Evaluating the Depression, Anxiety, Stress, and Predictors of Psychological Morbidity among COVID-19 Survivors in Mashhad, Iran

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Abstract

Background: The outbreak of coronavirus disease 2019 (COVID-19) pandemic has led to public panic and psychological problems. In this regard, few studies have reported the post-discharge mental health status of COVID-19 survivors.

Objectives: This study aimed to evaluate the mental health status of COVID-19 survivors and determine the risk factors of adverse psychological outcomes.

Methods: This cross-sectional study consisted of 188 COVID-19 survivors discharged from hospital. Data were recorded using social media applications. To evaluate the mental health status, Hospital Anxiety and Depression Scale (HADS) and Depressive Anxiety and Stress Scale 42 (DASS-42) were used. Ordinal regression with a logit link was used to assess the simultaneous effect of variables.

Results: The mean age of participants was 56.4 ± 9.6 years, and the majority of patients were male (62.2%). According to HADS, 81 (43.1%) and 24 (12.8%) patients suffered from anxiety and depression, respectively. Using DASS-42, we reported at least a mild degree of depression [23 (12.2%)] and anxiety [20 (10.6%)] and stress [74 (39.4%)] among the discharged patients. Depression, anxiety, and stress were significantly associated with length of hospital stay (P < 0.05). In addition, there was a direct association between stress and patients’ number of children (β = 0.38, P = 0.02).

Conclusions: Depression, anxiety, and stress are relatively high among COVID-19 survivors. Length of hospital stay and number of children were identified as the predisposing factors for adverse psychological outcomes.

Keywords: COVID-19, Survivors, Depression, Anxiety, Stress

1. Background

Much information has been achieved about coronavirus disease 2019 (COVID-19), including clinical characteristics, diagnostic methods, virological information, and routes of transmission, but there is no proved effective way to treat the disease yet (1). According to the behavioral immune system, people are more likely to develop avoidance behavior, negative emotions, and negative assessment of the disease information to protect themselves (2).

As the number of patients is increasing, the worry about the possibility of contamination is improving among the general population. As some similar epidemics and pandemics, severe concerns like fear from death arise among people who are in quarantine or hospital. Besides, some symptoms of COVID-19, such as fever, cough, lack of oxygen, and adverse effects of some corticosteroid drugs, including insomnia and lack of access to specific medications, can worsen depression and psychological distress. Mandatory contact tracing and quarantine situations are considered as part of public health strategies against COVID-19, which make patients feel guilty about the effects of contagion and stigma on their friends and families (3, 4).

Also, quarantine, missing social interactions, lack of proper management in controlling the outbreak of COVID-19 by authorities, presence of excessive information with misinterpretation on social media, and being far from
friends, colleagues, and daily routine works for a long time increase the feeling of loneliness and anger among patients (5, 6). Although previous studies have shown that depression and anxiety are associated with the COVID-19 pandemic, most of them have focused on healthcare workers and the general population. Hence, there are few studies to investigate the psychological effects of COVID-19 on hospitalized patients (7-9).

2. Objectives

We aimed to investigate depression and anxiety in COVID-19 patients discharged from the local referral center for COVID-19 and to analyze the risk factors associated with these symptoms.

3. Methods

3.1. Study Design

This cross-sectional study was conducted among discharged patients who were hospitalized for COVID-19 in Imam Reza Hospital of Mashhad, Iran, from 20 March to 3 April, 2020. All patients were diagnosed based on the guidelines provided by the World Health Organization (WHO). Totally, 188 consecutive individuals completed online self-reported questionnaires via common social media apps to prevent the transmission of the virus. We included the COVID-19 patients discharged from hospital. Individuals with pre-existing psychological disorders were excluded from the study. The sample size was calculated using the following formula assuming d = 0.068, α = 0.05, and Z1 - α/2 = 1.96. Also, P = 0.34 represented the prevalence of depression in hospitalized COVID-19 patients, according to the study by Kong et al. (9). Finally, the total sample size was calculated as 187 individuals.

\[
n = \frac{Z_1^2 \cdot p \cdot q}{d^2}
\]

All participants were requested to sign a written informed consent, and they were assured that their information would remain confidential. The study protocol was approved by the Research Ethics Committee of Mashhad University of Medical Sciences (code: IR.MUMS.REC.1399.200).

3.2. Outcome Measurements

Patients were asked to complete three questionnaires, including demographic data, Hospital Anxiety and Depression Scale (HADS), and Depressive Anxiety and Stress Scale 42 (DASS-42).

Demographic data included such information as age, gender, education, income level, underlying disease, number of children, marital status, physical illness under medical treatment, history of smoking, history of psychiatric disorders in patients and their first-degree relatives, history of COVID-19 infection in first-degree relatives, history of hospitalization in a psychiatric hospital, and length of hospital stay due to COVID-19 infection. The monthly income of participants was also recorded. Current and ex-smokers were considered as patients with a positive history of smoking according to their self-reports in the online questionnaire.

The Persian version of DASS-42, a 42-item self-report inventory, was used for the evaluation of negative emotional symptoms among patients. The presence and severity of symptoms of depression, anxiety, and stress were assessed using this scale. The reliability and validity of DASS-42 were approved by Antony et al. (10). Also, the reliability and validity of the Persian version of DASS-42 had been previously confirmed (11).

The HADS is a 21-item self-report questionnaire designed to identify anxiety and depression symptoms in hospitalized patients. The reliability and validity of HADS questionnaire were confirmed by Montazeri et al. (12).

3.3. Statistical Analysis

For quantitative variables, the central tendency and dispersion parameter, including mean and standard deviation, and for categorical variables, the frequency and percentage were reported. For univariate analysis, the Mann-Whitney test was used to investigate differences between HADS and DASS-42 scales with sex, smoking, and history of COVID-19 virus infection. Moreover, the Kruskal-Wallis test was applied to investigate the univariate relationship of HADS and DASS-42 scales with marital status, income, and Education level. Spearman’s correlation coefficients were used to evaluate the correlation between ordinal variables.

Ordinal regression with logit link was used to assess the simultaneous effect of variables. We run five models in each one of the HDAS and DASS-42 subscales, which were considered as dependent variables. All statistical analysis was performed using SPSS v.16.0 (SPSS Inc., Chicago, Illinois, USA), and p-values less than 0.05 were considered as statistically significant.

4. Results

The age range of patients was 33 - 80 years, and the mean age was 56.4 ± 9.6 years. The majority of patients were male (62.2%) and married (64.4%). Furthermore, the mean of hospital stay duration was 7.1 ± 1.4 days (range: 4
- 16 days). Besides, 46 (24.5%) of discharged patients had at least one individual in their family who was infected with COVID-19 (Table 1).

According to the cut points of the DASS-42 questionnaire, 23 (12.2%) and 73 (38.8%) COVID-19 patients discharged from the hospital had extremely severe depression and anxiety, respectively; meanwhile, only one patient had extremely severe stress. It should be noted that 23 (12.2%), 20 (10.6%), and 74 (39.4%) patients did not have any sign of depression, anxiety, or stress. Further details are presented in Table 2.

We also evaluated the relationship between age, sex, marital status, level of education, income, the number of children, and days of hospitalization and all HDAS and DASS-42 subscales by using both univariate analysis and ordinal regressions.

In univariate correlation analysis, hospitalization days and gender were significantly related to hospital anxiety ($r = 0.150, P = 0.041$). After controlling the effect of age, sex, marital status, level of education, income, and the number of children, we observed a significant positive association between duration of hospitalization and HDAS and DASS-42 subscales. Gender was found to have a significant association with hospital anxiety ($\beta = 0.80, P = 0.047$). The number of children and hospital depression was significantly associated in univariate analysis ($r = 0.159, P = 0.03$). By controlling the effect of age, sex, marital status, level of education, income, and the duration of hospitalization, the association of the number of children and stress was significant ($\beta = 0.38, P = 0.02$) (Tables 3 and 4).

5. Discussion
Survivors of critical illness may face various psychiatric disorders after hospitalization. However, few studies have investigated post-discharge psychological issues in COVID-19 patients. Here, we reported the prevalence of depression, anxiety, and stress in COVID-19 patients after their discharge.

Based on the clinical cut off point of 11 for anxiety and depression subscales of the HADS questionnaire, we found that 43.1 and 12.8% of participants experienced anxiety and depression after their hospitalization period, respectively. Also, the level of abnormal anxiety in discharged patients was 81 (43.1%), while this frequency for depression was 24 (12.8%).

As illustrated in Table 2, according to the results of the HADS questionnaire, the frequency of patients in the borderline of anxiety and depression was 42 (22.3%) and 84 (44.7%), respectively. Also, the level of abnormal anxiety in discharged patients was 81 (43.1%), while this frequency for depression was 24 (12.8%).

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Table 3. Ordinal Regression of Factors Affecting Hospital Anxiety or Depression in COVID-19 Survivors

| Variables                  | Hospital Anxiety | Hospital Depression |
|----------------------------|------------------|---------------------|
|                            | Estimate         | P-Value             | 95% CI LB | 95% CI UB | Estimate | P-Value | 95% CI LB | 95% CI UB |
| Age                        | -0.008           | 0.75                | -0.06     | 0.04      | -0.009   | 0.74     | -0.06     | 0.04      |
| Number of children         | 0.31             | 0.53                | -0.22     | 0.44      | 0.28     | 0.31     | -0.06     | 0.62      |
| Days of hospitalization    | 0.37             | 0.007               | 0.09      | 0.64      | 0.32     | 0.007    | 0.08      | 0.54      |
| Sex                        | Male             | 0.80                | 0.047     | 0.01      | 1.60     | 0.12     | 0.76      | -0.69     | 0.94      |
|                            | Female           | 0                  | -         | -         | 0        | -       | -         | -         |
| Marital status             | Married          | -0.23               | 0.62      | -1.14     | 0.68     | 0.41     | 0.39      | -0.52     | 1.35      |
|                            | Single           | -0.30               | 0.79      | -2.50     | 1.91     | -0.07    | 0.95      | -2.47     | 2.33      |
|                            | Divorced         | -0.34               | 0.58      | -3.57     | 0.38     | -0.71    | 0.29      | -2.01     | 0.60      |
|                            | Widow(ier)       | 0                  | -         | -         | 0        | -       | -         | -         |
| Studies                    | Illiterate       | 0.12                | 0.91      | -1.90     | 2.14     | -0.66    | 0.54      | -2.77     | 1.46      |
|                            | Second school    | 0.50                | 0.57      | -2.24     | 2.24     | -0.05    | 0.96      | -1.88     | 1.78      |
|                            | Highschool diploma | 0.69             | 0.41      | -0.94     | 2.31     | -0.09    | 0.92      | -1.82     | 1.63      |
|                            | Associate’s degree | 0.37             | 0.68      | -1.41     | 2.14     | 0.20     | 0.83      | -1.68     | 2.09      |
|                            | Undergraduate    | 0.69                | 0.35      | -0.77     | 2.16     | 0.10     | 0.89      | -1.47     | 1.68      |
|                            | Postgraduate     | 0                  | -         | -         | 0        | -       | -         | -         |
| Monthly Income ($)         | 0                | 0.56                | 0.52      | -1.13     | 2.25     | 0.24     | 0.79      | -1.53     | 2.00      |
|                            | < 70             | 0.29                | 0.71      | -1.27     | 1.86     | 0.86     | 0.30      | -0.78     | 2.50      |
|                            | 70 - 200         | 0.49                | 0.51      | -1.00     | 1.99     | 0.02     | 0.98      | -1.55     | 1.59      |
|                            | 200 - 350        | 0.004               | 0.99      | -1.62     | 1.89     | -0.90    | 0.31      | -2.64     | 0.84      |
|                            | More than 350    | 0                  | -         | -         | 0        | -       | -         | -         |
| Smoking                    | No               | 0.54                | 0.13      | -0.17     | 1.26     | 0.36     | 0.34      | -0.38     | 1.09      |
|                            | Yes              | 0                  | -         | -         | 0        | -       | -         | -         |
| Family history of COVID-19 | No               | 0.31                | 0.38      | -0.38     | 1.01     | 0.33     | 0.36      | -0.39     | 1.06      |
|                            | Yes              | 0                  | -         | -         | 0        | -       | -         | -         |

Abbreviations: LB, lower bound; UB, upper bound.  
* This parameter is reference.

However, the proportion of patients who experience anxiety was relatively high in our study. A high rate of anxiety was expected since the study was conducted in the period COVID-19 was newly emerged in Iran, making the country one of the most endemic regions in the world. This situation, along with the unknown disease progress and the lack of sufficient treatment in the early phases of the COVID-19 epidemic raised the fear of survival among patients. Anxiety and psychoticism were indicated as the two major mental health problems in COVID-19 survivors (19). A similar prevalence of anxiety and depression was reported among the survivors of SARS and Middle East respiratory syndrome (MERS) epidemics (20, 21). Conversely, Wu et al. (18) observed a lower level of anxiety (13.5%) among COVID-19 survivors compared to our study. Also, several studies reported the anxiety range as 10 - 18% among discharged patients with SARS infection (17, 22). The discrepancy between our study and these investigations may result from different sociodemographic backgrounds between the study populations, follow-up intervals, and tools for evaluating anxiety.

Various factors, including post-discharge respiratory symptoms, gender, and concerns about recurrence and disease transmission to others, have been described as the determinant of adverse psychological events during the recovery period of COVID-19 patients (18). We found that
Table 4. Ordinal Regression of Factors Affecting DASS-42 Scores in COVID-19 Survivors (Link = Logit)\(^a\)

| Variables                  | Depression | Anxiety | Stress |
|----------------------------|------------|---------|--------|
|                            | Estimate  | P-Value | 95% CI | Estimate  | P-Value | 95% CI | Estimate  | P-Value | 95% CI |
| Age                        | -0.02     | 0.47    | -0.07 | 0.03 | -0.01 | 0.64 | -0.06 | 0.04 | -0.04 | 0.05 |
| Number of children         | 0.36      | 0.06    | -0.06 | 0.02 | 0.05 | 0.35 | -0.07 | 0.07 | 0.38 | 0.02 |
| Hospitalization days       | 0.33      | 0.003   | 0.31 | 0.55 | 0.27 | 0.02 | 0.03 | 0.51 | 0.39 | 0.001 |
| Sex                        | Male      | -0.10   | -0.45 | 1.06 | 0.07 | 0.66 | -0.70 | 0.84 | 0.22 | 0.58 |
|                            | Female    | -0.01   | 0.64  | 0.04 | 0.04 | 0.15 | 0.05 | 0.75 | 0.07 | 0.04 |
| Marital status             | Married   | -0.04   | 0.34 | -1.53 | 0.22 | -0.76 | 0.40 | -1.68 | 0.35 | -0.96 |
|                            | Single    | -0.36   | 0.74  | -2.45 | 1.78 | -0.04 | 0.94 | -2.27 | 2.06 | 0.008 |
|                            | Divorced  | -0.01   | 0.97  | -1.19 | 1.14 | -0.82 | 0.88 | -2.03 | 1.98 | 0.38 |
|                            | Widow/er  | 0.00    | 0.00  | 0.00 | 0.00 |
| Studies                    | Illiterate| 0.20    | 0.04  | -1.74 | 2.13 | -0.06 | 0.72 | -1.61 | 2.15 | 1.09 |
|                            | Sec. school| 0.65  | 0.04  | -1.01 | 2.32 | 0.07 | 0.35 | -1.03 | 2.06 | 0.72 |
|                            | High-school diploma | 0.90 | 0.25  | -0.65 | 2.44 | 0.82 | 0.31 | -0.75 | 2.09 | 1.89 |
|                            | Associate's degree | 0.61 | 0.40  | -1.09 | 2.29 | 0.41 | 0.64 | -1.31 | 2.13 | 0.72 |
|                            | Under-graduate | 0.51 | 0.20  | -0.49 | 2.00 | 0.86 | 0.39 | -0.46 | 2.10 | 1.25 |
|                            | Post-graduate | 0.00 | 0.00  | 0.00 | 0.00 |
| Monthly income ($)         | 0         | 0.28    | 0.73  | -1.94 | 1.81 | -0.42 | 0.62 | -2.08 | 1.24 | -0.04 |
|                            | < 70      | 0.54    | 0.40  | -0.96 | 2.04 | 0.00 | 0.42 | -1.35 | 1.71 | 0.46 |
|                            | 70 - 200  | 0.56    | 0.49  | -0.93 | 1.93 | 0.06 | 0.40 | -1.40 | 1.32 | 0.53 |
|                            | > 200     | 0.05    | 0.95  | -1.39 | 1.09 | -0.40 | 0.81 | -1.98 | 1.06 | 0.09 |
|                            | More than | 0.00    | 0.00  | 0.00 | 0.00 |
| Smoking                    | No        | 0.42    | 0.23  | -0.26 | 1.09 | 0.35 | 0.33 | -0.34 | 1.04 | 0.70 |
|                            | Yes       | 0.00    | 0.00  | 0.00 | 0.00 |
| Family history of COVID-19 | No        | 0.55    | 0.01  | -0.02 | 1.22 | 0.27 | 0.43 | -0.41 | 0.95 | 0.67 |
|                            | Yes       | 0.00    | 0.00  | 0.00 | 0.00 |

| Abbreviations: LB, lower bound; UB, upper bound. | Application: reference. | \(a\) This parameter is reference. |

longer hospitalization is independently associated with higher stress, anxiety, and depression. The association of psychological outcome with length of hospital stay has been described in numerous studies (23, 24). However, this factor is not mentioned as a risk factor for psychological problems in COVID-19 survivors.

The current study found that people having more children had higher post-discharge stress. Arguably, this may be resulted from the parents’ concerns about disease transmission to their children and what might happen to them should they fall ill. In this regard, Lauri Korajlija et al. (25) showed that parents, especially mothers, are at a greater risk of amplified concerns during the COVID-19 pandemic. The same results were obtained by studies during the swine flu epidemic, where parental status was recognized as a risk factor for anxiety and fear (26, 27).

This study had some potential limitations. First, we did not consider the effect of recurrence, reinfection, or the residual symptoms of the disease in the patients. Previous studies showed that recurrence is a significant determinant of decreased mental status. Second, the use of HADS to evaluate anxiety and depression is debated in the literature. Coyne et al. (28) showed that the HADS is unable to differentiate anxiety and depression. However, various
studies applied HADS as a reliable and valid instrument. Besides, our findings were consistent with HADS when using an alternative tool (DASS-21). Finally, it should be mentioned that no operational definitions of being ‘smoker’, ‘ex-smoker’, and having a ‘history of smoking’ were provided to the participants in our demographic questionnaire because we supposed that technical detailed definitions might result in confusion in a self-administered online questionnaire for subjects with different educational levels; this might have caused some inaccuracy in smoking data.

5.1. Conclusion

We found relatively high rates of anxiety (43.1%), severe stress (32.4%), and depression (12.8%) among COVID-19 survivors. Length of hospital stay, number of children, and gender were associated with adverse psychological outcomes, including anxiety, depression, and stress. Our results also suggested that COVID-19 patients commonly experience some degree of anxiety and stress.

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Footnotes

Authors’ Contribution: Study concept and design, Z.S., and H.M.A; Analysis and interpretation of data, S.H.K; Drafting of the manuscript, R.N. and R.O.; Critical revision of the manuscript for important intellectual content, N.S., F.M., and Z.S.; Statistical analysis, S. H. K; Collected the clinical data A.K. and A. S.

Conflict of Interests: The authors declare they have no actual or potential competing financial interests.

Ethical Approval: The study protocol was approved by the Research Ethics Committee of Mashhad University of Medical Sciences (code: IR.MUMS.REC.1399.200).

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Informed Consent: All participants signed written informed consent, and they were assured that their information would remain confidential.

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