Iran J Psychiatry Behav Sci. In Press(In Press):e122958. doi: 10.5812/ijpbs-122958.

Published online 2022 August 1. **Brief Report**

Posttraumatic Stress Symptoms, Anxiety, and Depression Among COVID-19 Survivors After Discharge from Hospital

Razieh Salehian [1], Mahnaz Abdi [2,*], Mahdi Sadegh Abedin [3], Azad Maroufi [4] and Khaled Rahmani [5]

[1]Department of Psychiatry, Health Research Institute, Rasoul-e-Akram Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
[2]Department of Psychiatry, Kurdistan University of Medical Sciences, Sanandaj, Iran
[3]Student Research Committee, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
[4]Neurosciences Research Center, Department of Psychiatry, Kurdistan University of Medical Sciences, Sanandaj, Iran
[5]Spiritual Health Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran

[*]*Corresponding author*: Department of Psychiatry, Kurdistan University of Medical Sciences, Sanandaj, Iran. Email: heroabdi@yahoo.com

Received 2022 February 26; **Revised** 2022 May 23; **Accepted** 2022 June 05.

Abstract

The coronavirus disease 2019 (COVID-19) pandemic can lead to psychological issues; however, few studies have evaluated the mental health status of COVID-19 patients after discharge from the hospital. This study aimed to assess the psychological status of COVID-19 survivors and determine the risk factors associated with adverse psychological outcomes. Through a web-based cross-sectional survey, the data were collected from 158 COVID-19 survivors one month after discharge from the hospital using demographic information, the Hospital Anxiety and Depression Scale (HADS), and the Posttraumatic Stress Disorder Checklist for the Fifth Edition of Diagnostic and Statistical Manual of Mental Disorders (PCL-5). Data analysis was conducted in SPSS software (version 24) using logistic regression modeling. The mean age of the participants was 42.02 $\pm$ 10.56 years, and the majority of patients were male (58.2%) and married (79.1%). According to the HADS, 32 (20.3%) and 21 (13.3%) patients had anxiety and depression, respectively. Using the PCL-5, 45 (28.5%) patients experienced posttraumatic stress disorder (PTSD) after discharge from the hospital. A positive history of psychiatric disorders, substance abuse, and smoking were the related risk factors for depression, anxiety, and PTSD ($P < 0.05$). Based on the results, it might be concluded that COVID-19 survivors, especially the aforementioned groups, need more targeted interventions regarding psychological health during and after discharge to avoid COVID-19-related psychiatric injuries.

Keywords: COVID-19, Adult Survivors, Mental Health, Posttraumatic Stress Disorder, Anxiety, Depression

1. Introduction

To date, studies have examined coronavirus disease 2019 (COVID-19)-related mental health outcomes among the general population and healthcare workers. However, evidence for the psychological consequences of hospitalized patients with COVID-19 has not been extensively studied (1, 2). Most recent studies are cross-sectional and reported that patients with COVID-19 had high levels of mental health burden, such as depression, anxiety, and posttraumatic stress disorder (PTSD), associated with the pandemic disease during hospitalization (3, 4). Importantly, these studies did not evaluate the psychological consequences of patients with COVID-19 after discharge from the hospital. Studies during previous pandemics reported that infected hospitalized patients have high rates of PTSD and mental distress (5, 6).

2. Objectives

This study aimed to evaluate the mental health status of COVID-19 patients one month after discharge from the hospital and determine the risk factors associated with anxiety, depression, and PTSD after hospitalization.

3. Methods

3.1 Study Design and Participants

This cross-sectional study was performed on all confirmed COVID-19 patients who had been hospitalized at Rasoul-Akram Medical Center, Tehran, Iran, within March 20, 2020, to September 21, 2020, and one month had passed since their discharge from the hospital. It should be noted that patients under 17 years of age or with cognitive or communication barriers were excluded from the study. Finally, 400 eligible patients were contacted by telephone

and were informed about the purpose of the study. A total of 158 patients (39.5%) agreed to participate in the study. Then, the questionnaires were sent to them online. The participants answered the questionnaire anonymously on the Internet if they consented. The participants were asked to answer the questionnaire based on their experience with COVID-19 infection and hospitalization and show how much each problem bothered them.

3.2. Ethical Statement

This study was approved by the Ethics Committee of the Iran University of Medical Sciences, Tehran, Iran (code: 1399.594). Firstly, the respondents were asked to read the purpose of the study, give informed consent again, and participate in the survey if they agreed.

3.3. Measures

3.3.1. Demographic Information

Demographic information included the data, such as age, gender, education, occupation, marital status, underlying disease or physical illness under medical treatment, history of smoking or/and use of other substances (e.g., opioids, cannabinoids, methamphetamine, or alcohol), history of psychiatric disorders, hospitalization history in the intensive care unit (ICU), and duration of hospital stay due to COVID-19 infection.

3.3.2. Hospital Anxiety and Depression Scale (HADS)

The HADS questionnaire is a 14-item tool to measure depression and anxiety in inpatient, outpatient, and community settings. Each item is ranked on a 4-point Likert scale with a maximum score of 21 for anxiety and depression. Scores of 0-7 are considered normal on the relevant scales, with 8 - 10 as borderline and 11 or more as significant distress (7). This scale has been validated in Iran with good reliability and validity for Iranian society (8).

3.3.3. Posttraumatic Stress Disorder Checklist for the Fifth Edition of Diagnostic and 3.3.3.1. Statistical Manual of Mental Disorders (PCL-5)

The PCL-5 is a 20-item self-report questionnaire that assesses the severity of PTSD symptoms over the past month and is based on the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders. This scale has four subscales (i.e., intrusion, avoidance, negative alterations in cognition/mood, and alterations in arousal/reactivity), and respondents on a 5-point Likert scale from 0 (not at all) to 4 (extremely) rated how much a problem described in the statement bothered them last month. The PCL-5 scores showed strong internal consistency (α = 0.94), test-retest reliability (r = 0.82), and convergent (rs = 0.74 to 0.85) and discriminant (rs = 0.31 to 0.60) validity (9). Scores on the PCL-5 range from 0 to 80, and a preliminary cut-off score of 33 is recommended as indicating PTSD caseness (10). The PCL-5 has been validated in Iran with good reliability and validity for Iranian society (11).

3.3.4. Statistical Analysis

Firstly, the central tendency and dispersion parameters, including mean and standard deviation, for quantitative variables and the frequency and percentage for categorical variables were reported. Secondly, multivariable logistic regression modeling was performed to explore the effect of demographic and clinical factors on anxiety, depression, and PTSD. All the analyses were conducted in SPSS software (version 24.0). P-values of less than 0.05 were considered statistically significant (two-tailed tests).

4. Results and Discussion

The patients were within the age range of 17 - 69 years, and the mean age value was 42.02 $\pm$ 10.56 years. Most participants were male (58.2%) and married (79.1%) and the mean value of hospital stay duration was 9.08 $\pm$ 7.26 days (range: 5 - 35 days). In this study, 16 (10.1%) participants were healthcare workers, and 20 (12.7%) subjects had a positive history of psychiatric illness. Moreover, 21 (13.3%) patients were substance abusers. Additionally, 34 (21.5%) participants were admitted to the ICU during hospitalization.

Based on the results of the HADS, the prevalence rates of borderline anxiety and depression were 19.6% (n = 31) and 27.2% (n = 43), respectively. The prevalence rates of abnormal anxiety and depression in discharged patients were 20.3% (n = 32) and 13.3% (n = 21), respectively. According to the cut-off points of the PCL-5 questionnaire, 28.5% (n = 45) of COVID-19 patients discharged from the hospital had PTSD.

This study also evaluated the relationship between demographic data and all HDAS subscales and PCL-5 using both univariate and multivariate logistic regressions. In the multivariable logistic regression models, the female participants were more prone to hospital anxiety [adjusted odds ratio (AOR) = 2.571, 95% confidence interval (CI): 0.914 - 7.228], hospital depression (AOR = 2.282, 95% CI: 0.767 - 6.789), and PTSD (AOR = 1.513, 95% CI: 0.492 - 4.657) than male participants, although they were not statistically significant (P > 0.05). In addition, the participants with a positive history of psychiatric disorders and substance abuse were more likely to develop hospital depression and PTSD in the multivariate logistic regression (P < 0.05). A positive history of smoking was also a potential influencing factor associated with anxiety, depression, and PTSD in the univariate model (P < 0.05). Further details are presented in Tables 1 and 2.

Survivors of critical illnesses might experience a variety of psychological problems after hospitalization. Few

Table 1. Binary Logistic Regression of Factors Affecting Hospital Anxiety or Depression in Coronavirus Disease 2019 Survivors

Variables	Hospital Anxiety				Hospital Depression			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	95% CI	P-Value	95% CI	P-Value	95% CI	P-Value	95% CI	P-Value
Age (y)	1.015 (0.985 - 1.047)	0.326	1.011 (0.963 - 1.061)	0.656	1.008 (0.978 - 1.039)	0.593	1.038 (0.985 - 1.093)	0.165
Gender								
Male	-	-	-	-	-	-	-	-
Female	1.490 (0.782 - 2.840)	0.226	2.571 (0.914 - 7.228)	0.073	1.765 (0.925 - 3.366)	0.085	2.282 (0.767 - 6.789)	0.138
Marital status								
Single	-	-	-		-	-	-	-
Married	1.211 (0.513 - 2.857)	0.662	1.562 (0.517 - 4.715)	0.429	0.599 (0.260 - 1.381)	0.229	0.458 (0.150 - 1.398)	0.170
Divorced/widowed	0.340 (0.035 - 3.340)	0.355	0.197 (0.014 - 2.692)	0.224	0.186 (0.019 - 1.808)	0.147	0.020 (0.001 - 0.453)	0.014
Education level								
Under diploma	-	-	-	-	-	-	-	-
Diploma/Associate degree	0.839 (0.372 - 1.897)	0.674	1.183 (0.417 - 3.356)	0.753	0.683 (0.303 - 1.573)	0.357	0.985 (0.334 - 2.902)	0.978
Bachelor's/Master's degree	0.803 (0.339 - 1.906)	0.619	0.609 (0.189 - 1.960)	0.406	0.543 (0.227 - 1.298)	0.170	0.320 (0.090 - 1.130)	0.077
PhD and higher	0.739 (0.186 - 2.945)	0.669	0.902 (0.123 - 6.603)	0.920	0.877 (0.229 - 3.359)	0.848	1.189 (0.158 - 8.925)	0.867
Employment								
Unemployment	-	-	-	-	-	-	-	-
Housewife	0.533 (0.169 - 1.680)	0.283	0.208 (0.041 - 1.049)	0.057	0.517 (0.164 - 1.636)	0.262	0.253 (0.045 - 1.419)	0.118
Student	1.778 (0.254 - 12.449)	0.562	1.809 (0.148 - 22.141)	0.643	0.700 (0.108 - 4.538)	0.708	0.158 (0.011 - 2.313)	0.178
Part-time employee	1.111 (0.294 - 4.205)	0.877	0.572 (0.124 - 2.634)	0.473	0.700 (0.184 - 2.664)	0.601	0.285 (0.055 - 1.459)	0.132
Full-time employee	0.404 (0.136 - 1.201)	0.103	0.419 (0.116 - 1.511)	0.184	0.342 (0.114 - 1.025)	0.055	0.188 (0.046 - 0.763)	0.019
Retired	0.556 (0.128 - 2.412)	0.433	0.204 (0.031 - 1.356)	0.100	0.311 (0.068 - 1.427)	0.133	0.087 (0.011 - 0.715)	0.023
Occupation								
Healthcare worker	-	-	-	-	-	-	-	-
Nonhealthcare worker	1.118 (0.385 - 3.246)	0.838	1.683 (0.379 - 7.085)	0.509	0.492 (0.173 - 1.396)	0.183	0.570 (0.126 - 2.578)	0.465
History of psychiatric disorder								
Negative	-	-	-	-	-	-	-	-
Positive	3.269 (1.224 - 8.728)	0.018	3.064 (0.971 - 9.670)	0.056	5.449 (1.868 - 15.894)	0.002	6.468 (1.735 - 24.119)	0.005
History of smoking								
Negative	-	-	-	-	-	-	-	-
Positive	3.298 (1.442 - 7.542)	0.005	2.411 (0.876 - 6.635)	0.088	2.674 (1.184 - 6.040)	0.018	1.925 (0.650 - 5.703)	0.237
History of other substance abuse								
Negative	-	-	-	-	-	-	-	-
Positive	1.441 (0.573 - 3.626)	0.438	0.938 (0.295 - 2.978)	0.913	3.480 (1.317 - 9.195)	0.012	3.804 (1.135 - 12.750)	0.030
Comorbidity of hypertension and/or cardiovascular diseases								
No	-	-	-	-	-	-	-	-
Yes	1.802 (0.783 - 4.149)	0.166	1.624 (0.501 - 5.266)	0.419	1.215 (0.527 - 2.804)	0.647	0.575 (0.160 - 2.068)	0.397
Comorbidity of diabetes mellitus								
No	-	-	-	-	-	-	-	-
Yes	1.813 (0.659 - 4.982)	0.249	1.534 (0.420 - 5.601)	0.517	2.302 (0.827 - 6.407)	0.111	1.827 (0.471 - 7.084)	0.383
Hospitalization days	1.008 (0.965 - 1.053)	0.723	1.016 (0.962 - 1.073)	0.571	0.990 (0.947 - 1.035)	0.667	1.025 (0.967 - 1.087)	0.400
Hospitalized in intensive care unit								
No	-	-	-	-	-	-	-	-
Yes	0.800 (0.371 - 1.723)	0.569	0.837 (0.304 - 2.305)	0.731	1.324 (0.602 - 2.914)	0.485	2.226 (0.707 - 7.008)	0.171

Abbreviations: OR , odds ratio; CI , confidence interval.

studies have evaluated the mental health of COVID-19 patients after discharge from the hospital. The current study reported that 20.3% and 13.3% of COVID-19 patients experienced abnormal anxiety and depression after discharge from the hospital, respectively. In addition, 28.5% of the participants experienced PTSD.

Psychological problems might occur in COVID-19 survivors for a variety of reasons, such as the high rates of mortality and prolonged quarantine, which separates the patients from family and community (12-14). Furthermore, most ordinary individuals receive information about COVID-19 through social media, often exaggerating the consequences of the disease and leading to panic and anxiety in patients (15). On the other hand, the symptoms that remain after discharge, worry about recurrence, and worry about infecting others might cause anxiety and depression in survivors (16).

In a similar study conducted in Mashhad, Iran, within March 20 to April 3, 2020, on 188 COVID-19 survivors to assess mental health using the 42-item Depression-Anxiety-Stress Scale and HADS, the prevalence rates of depression, anxiety, and stress were 43.1%, 12.8%, and 39.4%, respectively

Table 2. Binary Logistic Regression of Factors Affecting Scores of Posttraumatic Stress Disorder Checklist for the Fifth Edition of Diagnostic and Statistical Manual of Mental Disorders in Coronavirus Disease 2019 Survivors

Variables	PTSD			
	Unadjusted		Adjusted	
	OR (95% CI)	P-Value	OR (95% CI)	P-Value
Age (y)	1.017 (0.984 - 1.051)	0.316	1.031 (0.974 - 1.091)	0.295
Gender				
Male	-	-	-	-
Female	1.500 (0.748 - 3.009)	0.254	1.513 (0.492 - 4.657)	0.470
Marital status				
Single	-	-	-	-
Married	0.635 (0.265 - 1.523)	0.309	0.362 (0.106 - 1.236)	0.105
Divorced/Widowed	0.340 (0.035 - 3.340)	0.355	0.069 (0.002 - 2.048)	0.122
Education level				
Under diploma	-	-	-	-
Diploma/Associate degree	0.690 (0.292 - 1.632)	0.398	0.712 (0.229 - 2.213)	0.558
Bachelor's/Master's degree	0.483 (0.185 - 1.257)	0.136	0.233 (0.057 - 0.952)	0.042
PhD and higher	1.020 (0.254 - 4.104)	0.977	0.669 (0.074 - 6.079)	0.721
Employment				
Unemployment	-	-	-	-
Housewife	0.910 (0.260 - 3.187)	0.883	0.922 (0.151 - 5.613)	0.930
Student	4.800 (0.655 - 35.198)	0.123	6.164 (0.411 - 92.374)	0.188
Part-time employee	2.400 (0.596 - 9.670)	0.218	2.340 (0.420 - 13.027)	0.332
Full-time employee	0.554 (0.164 - 1.871)	0.342	0.538 (0.117 - 2.466)	0.425
Retired	1.067 (0.221 - 5.145)	0.936	0.831 (0.105 - 6.554)	0.860
Occupation				
Healthcare worker	-	-	-	-
Nonhealthcare worker	0.631 (0.215 - 1.853)	0.402	0.844 (0.153 - 4.668)	0.846
History of psychiatric disorder				
Negative	-	-	-	-
Positive	4.773 (1.798 - 12.671)	0.002	3.760 (1.082 - 13.065)	0.037
History of smoking				
Negative	-	-	-	-
Positive	2.738 (1.202 - 6.238)	0.017	1.999 (0.669 - 5.972)	0.215
Comorbidity of hypertension and/or cardiovascular diseases				
No	-	-	-	-
Yes	1.613 (0.675 - 3.858)	0.282	0.972 (0.262 - 3.614)	0.967
Comorbidity of diabetes mellitus				
No	-	-	-	-
Yes	1.897 (0.674 - 5.342)	0.225	0.967 (0.224 - 4.186)	0.965
Hospitalization days	0.983 (0.935 - 1.033)	0.501	0.987 (0.923 - 1.055)	0.694
Hospitalized in intensive care unit				
No	-	-	-	-
Yes	1.136 (0.483 - 2.672)	0.769	1.371 (0.411 - 4.575)	0.608

Abbreviations: PTSD, posttraumatic stress disorder; OR, odds ratio; CI, confidence interval.

(17). The depression rate reported in the current study is in line with that of the aforementioned study; however, the rate of anxiety was higher in the aforementioned study. Because the aforementioned study was conducted when COVID-19 had just appeared in Iran, a high level of anxiety was expected when the disease was unknown, and there was insufficient treatment in the early stages of COVID-19.

One study in Italy that investigated psychiatric symptoms in 402 adult COVID-19 survivors one month after hospitalization using clinical interviews and a battery of self-report questionnaires showed that a significant proportion of participants evaluated themselves within the range of psychopathology, including 28%, 31%, and 42% for PTSD, depression, and anxiety, respectively (18). Conversely, one study in China showed that approximately 10% of COVID-19 survivors reported anxiety and depression, which was lower than the present study (16). The aforementioned reports might indicate that the prevalence of mental disorders in COVID-19 survivors is different in various countries and even in different provinces; however, it is not certain due to differences between studies, such as measuring instruments, study time, and duration, and the number of participants.

According to the risk factor associated with psychopathology, consistent with previous research, the current study showed that the female participants and pa-

tients with a positive history of psychiatric illness and substance use disorder suffered more in all psychopathological dimensions (1, 18). Based on the aforementioned results, it might be concluded that COVID-19 survivors, especially the aforementioned groups, need more targeted interventions regarding psychological health during and after discharge to avoid COVID-19-related psychiatric injuries.

In addition to the main limitation, which is the cross-sectional nature of the study that does not allow the interpretation of causation, this study had some limitations. Firstly, because the sample size was relatively small and all participants were from the same hospital in Iran, it was impossible to generalize the results to other areas. Secondly, PTSD was assessed using a self-report inventory tool instead of a clinical assessment of PTSD; therefore, the degree of direct association of symptoms with the COVID-19 epidemic could not be determined. Thirdly, since this study did not have a control group of nonCOVID-19 hospitalized patients, it cannot be concluded which of the findings, if at all, are specific to COVID-19 patients.

Footnotes

Authors' Contribution: Study concept and design, R.S. and M.A.; Acquisition of the data, M.S.; Analysis and interpretation of the data, K.R. and M.A.; Drafting of the manuscript, M.A.; Critical revision of the manuscript for important intellectual content, A.M.; Study supervision, R.S.

Conflict of Interests: The authors have no conflict of interest to disclose.

Data Reproducibility: The dataset presented in the study is available on request from the corresponding author during submission or after its publication.

Ethical Approval: This study was approved by the Ethics Committee of Iran University of Medical Sciences (code: 1399.594).

Funding/Support: This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Informed Consent: The respondents were asked to read the purpose of the study, give informed consent again, and participate in the survey if they agreed.

References

1. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain Behav Immun*. 2020;**89**:531–42. doi: 10.1016/j.bbi.2020.05.048. [PubMed: 32485289]. [PubMed Central: PMC7260522].
2. Carmassi C, Foghi C, Dell'Oste V, Cordone A, Bertelloni CA, Bui E, et al. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. *Psychiatry Res*. 2020;**292**:113312. doi: 10.1016/j.psychres.2020.113312. [PubMed: 32717711]. [PubMed Central: PMC7370915].
3. Bo HX, Li W, Yang Y, Wang Y, Zhang Q, Cheung T, et al. Posttraumatic stress symptoms and attitude toward crisis mental health services among clinically stable patients with COVID-19 in China. *Psychol Med*. 2021;**51**(6):1052–3. doi: 10.1017/S0033291720000999. [PubMed: 32216863]. [PubMed Central: PMC7200846].
4. Nie XD, Wang Q, Wang MN, Zhao S, Liu L, Zhu YL, et al. Anxiety and depression and its correlates in patients with coronavirus disease 2019 in Wuhan. *Int J Psychiatry Clin Pract*. 2021;**25**(2):109–14. doi: 10.1080/13651501.2020.1791345. [PubMed: 32662692].
5. Hong X, Currier GW, Zhao X, Jiang Y, Zhou W, Wei J. Posttraumatic stress disorder in convalescent severe acute respiratory syndrome patients: a 4-year follow-up study. *Gen Hosp Psychiatry*. 2009;**31**(6):546–54. doi: 10.1016/j.genhosppsych.2009.06.008. [PubMed: 19892213]. [PubMed Central: PMC7112559].
6. Wu KK, Chan SK, Ma TM. Posttraumatic stress after SARS. *Emerg Infect Dis*. 2005;**11**(8):1297–300. doi: 10.3201/eid1108.041083. [PubMed: 16102324]. [PubMed Central: PMC3320475].
7. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand*. 1983;**67**(6):361–70. doi: 10.1111/j.1600-0447.1983.tb09716.x. [PubMed: 6880820].
8. Montazeri A, Vahdaninia M, Ebrahimi M, Jarvandi S. The Hospital Anxiety and Depression Scale (HADS): translation and validation study of the Iranian version. *Health Qual Life Outcomes*. 2003;**1**:14. doi: 10.1186/1477-7525-1-14. [PubMed: 12816545]. [PubMed Central: PMC161819].
9. Blevins CA, Weathers FW, Davis MT, Witte TK, Domino JL. The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and Initial Psychometric Evaluation. *J Trauma Stress*. 2015;**28**(6):489–98. doi: 10.1002/jts.22059. [PubMed: 26606250].
10. Kheramin S, Shakibkhah I, Ashrafganjooie M. Prevalence of PTSD Symptoms Among Iranian Red Crescent Disaster Workers Participated in Rescue and Collection Operation of the Tehran - Yasuj Airplane Crash. *Iran Red Crescent Med J*. 2019;**21**(10). doi: 10.5812/ircmj.95307.
11. Varmaghani H, Fathi Ashtiani A, Poursharifi H. Psychometric properties of the persian version of the posttraumatic stress disorder checklist for DSM-5 (PCL-5). *Journal of Applied Psychological Research*. 2018;**9**(3):131–42.
12. Yao H, Chen J, Xu Y. Patients with mental health disorders in the COVID-19 epidemic. *The Lancet Psychiatry*. 2020;**7**(4). e21. doi: 10.1016/s2215-0366(20)30090-0.
13. Webster P. Virtual health care in the era of COVID-19. *The Lancet*. 2020;**395**(10231):1180–1. doi: 10.1016/s0140-6736(20)30818-7.
14. Chen B, Wang Y, Yang T, Li C, Sun Z. Mental health among COVID-19 survivors and healthcare workers exposed to COVID-19 in Wuhan, China: a cross-sectional study. *Research Square*. 2020. doi: 10.21203/rs.3.rs-30351/v1.
15. Chen Q, Min C, Zhang W, Wang G, Ma X, Evans R. Unpacking the black box: How to promote citizen engagement through government social media during the COVID-19 crisis. *Comput Human Behav*. 2020;**110**:106380. doi: 10.1016/j.chb.2020.106380. [PubMed: 32292239]. [PubMed Central: PMC7151317].
16. Wu C, Hu X, Song J, Yang D, Xu J, Cheng K, et al. Mental health status and related influencing factors of COVID-19 survivors in Wuhan, China. *Clin Transl Med*. 2020;**10**(2). doi: 10.1002/ctm2.52.
17. Salimi Z, Najafi R, Khalesi A, Oskoei R, Moharreri F, Hajebi Khaniki S, et al. Evaluating the Depression, Anxiety, Stress, and Predictors of Psychological Morbidity Among COVID-19 Survivors in Mashhad, Iran. *Iran J Psychiatry Behav Sci*. 2021;**15**(2). doi: 10.5812/ijpbs.108972.
18. Mazza MG, De Lorenzo R, Conte C, Poletti S, Vai B, Bollettini I, et al. Anxiety and depression in COVID-19 survivors: Role of inflammatory and clinical predictors. *Brain Behav Immun*. 2020;**89**:594–600. doi: 10.1016/j.bbi.2020.07.037. [PubMed: 32738287]. [PubMed Central: PMC7390748].