	176 (61.5)	110 (38.5)	286	
Family history of COVID-19	No	110 (62.5)	66 (37.5)	176	0.143
	Yes, recovered	8 (42.1)	11 (57.9)	19	
	Yes, deceased	144 (64.9)	78 (35.1)	222	
Economic status	Low	194 (62.4)	117 (37.6)	311	0.705
	Medium	51 (62.2)	31 (37.8)	82	
	High	17 (70.8)	7 (29.2)	24	
Underlying disease	No	69 (56.6)	53 (43.4)	122	0.088
	Yes	193 (65.4)	102 (34.6)	295	
Overall sample	—	262 (62.8)	155 (37.2)	417	—

Note: Economic status refers to participants' socioeconomic classification (low, medium, or high), whereas reported economic impact of COVID-19 refers to participants' self-reported economic consequences attributable to the pandemic (yes/no)

Table 4. Simple linear regression analysis of the association between GHQ-28 total score and PCL-5 total symptom score

Predictor	B	SE	Standardized β	95% CI for B	t	*P*
Constant	13.45	1.44	—	10.62 – 16.28	9.29	<0.001
GHQ-28 total score	0.77	0.05	0.60	0.67 – 0.87	15.28	<0.001
Regression Model Statistics						
R^2	Adjusted R^2	F	Degrees of freedom			
0.36	0.358	233.48	1,415			

Note: The dependent variable was the PCL-5 total symptom score, and the independent variable was the GHQ-28 total score. B represents the unstandardized regression coefficient, SE the standard error, and β the standardized regression coefficient. The model was an unadjusted simple linear regression. Model statistics calculated from rounded values are approximate and should not be interpreted as exact values from the original statistical output

scores ($R^2 = 0.36$) (Table 4). Because higher GHQ-28 scores indicate poorer general health, the positive regression coefficient indicates that poorer general health was associated with greater PTSD symptom severity.

Discussion

This cross-sectional study examined probable PTSD and its link to general health among 417 COVID-19 patients in Sanandaj, Iran. Probable PTSD was found in 37.2% of participants and was significantly associated with female sex (44.1% vs. 27.9%; $P < 0.001$), hospitalization history (52.3% vs. 35.4%; $P = 0.028$), having children (42.7% vs. 30.1%; $P = 0.008$), longer time since diagnosis (up to 43.5%; $P = 0.041$), and higher adherence to protective measures (41.3%; $P = 0.023$). GHQ-28 scores were positively

associated with PCL-5 scores (B = 0.77, β = 0.60, $P < 0.001$; $R^2 = 0.36$), indicating poorer general health correlated with greater PTSD severity.

In this study, a significant association was observed between PTSD symptoms and general health. Asnaani et al. reported impaired physical and mental health functioning among returning veterans with PTSD symptoms.[19] Servatyari et al. reported that the prevalence of stress, anxiety, and depression among patients with COVID-19 in Kurdistan was 51.7% (95% confidence interval [CI]: 48.7–54.7), 64.3% (95% CI: 61.3–67.1), and 61.4% (95% CI: 58.4–64.2), respectively.[20] These findings highlight the importance of considering psychological well-being alongside general health. However, the cross-sectional design of our study does not establish the direction or causality of the association between these variables.

In the present study, 37.2% of the patients met the criteria for probable PTSD. This finding represents the proportion of participants who met the study's PCL-5 screening threshold and should not be interpreted as the prevalence of clinically confirmed PTSD. The psychological consequences of COVID-19 may vary according to the characteristics of the population studied and the assessment methods used. Liu et al. reported a prevalence of posttraumatic stress symptoms of 7% or lower during the COVID-19 outbreak in China.[21] The difference between their findings and ours may partly reflect differences in the study populations, because our study specifically included patients diagnosed with COVID-19. In another study conducted in Iran, the prevalence of PTSD was reported to be 48% among patients discharged from critical care units.[22] Differences in disease severity, clinical setting, and assessment methods may partly explain the variation in prevalence estimates across studies.

In the present study, probable PTSD was more frequent among women than men (44.1% vs. 27.9%), consistent with the findings reported by Liu et al.[21] Differences in psychological and social responses to stressful experiences may contribute to the observed sex difference. However, the present study was not designed to investigate its underlying mechanisms, and this explanation should therefore be interpreted cautiously.

According to the results of the present study, the proportion of probable PTSD was higher among patients whose COVID-19 diagnosis had occurred 3–6 months earlier than among those diagnosed more recently. The proportion increased from 25.0% among recently diagnosed patients to 35.7% and 43.5% among those diagnosed 1–3 and 3–6 months earlier, respectively. Because this was a cross-sectional study, these results reflect differences between groups assessed at different intervals after diagnosis; they do not establish that symptoms increased over time within the same individuals. PTSD symptoms may persist following stressful experiences, and these findings suggest that psychological symptoms may warrant attention beyond the acute phase of illness.

In the current study, the prevalence of probable PTSD was also higher among patients who reported greater adherence to hygiene guidelines before diagnosis. One possible explanation is that infection despite adherence to protective measures may have been unexpected or inconsistent with participants' perceptions of their infection risk. However, this explanation was not directly assessed in our study, and the observed association should be interpreted cautiously.

Our findings indicated no statistically significant associations between probable PTSD and marital or occupational status. In contrast, Sadat et al. reported PTSD-related findings in patients discharged from critical care units.[22] Differences in patient characteristics, clinical settings, and assessment methods may partly explain the differences between their findings and ours.

The results of the present study showed a significant association between probable PTSD and having children. Probable PTSD was observed in 42.7% of participants with children compared with 30.1% of those without children. This finding is consistent with the results reported by Sadat et al.[22] Concern about children's health during the pandemic may be one possible explanation for this association, although this mechanism was not directly assessed in our study. We observed no statistically significant association between underlying diseases and probable PTSD. This finding may differ from reports involving other clinical populations, in which comorbid medical conditions and the severity of illness may be related to psychological outcomes. Differences in patient populations, the type and severity of underlying diseases, and assessment methods may partly explain these discrepancies.

Previous research by Di Crosta et al. examined individual differences, economic stability, and fear of contagion as factors associated with PTSD symptoms during the COVID-19 emergency.[23] In our study, probable PTSD was numerically more frequent among participants who reported an economic impact of COVID-19 than among those who did not (38.2% vs. 31.9%). However, the association was not statistically significant in the revised analysis ($P = 0.320$); therefore, our findings do not provide sufficient evidence to conclude that reported economic impact was associated with probable PTSD in this sample.

In addition, patients hospitalized because of COVID-19 had a higher proportion of probable PTSD than non-hospitalized patients (52.3% vs. 35.4%). Hospitalization may be associated with greater illness severity or a stronger perceived threat to health. However, these potential explanations were not directly assessed in the present study, and the observed association should not be interpreted as evidence that hospitalization caused PTSD symptoms.[24]

No statistically significant association was observed between age and probable PTSD in the present study. This finding should be interpreted in the context of the characteristics of the study population and the cross-sectional design.

One of the major findings of the present study was the significant association between general health and PTSD symptom scores. Simple linear regression showed that the GHQ-28 total score was positively associated with the PCL-

5 total symptom score (B = 0.77, SE = 0.05, standardized β = 0.60, t = 15.28, $P < 0.001$), with the model explaining 36% of the variance in PTSD symptom scores ($R^2 = 0.36$). Because higher GHQ-28 scores indicate poorer general health, the positive coefficient indicates that poorer general health was associated with greater PTSD symptom severity. Assessing general health may help identify patients who could benefit from further psychological evaluation and supportive interventions. Nevertheless, the cross-sectional design does not establish a temporal or causal relationship between general health and PTSD symptoms.[25,26]

Several limitations should be taken into account when interpreting these results. First, questionnaires were administered electronically to minimize the risk of SARS-CoV-2 transmission. Although questionnaires were randomly sent to patients with positive PCR test results registered at the Center for Infectious Disease Management, the exact methods used for distribution and to encourage participation are not fully described. This lack of information restricts the ability to evaluate possible selection bias. Additionally, patients with limited internet access or lower digital literacy may have been less likely to respond, which could influence the representativeness of the sample. Second, the cross-sectional design does not permit causal conclusions or clarify the temporal relationship between general health and PTSD symptoms. Third, since the regression analysis was not adjusted for potential confounding variables, residual confounding cannot be ruled out. Furthermore, the assumptions of the linear regression model were not formally assessed, which may limit the evaluation of the model's adequacy. The analyses were based on the total PCL-5 symptom score and the total GHQ-28 score; separate analyses of individual PTSD symptom clusters and GHQ-28 dimensions were not performed. Therefore, the study could not determine whether specific PTSD symptom clusters or particular dimensions of general health contributed differently to the observed association. Fourth, the study was carried out in a single city, which may affect the generalizability of the results to other populations. Finally, the use of self-reported questionnaires may have led to reporting bias, and the PCL-5 screening threshold does not confirm a clinical diagnosis of PTSD.

Conclusion

In this cross-sectional study, poorer general health was significantly associated with greater posttraumatic stress disorder (PTSD) symptom severity among patients with COVID-19. The findings highlight the potential value of assessing general health and considering further psychological evaluation in patients reporting poorer general health. Probable PTSD was also more frequent among women, hospitalized patients, participants with children, and those reporting greater adherence to protective measures. A higher proportion of probable PTSD was observed among patients with a longer interval since COVID-19 diagnosis; however, this cross-sectional finding does not establish that symptoms increased over time within individual patients. Although probable PTSD was numerically more frequent among participants reporting an economic impact of COVID-19, this difference was not statistically significant ($P = 0.320$). Appropriate psychological assessment and support may be considered for patients experiencing substantial psychological distress. Longitudinal studies are needed to clarify the temporal relationship between general health and PTSD symptoms and to determine how these symptoms evolve after COVID-19 diagnosis.

Acknowledgments

This article was approved by the Vice-Chancellor for Research and Technology of the Kurdistan University of Medical Sciences for the financial support of the study. his article was derived from the doctoral thesis of Dr. Karo Servatyari, submitted in partial fulfillment of the requirements for the degree of Doctor of Medicine.

Authors' Contribution

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Competing Interests

The authors declare that they have no competing interests.

Ethical Approval

The study protocol was reviewed and approved by the Ethics Committee of Kurdistan University of Medical Sciences (ethics approval code: IR.MUK.REC.1399.144). Informed consent was obtained from all participants before they completed the study questionnaires.

Funding

This study was supported by Kurdistan University of Medical Sciences.

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