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Prevalence of Psychological Distress and Posttraumatic Stress Symptoms and Associated Factors in Hospitalized Iranian COVID-19 Patients

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ABSTRACT

Objectives: To investigate the prevalence of psychiatric symptoms/distress and posttraumatic stress (PTS) and associated factors among inpatients with COVID-19 before discharge from the hospital. ***Methods***: This cross-sectional study was conducted in two teaching referral hospitals in Babol, Iran from July to November 2020. The subjects were inpatients diagnosed with COVID-19 who were clinically stable. Before their discharge from the hospital, the patients completed three questionnaires: demographic data, Brief Symptom Inventory, and Primary Care Post Traumatic Stress Disorder Screen for Diagnostic and Statistical Manual-5. ***Results:*** The subjects were 477 inpatients diagnosed with COVID-19 including 40 (8.4%) admitted to intensive care units. Their average age was 60.5±17.9 years; 53.9% were female. Most had symptoms of significant psychological distress (96.0%) and PTS (8.1%) prior to discharge. A higher level of education (-0.18; standard error (SE) = 0.05; $p < 0.001$) was a negative predictor of psychiatric distress. The admission to intensive care units (0.86; SE = 0.08; $p < 0.001$) was a positive predictor of psychiatric distress. ***Conclusions:*** Most COVID-19 inpatients suffered significant psychiatric distress and PTS symptoms before discharge. Appropriate mental health crisis interventions are recommended for COVID-19 patients during hospitalization.

At the end of 2019, COVID-19 a new strain of coronavirus caused by SARS-CoV-2 appeared in Wuhan, China, and precipitously spread worldwide with unique rates of transmissibility, morbidity, and mortality.[1–3] Clinical features included fever, chills, cough, sore throat, myalgia, nausea and vomiting, and diarrhea.[4] Patients with moderate to severe symptoms had to be hospitalized.[5] Some with severe symptoms and comorbidities required admission to intensive care units (ICU) and risked relatively poor outcomes.[6]

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Considerable studies have been conducted worldwide on mental health issues associated with the COVID-19 pandemic.[7–11] The socio-demographic variables associated with psychological distress during COVID-19 are female sex, young adulthood, old age, and low socioeconomic status.[7–10] Higher educational level and living in rural areas are considered risk factors for depressive and anxiety symptoms.[10,11]

Public responses to the pandemic varied widely ranging from mild worries to manifestation of new mental disorders or aggravation of existing ones.[7,12,13] The mental health impact was evident early in the pandemic as evidenced by a mid-2020 review that reported a high prevalence of psychological symptoms in the general population of countries as demographically and culturally different as China, Spain, Italy, Iran, USA, Turkey, Nepal, and Denmark, albeit with widely varying rates for anxiety (6.3–50.9%), depression (14.6–48.3%), posttraumatic stress symptoms (7–53.8%), psychological distress (34.4–38%), and stress (8.1–81.9%).[14] The study found a higher prevalence of such symptoms in COVID-19 patients than in the general population.[14]

Now, in the third year of the pandemic, there is still insufficient information about psychiatric symptoms in hospitalized COVID-19 patients. The available reports indicate that they may be at high risk for psychiatric symptoms because of clinical symptoms of the disease, medication side effects, fear of virus transmission to others, social isolation, perceived danger, uncertainty, and physical discomfort.[15] A study in China on hospitalized COVID-19 patients reported that 96.2% had posttraumatic stress (PTS) symptoms before discharge.[16] Another Chinese study reported that 50% of patients had depressive symptoms, 55% had anxiety symptoms, 70% had somatic symptoms, 68% had insomnia, and 25% reported suicidal thoughts.[17]

COVID-19 patients admitted to ICU may have even higher mental health issues. Survivors of ICU treatment are reported to be at high risk for PTS disorder (PTSD), depression, sleep disturbance, poor quality of life, and cognitive dysfunction.[18,19] Prolonged exposure to stressful environments, invasive procedures, and the perception of threats in the ICU environment can be experienced as traumatic and could lead to long-term psychological sequelae.[18]

During the pandemic, several studies probed psychological distress in specific populations, ranging from vulnerable patient types such as cancer survivors to healthcare providers,students, elderly, and children.[20–26] However, there are fewer studies on the psychological distress among COVID-19 patients themselves,especially hospitalized stable patients.[27] Bo et al,[16] early 2000 in Wuhan found PTS symptoms among 714 hospitalized COVID-19 patients before discharge.

To address these gaps in the literature, we designed a study to investigate the prevalence of psychiatric and PTS symptoms among inpatients with COVID-19 before discharge. The second aim of the study was to investigate the demographic predictors of psychiatric symptoms in inpatients with COVID-19. This study is novel in several ways as there is limited information regarding the prevalence of psychiatric symptoms in hospitalized COVID-19 patients worldwide, and none from Iran. To our knowledge, no published study has reported the prevalence of nine important psychiatric symptoms—somatization, depression, anxiety, interpersonal sensitivity, obsessive-compulsive disorder (OCD), hostility, paranoid ideations, phobia, and psychosis—in patients with COVID-19. Therefore, understanding psychiatric symptoms and their predictive factors in hospitalized COVID-19 patients are expected to enhance their mental health management during their hospitalization.

METHODS

This cross-sectional study was conducted from July to November 2020 (during the second peak of the COVID-19 outbreak) in two teaching referral hospitals (Yahya Nejad and Ayatollah Rohani) in Babol city in northern Iran which admitted COVID-19 patients. The inpatients who satisfied our inclusion criteria were enrolled in the study using convenience sampling method. The ethics committee of Babol University of Medical Sciences approved the study (Ref. IR.MUBABOL.REC.1399.004 dated March 24, 2020). Potential participants were invited to the study before their hospital discharge and assured of the confidentiality of their data and that they had the option to refuse to participate.

Inclusion criteria were age > 18 years, education more than primary school, diagnosis of COVID-19 (based on the World Health Organization guidance

for 2019 novel coronavirus)[28] as per their medical records, clinically stable with COVID-19, and consent to enter the study. Patients who did not have a definite diagnosis of COVID-19 and those who were not in a stable general condition to answer the questionnaires were excluded from the study.

PASS version 11 statistical software (NCSS, LLC) was used to calculate the sample size. The confidence level and width were set to 0.95 and 0.54, respectively, estimating the likely prevalence of PTSD (≥ 3) as 10% among hospitalized COVID-19 patients. This estimate necessitated a sample size of 477 patients.

Two hospital nurses who were independent of the research identified prospective subjects from their medical records based on the inclusion/exclusion criteria. The nurses introduced the study and its aims to the patients who met the criteria and invited them to participate. Those who were willing were briefed on how to fill the three paper questionnaires: demographic data, Brief Symptom Inventory (BSI-53), and Primary Care Post Traumatic Stress Disorder Screen for Diagnostic and Statistical Manual-5 (PC-PTSD-5). The nurses assessed the patients' characteristics and outcomes simultaneously. There was no post-discharge follow-up to determine the psychological outcomes.

Derogatis et al,[29,30] (1975) developed the BSI 53-item scale to identify psychological symptoms related to clinical symptoms in adolescents and adults. Each item is rated on a 5-point scale from 0 (not at all) to 4 (extremely). The scale covers nine subscales: somatization, depression, anxiety, interpersonal sensitivity, OCD, hostility, paranoid ideations, phobia, and psychosis. Global Severity Index (GSI) can be calculated using the sums of the results of the 53 items in BSI-53 and divided by the total number of items answered by the individual. GSI also measures psychological distress. The Persian version of BSI-53 used in this study has high validity with Cronbach alpha of 0.98.[31] The cut-score of GSI of BSI-53 ≥ 0.8 and all nine subscales GSI ≥ 0.8 were considered as indicating psychological distress.[32,33]

Prins et al,[34,35] (2003) developed the PC-PTSD five-item dichotomous scale: response 'yes' scores 1 and 'no' scores 0. An overall score of ≥ 3 is considered a PTSD symptom. A recent evaluation of the PC-PTSD-5 on 396 primary care–seeking participants found the scale to have high diagnostic accuracy, area under the receiver operating characteristic curve being 0.927; 95% CI: 0.896–0.959.[36]

We presented the data as percentages and mean with SD for categorical and continuous variables. Univariate and multivariate linear regressions were used to estimate the adjusted and unadjusted association effect of the patient's characteristics with a total score of PTSD symptoms and a total score of GSI-53, as well as the relevant subscales. In the regression models, the total score of PTSD symptoms and the total score of GSI-53 were considered dependent variables. Linear regression was also used to assess the relationship between the demographic variables and the other psychological outcomes. The demographic characteristics of the patients, including age, gender, location of living, smoking, history of chorionic illness, and ICU admission, were considered independent variables. STATA Version 15 software (STATA Corp, Texas) was used to estimate the linear regression parameters and other relevant analyses. All p-values were two-tailed, with $p < 0.050$ considered significant.

RESULTS

Table 1 shows the demographics of the COVID-19 participants. Their average age was 60.5±17.9 years and 15.4% had a university education. Most patients (95.8%) were married, had no history of mental illness (98.1%), were female (53.9%), and did not smoke (70.4%).

Table 2 summarizes the means±SD for the GSI of the BSI-53 and its nine subscales and the total PTSD score. We considered GSI ≥ 1.3 as a cut-off score of psychological distress. The patients had psychological distress for nine subscales of BSI-53, including somatization, depression, anxiety, interpersonal sensitivity, OCD, hostility, paranoid ideations, phobia, and psychosis. The mean score of GSI for BSI-53 (1.7±0.4) showed that hospitalized patients infected with COVID-19 experienced significant psychiatric distress with overall prevalence of 96.0%. The mean score of PTSD symptoms was 0.9±1.1 from a total score of 5 and the prevalence was 8.1%.

Table 3 shows the influence of our participants' demographic characteristics on their psychological distress, as revealed by univariate and multivariate linear regression. Those with at least high school education had significantly lower psychological

Table 1: Demographic characteristics of the participating patients (N = 477).

Characteristics	No. of patients (%)
Sex	
Male	220 (46.1)
Female	257 (53.9)
Education	
Primary school	202 (44.3)
High school	184 (40.4)
University	70 (15.4)
Mean age ± SD	60.5 ± 17.9
Location	
Urban	332 (70.0)
Rural	142 (30.0)
Marriage	
No	18 (4.2)
Yes	414 (95.8)
Smoking	
No	329 (70.4)
Yes	138 (29.6)
Alcohol/substance use	
No	445 (98.5)
Yes	7 (1.5)
History chronic disease	
No	148 (31.0)
Yes	329 (69.0)
History of using psychiatric drugs	
No	461 (98.9)
Yes	5 (1.1)
History of suicide attempts	
No	424 (88.9)
Yes	53 (11.1)
Admitted to ICU	
No	436 (91.6)
Yes	40 (8.4)

ICU: intensive care unit.

Table 2: Psychological symptoms in the patients infected with COVID-19.

Variables	Mean ± SD
Somatization symptoms	16.2 ± 4.4
GSI of somatization	2.3 ± 0.6
Obsessive-compulsive disorder symptoms	11.6 ± 2.8
GSI of Obsessive-compulsive disorder	1.9 ± 0.4
Interpersonal sensitivity	5.4 ± 2.7
GSI of interpersonal sensitivity	1.3 ± 0. 6
Depression symptoms	9.4 ± 3.5
GSI of depression	1.5 ± 0.5
Anxiety symptoms	11.0 ± 3.8
GSI of anxiety	1.8 ± 0.6
Hostility symptoms	8.5 ± 2.4
GSI of hostility	1.7 ± 0.4
Phobic anxiety symptoms	7.8 ± 3.4
GSI of phobic anxiety	1.5 ± 0.6
Paranoid Ideation symptoms	9.0 ± 3.0
GSI of paranoid ideation	1.8 ± 0.6
Psychoticism symptoms	8.8 ± 2.7
GSI of psychoticism	1.7 ± 0.5
GSI of total score of BSI-53	1.7 ± 0.4
PTSD symptoms (of scale PC-PTSD)	0.9 ± 1.1

GSI: Global Severity Index; BSI: Brief Symptom Inventory; PTSD: posttraumatic stress disorder; PC-PTSD: Primary Care Posttraumatic Stress Disorder Screen. Rage scores: somatization (0–28); obsessive-compulsive disorder (0–24); interpersonal sensitivity (0–16); depression (0–24); anxiety (0–24); hostility (0–20); phobic anxiety (0–20); paranoid ideation (0–20); and psychoticism (0–20).

distress than patients with primary education in both univariate ($p < 0.001$) and multivariate analyses ($p < 0.001$). In addition, admission to ICU was a positive predictor of psychological distress in both models of univariate ($p < 0.001$) and multivariate analysis of regression ($p < 0.001$). However, other demographic factors, including sex, age, place of living, smoking, and chorionic illness, were associated with scores of psychological distress among patients with COVID-19 in both regression models. The results of multivariate linear regressions for all of the subscales of BSI-53 revealed that admission to ICU was the only positive predictor of scores of BSI for all subscales of BSI-53, including somatization, depression, anxiety, interpersonal sensitivity, OCD, hostility, paranoid ideations, phobia, and psychosis [Tables S1–S3 in Appendix].

DISCUSSION

This cross-sectional study investigated the prevalence of psychological distress in clinically stable patients with COVID-19 admitted to two hospitals in Babol, Iran. In addition, the study evaluated the prevalence and associated factors of PTS symptoms among these patients.

We found a high prevalence of psychological distress (96.0%), higher than found in other studies. A Chinese study reported the prevalence of depression at 43.1% based on the Patient Health

Table 3: Effect of demographic characteristics on psychological distress in participants based on univariate and multivariate analyses.

Variables	Univariate ß coefficient (SE)	*p*-value	Multivariate ß coefficient (SE)	*p*-value
Patient age	0.0002 (0.0012)	0.855	0.0016 (0.0015)	0.280
Sex				
Female	1		1	
Male	-0.0048 (0.0441)	0.913	-0.0222 (0.0725)	0.760
Education				
Primary	1		1	
High school	-0.2227 (0.0477)	< 0.001	-0.1888 (0.0499)	< 0.001
University	-0.0407 (0.0649)	0.531	0.0146 (0.0785)	0.852
Place of living				
Urban	1		1	
Rural	-0.0389 (0.0482)	0.419	-0.0171 (0.0476)	0.719
Smoking				
No	1		1	
Yes	-0.0514 (0.0484)	0.288	-0.0385 (0.0635)	0.545
Chronic disease history				
No	1		1	
Yes	-0.0767 (0.0469)	0.103	-0.0897 (0.0514)	0.082
ICU admission				
No	1		1	
Yes	0.8753 (0.0684)	< 0.001	10.8593 (0.0818)	< 0.001

SE: standard error; ICU: intensive care unit.

Questionnaire scale among patients hospitalized with COVID-19.[37] Another study reported the prevalence of psychological distress at 19.1% based on anxiety/depression among patients with infected COVID-19 after one month of discharge from the hospital.[38] The differences in observed prevalence could be attributable to differing study designs and different subject demographies. For example, we assessed the prevalence of psychological symptoms based on nine psychological symptoms (BSI-53) while others reported psychological distress based only on one or two symptoms such as depression and anxiety.[37,38] Also, the prevalence and manifestations of psychological symptoms are known to be influenced by socioeconomic and cultural contexts.

The prevalence of PTS symptoms found in this study (8.1%) was much lower compared to a study from China which reported that 96.2% of 714 hospitalized patients suffered from PTSD symptoms.[16] Meanwhile, in a Swiss study, 8.7% of COVID-19 patients continued to have PTSD symptoms one month following discharge.[38] We do not have such data as our study design did not include post-discharge follow-ups.

Our findings demonstrated that higher education level of patients was a protective factor against psychological distress. Age, gender, living location, smoking, and history of chronic illness were unrelated to experiencing such distress. In line with our results, a study from China reported that higher education was a protective factor in psychological distress in patients with COVID-19.[39] A Japanese study (on non-COVID-19 patients) revealed that more educated individuals could process stress more scientifically and engage in organized social activities as a means of psychological protection, especially from depressive symptoms.[40]

Some studies gave results that differed from our findings. For example, the Swiss study mentioned earlier found that female COVID-19 patients had more psychiatric symptoms than males.[38] Another study in 144 patients reported that female sex and age were predictive factors of depressive symptoms.[41] Wang et al,[39] reported that unemployed patients with children had higher psychological distress.

Our study found that for COVID-19 patients, admission to ICU was a positive predictor of all the nine subscales of psychological distress measured

by BSI-53 including somatization, depression, anxiety, interpersonal sensitivity, OCD, hostility, paranoid ideations, phobia, and psychosis. While some previous research in line with our results reported that ICU patients had higher risk of psychological distress,[42–44] some studies' findings were not consistent with ours.[38] Regarding why ICU survivors were at a heightened risk for experiencing psychological distress it may be hypothesized thus the ICU patients with COVID-19 may have acute respiratory failure and need invasive mechanical ventilation in addition to other monitoring equipment. The loud machines, alarms, and sounds from fellow patients may disturb the patient.[45] In addition, the often-overworked caregivers in COVID-19 ICU may not always be able to promptly respond to patients' requests for assistance, leading to feelings of frustration and helplessness.

Our study had limitations. Firstly, the sampling was conducted at two hospitals in Babol city situated in the very north of Iran which is a country that is geographically vast, mountainous, and populated by diverse ethnicities and cultures. Thus, our study sample cannot be considered representative of all hospitalized COVID-19 patients in Iran. Secondly, the convenience sampling method we used may have again limited the generalizability of the results. Finally, it was a cross-sectional study where all patients' data was collected before discharge. Future studies should consider a longitudinal design where psychiatric symptoms from hospital admission to discharge and long-term follow-ups are monitored, which may give a better understanding of their etiology, course, and outcome.

Despite limitations, our study provided evidence for high psychological distress and PTS symptoms in hospitalized COVID-19 patients. Our findings suggest that anesthesiologists, infectious specialists, psychologists, psychiatrists, all clinicians, and nurses who manage hospitalized COVID-19 patients, especially ICU patients, should give importance to the mental health component of this disease and develop management measures. After discharge, long-term follow-up adequate crisis psychiatric therapies should be considered.

CONCLUSION

This study found that most clinically stable COVID-19 patients, especially those admitted to ICU, suffered significant psychological distress and PTS symptoms prior to discharge. COVID-19 patients with a history of prior stressful events in life were at more risk for experiencing psychological distress. We recommend regular screening of hospital inpatients with COVID-19, especially those in the ICU, for psychological distress during their hospital stay and at discharge.

Disclosure

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REFERENCES

1. Wang Y, Wang Y, Chen Y, Qin Q. Unique epidemiological and clinical features of the emerging 2019 novel coronavirus pneumonia (COVID-19) implicate special control measures. J Med Virol 2020 Jun;92(6):568-576.
2. Bouey J. From SARS to 2019-Coronavirus (nCoV): US-China collaborations on pandemic response: addendum: testimony of Jennifer Bouey, before the US house committee on foreign affairs, Subcommittee on Asia, the Pacific, and Nonproliferation, March 5, 2020. RAND Corporation; 2020.
3. Yang Y, Peng F, Wang R, Yange M, Guan K, Jiang T, et al. The deadly coronaviruses: the 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China. J Autoimmun 2020 May;109:102434.
4. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 2020 Feb;395(10223):507-513.
5. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020 Feb;395(10223):497-506.
6. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H, et al; Washington State 2019-nCoV Case Investigation Team. First case of 2019 novel coronavirus in the United States. N Engl J Med 2020 Mar;382(10):929-936.
7. Zhou SJ, Zhang LG, Wang LL, Guo ZC, Wang JQ, Chen JC, et al. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. Eur Child Adolesc Psychiatry 2020 Jun;29(6):749-758.
8. Özdin S, Bayrak Özdin Ş. Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: the importance of gender. Int J Soc Psychiatry 2020 Aug;66(5):504-511.
9. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. Gen Psychiatr 2020 Mar;33(2):e100213.
10. Hawkins RB, Charles EJ, Mehaffey JH. Socio-economic status and COVID-19-related cases and fatalities. Public Health 2020 Dec;189:129-134.
11. Zhang Y, Chen Y-p, Wang J, Deng Y, Peng D, Zhao L. Anxiety status and influencing factors of rural residents in Hunan during the coronavirus disease 2019 epidemic: a web-based cross-sectional survey. Front Psychiatry 2020 Nov;11:564745.
12. Shigemura J, Ursano RJ, Morganstein JC, Kurosawa M, Benedek DM. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: mental health consequences and target populations. Psychiatry Clin Neurosci 2020 Apr;74(4):281-282.
13. Troyer EA, Kohn JN, Hong S. Are we facing a crashing wave of neuropsychiatric sequelae of COVID-19?

Neuropsychiatric symptoms and potential immunologic mechanisms. Brain Behav Immun 2020 Jul;87:34-39.

14. Talevi D, Socci V, Carai M, Carnaghi G, Faleri S, Trebbi E, et al. Mental health outcomes of the CoViD-19 pandemic. Riv Psichiatr 2020 May-Jun;55(3):137-144.
15. Xiang Y-T, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. Lancet Psychiatry 2020 Mar;7(3):228-229.
16. Bo H-X, 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 Apr;51(6):1052-1053.
17. Zhao Q, Hu C, Feng R, Yang Y. Investigation of the mental health of patients with COVID-19. Chin J Neurol 2020;53(6):E003.
18. Righy C, Rosa RG, da Silva RT, Kochhann R, Migliavaca CB, Robinson CC, et al. Prevalence of post-traumatic stress disorder symptoms in adult critical care survivors: a systematic review and meta-analysis. Crit Care 2019 Jun;23(1):213.
19. Wang S, Meeker JW, Perkins AJ, Gao S, Khan SH, Sigua NL, et al. Psychiatric symptoms and their association with sleep disturbances in intensive care unit survivors. Int J Gen Med 2019 Mar;12:125-130.
20. Ng DW, Chan FH, Barry TJ, Lam C, Chong CY, Kok HC, et al. Psychological distress during the 2019 coronavirus disease (COVID-19) pandemic among cancer survivors and healthy controls. Psychooncology 2020 Sep;29(9):1380-1383.
21. Labrague LJ, De Los Santos JA. COVID-19 anxiety among front-line nurses: predictive role of organisational support, personal resilience and social support. J Nurs Manag 2020 Oct;28(7):1653-1661.
22. Nanjundaswamy MH, Pathak H, Chaturvedi SK. Perceived stress and anxiety during COVID-19 among psychiatry trainees. Asian J Psychiatr 2020 Dec;54:102282.
23. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al. Mental health and psychosocial problems of medical health workers during the covid-19 epidemic in China. Psychother Psychosom 2020;89(4):242-250.
24. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Res 2020 May;287:112934.
25. Bergman YS, Cohen-Fridel S, Shrira A, Bodner E, Palgi Y. COVID-19 health worries and anxiety symptoms among older adults: the moderating role of ageism. Int Psychogeriatr 2020 Nov;32(11):1371-1375.
26. Abawi O, Welling MS, van den Eynde E, van Rossum EF, Halberstadt J, van den Akker EL, et al. COVID-19 related anxiety in children and adolescents with severe obesity: a mixed-methods study. Clin Obes 2020 Dec;10(6):e12412.
27. 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 Jun;25(2):109-114.
28. Xu XW, Wu XX, Jiang XG, Xu KJ, Ying LJ, Ma CL, et al. Clinical findings in a group of patients infected with the 2019 novel coronavirus (SARS-Cov-2) outside of Wuhan, China: retrospective case series. BMJ 2020 Feb;368:m606.
29. Derogatis LR, Spencer PM. Brief symptom inventory: BSI: Pearson Upper Saddle River, NJ; 1993.
30. Derogatis LR, Cleary PA. Confirmation of the dimensional structure of the SCL-90: a study in construct validation. J Clin Psychol 1977;33(4):981-989.
31. Mamaghani J, Javanmar G. Standardization of a brief symptom inventory (BSI) for diagnostic aims in consultant and therapeutic situations. Journal of Modern Psychological Researches 2008;2(8):129-144.
32. Akbari H, Zeraati H, Mohammad K, Mahmoodi-Farahani M, Omidi A. Evaluating the agreement between the three screening instruments for mental disorder among students of Kashan University of Medical Sciences during 2011-2012. Feyz 2014;17(6).
33. Fathi-Ashtiani A, Dastani M. Psychological tests, personality and mental health evaluation. Tehran: Besat 2005:83.
34. Prins A, Ouimette p, Kimerling R, Camerond R, Hugelshofer D, Shaw-Hegwer J, et al. The primary care PTSD screen (PC-PTSD): development and operating characteristics. Primary Care Psychiatry 2004;9(1):9-14.
35. Prins A, Bovin MJ, Smolenski DJ, Marx BP, Kimerling R, Jenkins-Guarnieri MA, et al. The primary care PTSD screen for DSM-5 (PC-PTSD-5): development and evaluation within a veteran primary care sample. J Gen Intern Med 2016 Oct;31(10):1206-1211.
36. Bovin MJ, Kimerling R, Weathers FW, Prins A, Marx BP, Post EP, et al. Diagnostic accuracy and acceptability of the primary care posttraumatic stress disorder screen for the diagnostic and statistical manual of mental disorders (Fifth Edition) among US Veterans. JAMA Netw Open 2021 1;4(2):e2036733.
37. Liu C, Wang M. Prevalence and factors associated with depression in patients with COVID-19. J Affect Disord Rep 2020 Dec;2:100042.
38. Beck K, Vincent A, Becker C, Keller A, Cam H, Schaefert R, et al. Prevalence and factors associated with psychological burden in COVID-19 patients and their relatives: a prospective observational cohort study. PloS One 2021;16(5):e0250590.
39. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (covid-19) epidemic among the general population in China. Int J Environ Res Public Health 2020 Mar;17(5):E1729.
40. Takaki J, Nishi T, Shimoyama H, Inada T, Matsuyama N, Kumano H, et al. Possible interactive effects of demographic factors and stress coping mechanisms on depression and anxiety in maintenance hemodialysis patients. J Psychosom Res 2005 Mar;58(3):217-223.
41. Kong X, Zheng K, Tang M, Kong F, Zhou J, Diao L, et al. Prevalence and factors associated with depression and anxiety of hospitalized patients with covid-19. medRxiv 2020.
42. Tingey JL, Bentley JA, Hosey MM. COVID-19: understanding and mitigating trauma in ICU survivors. Psychol Trauma 2020 Aug;12(S1):S100-S104.
43. Hatch R, Young D, Barber V, Griffiths J, Harrison DA, Watkinson p. Anxiety, depression and post traumatic stress disorder after critical illness: a UK-wide prospective cohort study. Crit Care 2018 Nov;22(1):310.
44. Jackson JC, Pandharipande PP, Girard TD, Brummel NE, Thompson JL, Hughes CG, et al; Bringing to light the Risk Factors And Incidence of Neuropsychological dysfunction in ICU survivors (BRAIN-ICU) study investigators. Depression, post-traumatic stress disorder, and functional disability in survivors of critical illness in the BRAIN-ICU study: a longitudinal cohort study. Lancet Respir Med 2014 May;2(5):369-379.
45. Devlin JW, Weinhouse GL. Earplugs, sleep improvement, and delirium: a noisy relationship. Crit Care Med 2016 May;44(5):1022-1023.

Appendix

Table S1: Multivariable association effect of patients characteristics on subscale of BSI-53 depression.

Variables	Multivariable coefficient (SE)	*p*-value
Age, year	0.0153 (0.0118)	0.198
Sex		
Female		
Male	-0.5496 (0.5660)	0.332
Education		
Primary	1	
High school	-1.3993 (0.3895)	< 0.001
University	-0.0435 (0.6122)	0.943
Occupation		
Unemployed	1	
Employed	0.8410 (0.5094)	0.100
Location		
Urban	1	
Rural	-0.4057 (0.3713)	0.275
Smoking		
No	1	
Yes	-0.5030 (0.4957)	0.311
Chronic disease history		
No	1	
Yes	-0.2835 (0.4011)	0.480
Stress experience		
No	1	
Yes	-0.0985 (0.4755)	0.836
ICU admission		
No	1	
Yes	5.8601 (0.6380)	< 0.001

SE: standard error; BSI: Brief Symptom Inventory; ICU: intensive care unit.

Table S2: Multivariable association effect of patients characteristics on subscale of BSI-53 anxiety.

Variables	Multivariable coefficient (SE)	*p*-value
Age, year	0.0061 (0.0117)	0.601
Sex		
Female	1	
Male	0.0019 (0.5619)	0.997
Education		
Primary	1	
High school	-1.3214 (0.3867)	0.001
University	-0.0684 (0.6077)	0.910
Occupation		
Unemployed	1	
Employed	0.3245 (0.5057)	0.522
Location		
Urban	1	
Rural	-0.1939 (0.3686)	0.599

Table S2: Multivariable association effect of patients characteristics on subscale of BSI-53 anxiety.

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Variables	Multivariable coefficient (SE)	*p*-value
Smoking		
No	1	
Yes	-0.7135 (0.4921)	0.148
Chronic disease history		
No	1	
Yes	-0.3899 (0.3982)	0.328
Stress experience		
No	1	
Yes	0.7383 (0.4721)	0.119
ICU admission		
No	1	
Yes	6.9993 (0.6333)	< 0.001

SE: standard error; BSI: Brief Symptom Inventory; ICU: intensive care unit.

Table S3: Multivariable association effect of patients characteristics on subscale of BSI-53 OCD.

Variables	Multivariable coefficient (SE)	*p*-value
Age, year	0.0104 (0.0095)	0.276
Sex		
Female	1	
Male	-0.8144 (0.4545)	0.074
Education		
Primary	1	
High school	-0.8864 (0.3127)	0.005
University	0.3360 (0.4915)	0.495
Occupation		
Unemployed	1	
Employed	0.1119 (0.4091)	0.785
Location		
Urban	1	
Rural	0.0021 (0.2982)	0.994
Smoking		
No	1	
Yes	0.7777 (0.3980)	0.051
Chronic disease history		
No	1	
Yes	-0.8735 (0.3221)	0.007
Stress experience		
No	1	
Yes	-0.2193 (0.3818)	0.566
ICU admission		
No	1	
Yes	4.3296 (0.5123)	< 0.001

SE: standard error; BSI: Brief Symptom Inventory; ICU: intensive care unit.