An investigation of hospital anxiety and depression and associated factors in COVID-19 patients

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Abstract

Context: The high incidence of anxiety and depression in patients with corona can be associated with serious complications in recovery and increased mortality.

Aim: This study was performed with the aim of determining the anxiety and depression of patients with corona and related factors.

Setting and Design: This study was conducted in general and special wards (coronary care unit) in Iran (Imam Khomeini and Bu Ali Sina in Sari and Razi hospitals in Ghaemshahr) in 2020.

Materials and Methods: Patients were selected by accessible sampling. The Hospital Anxiety and Depression Scale was used to assess anxiety and depression.

Statistical Analysis Used: This descriptive-analytical study was performed on 150 patients with Covid-19 admitted. Data were analyzed using SPSS software version 21, descriptive statistics and inferential statistics such as t-test, Chi-square, Fisher, Pearson correlation coefficient, and multiple linear regression test.

Results: The mean score of patients' anxiety was 6.83 ± 5.16, and the mean score of depression was 7.09 ± 4.37. According to the multiple linear regression test, depression with standard β (ß =0.53) and with standard β (ß =0.21) explore 42% of variance of anxiety. Anxiety (β =0.56), temperature (β =0.2), anorexia (β =0.18), and respiratory rate (β =0.12) explore 45% of variance of depression, respectively.

Conclusion: The results of this study indicated a high prevalence of anxiety and depression in hospitalized patients with corona disease. Therefore, further study of related factors and planning appropriate interventions according to the results of the study is recommended.

Keywords: 2019 Coronavirus disease, Corona, Hospital anxiety and depression

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INTRODUCTION

The 2019 coronavirus disease (COVID-19) is one of the severe acute respiratory infections reported for the first time on December 31, 2019 in Wuhan, the capital of Hubei Province in China. The pathogenic agent of the disease belongs to a large family of beta-coronaviruses whose transmission routes are animal reservoirs. There is a need for further research on the detection of preventive strategies and clinical manifestations.[1] The incubation period (the time elapsed between infection and appearance of the first symptoms of disease) is currently estimated to be between 2 and 11 days and can be as long as 14 days.[2] Some patients may experience fever, fatigue, dry cough, sore throat, pain and discomfort, nasal congestion, rhinorrhea, or diarrhea. These symptoms are usually mild with a gradual onset. However; some patients may also be asymptomatic. Numerous physicians from all over Iran reported the prevalence of shiver (even shaking shivering), anosmia at the onset of the disease, and extreme fatigue/bruising.[3] One in six patients with COVID-19 is seriously suffering from respiratory problems.[4] Two groups of people are at risk for COVID-19: those with underlying diseases (such as diabetes and cardiovascular disease) and those with immunodeficiency (such as chemotherapy and organ transplantation). On August 13, 2020, the World Health Organization (WHO) announced the involvement of 216 countries with coronavirus.[2] Anxiety in a COVID-19 patient can occur due to a variety of factors such as respiratory problems, go to medical centers to visit a doctor, definitive diagnosis of COVID-19, hospitalization in general ward or intensive care unit, and published statistics of deaths due to this disease by the Ministry of Health and Medical Education and WHO.[4]

Anxiety and depression are the most prevalent psychological disorders. Hence, it is clinically important to understand the parameters affecting the development of such symptoms.[5] Anxiety is a reaction in the face of ambiguous danger with internal and unknown causes and possesses an unconscious and uncontrollable origin, in which many factors are involved.[6] Anxiety is the most common psychological reaction in response to novel changes and experiences. It indicates an imminent danger that forces the individual to take the necessary measures to control or reduce the resulting complications.[7] Depression is a mood disorder manifested with symptoms such as low mood, loss of interest or pleasure, weight loss, insomnia, tiredness, emptiness, feelings of guilt, difficulty concentrating, and thoughts of death.[8] Depression can develop following infectious disease, isolation, and strict caution in hospital settings. Psychological distress, along with anxiety and depression, will have a negative impact on patients' quality of life and prognosis. Health-care providers not only should treat physical illnesses but also must pay attention to treating patients' depression and anxiety.[9] Knowing the level of anxiety and depression in COVID-19 patients will help the medical team involved in the health care and treatment of these patients for short-term and long-term planning. There are several descriptive studies on the prevalence of hospital depression and anxiety in various patients. In a study in China, Lai *et al*. reported that anxiety and depression level among hospital staff (physicians and nurses) providing care for COVID-19 patients is equal to 44.6 and 50.4, respectively.[10] Ramezani *et al*. (2020) investigated the role of anxiety and cortisol levels in the outcomes of COVID-19 patients, the results of which revealed a significant correlation ($P = 0.004$ and $r = 0.842$) between anxiety and cortisol levels.[11] Yohannes *et al*. reported 36% and 40% anxiety and depression levels, respectively, in chronic obstructive pulmonary disease (COPD) patients with respiratory problems.[12] Ghaleeha *et al*. (2009) estimated the incidence of depression and anxiety in hospitalized patients with acute coronary syndrome as 66.6% and 47.5%, respectively.[13] Since the symptoms such as anxiety, depression, fear, and sleep problems are the most prevalent problems during the COVID-19 epidemic,[14] and because there are limited studies on hospital anxiety and depression and related factors in COVID-19 patients, the present study aimed to investigate and correlation between hospital depression and anxiety and associated factors in COVID-19 patients hospitalized in Iran (Sari and Ghaemshahr) to design and implement appropriate preventive health care, medical treatment, and support measures based on the attained results.

MATERIALS AND METHODS

The present descriptive-analytical of correlation type study was conducted on 150 COVID-19 patients admitted to general wards and coronary care unit at referral hospitals of Imam Khomeini and Bu-Ali Sina in Sari and Razi Hospital in Ghaemshahr for 3 months during April to June 2020. The statistical population of the study included all COVID-19 patients admitted to the mentioned medical centers in the considered time interval. This research was approved by the Research Ethics Committee of Mazandaran University of Medical Sciences, Iran (IR.MAZUMS. REC.1399.7544). The sample size was calculated according to previous studies using the formula for determining sample size. Considering the mean (standard deviation), Anxiety and Depression subscales reported by Moradian *et al*. in a study entitled "Hospital Anxiety and Depression

in Patients with Coronary Artery Disease," 7.23 (2.6) and 6.74 (2.6), respectively,[15] the sample size of the present study was estimated at 150 patients who were selected by accessible sampling method.

$N = z (1 - a/2)$ 2. $S2/d2 = (1/96)$ 2× (2/6) 2/(0/42) 2 = 150.

Inclusion criteria were hospitalization due to COVID-19 symptoms, age over 18 years, no mental illness under treatment (based on patient statements or patient medical records), consciousness and ability to communicate with researcher, passage of 24 h from the onset of infection, and willingness to participate in research. Ethical considerations in this study were willingness to participate in research, free withdrawal without restriction at any time, explanation of research objectives and methodology, and confidentiality of information.

Demographic information of the patient including age, sex, marital status, level of education, occupation, economic status, number of hospitalization, head of the family, number of family members, high-risk behavior, insurance coverage, location, symptoms at the time of admission and during hospitalization, infection other family members, underlying disease, and vital signs at the time of admission. The required data were collected using demographic profile and Hospital Anxiety and Depression Scale (HADS), as well as interviewing patients and extracting their medical records. HADS, designed by Zigmond and Snaith in 1983, is a 14-item self-report tool for determining the presence and severity of anxiety and depression symptoms in patients,[16] including 7 questions on anxiety and 7 questions on depression; each question is rated on a 4-point Likert scale and scored between 0 and 3, with the maximum score of 21 points in each subscale.[17] A score of 0–7 indicates healthy status (asymptomatic), 8–10 means mild anxiety or depression, and 11–21 shows severe anxiety or depression (clinical symptoms) for both subscales.[18] Totally, out of 21 points earned, a score higher than 8 in each section is considered as the presence of anxiety and depression.[19] Kaviani has nationalized the validity and reliability of the HADS for use in the clinical population by conducting a study among depressed and anxious individuals compared with a healthy population. In the aforementioned study, the scale validity was reported with Cronbach's alpha coefficient of 0.7 and 0.85 in the depression and anxiety subscales, respectively, and its reliability was confirmed using the test–retest method in the depression ($P < 0.001$, $r = 0.77$) and in the anxiety ($P < 0.001$ and $r = 0.81$) subscales, respectively.[17] Cronbach's alpha coefficient of this instrument in the present study was 0.85 and 0.79 for the anxiety and depression subscales, respectively, and 0.87 for the whole scale.

Data were analyzed by SPSS version 21 software (SPSS 21 version, Chicago, IL, USA) using descriptive statistics (mean and standard deviation) and inferential statistics (*t*-test, Chi-square, Fisher, Pearson correlation coefficient, and multiple linear regression test) at a significance level of $P < 0.05$.

RESULTS

This study consisted of 150 participants in the age range of 18–83 years with a mean age of 49.32 ± 14.65 years, including 58.7% female and 41.3% male. The mean score of anxiety was 6.83 ± 5.16 and the mean score of depression was 7.09 ± 4.37, which are at a severe level due to the range above 11. The mean total score of anxiety and depression was 13.93 ± 8.58. The most prevalent clinical symptoms were dyspnea (53.3%), fever (46%), cough (45.4%), shiver (37.3%), myalgia (32.7%), weakness and lethargy (29.3%), nausea (22%), and headache (22%), respectively. The least common clinical symptoms included anorexia (17.3%), chest pain (11.3%), abdominal pain (11.3%), sore throat (8.7%), diarrhea (8%), vomiting (8.7%), palpitations (4%), hemoptysis (3.3%), loss of smell (3.3%), constipation (2.7%), kidney problems (1.3%), and seizure (1.3%), respectively. The highest frequency for underlying diseases was related to obesity (46.7%), diabetes (30.7%), hypertension (30.7%), cardiovascular disease (20.7%), hyperlipidemia (12.7%) immunodeficiency (8.7%), lung disease (8%), anemia (8%), cancer (8%), kidney failure (6.7%), hypothyroidism (5.3%), multiple sclerosis (2.7%), corticosteroid therapy (2%), and organ transplantation (2%), respectively.

Pearson correlation test was performed to examine the correlation between quantitative variables (including age, number of family members, duration of hospitalization, body mass index, arterial oxygen saturation, heart rate, respiration rate, and temperature) and the total score of anxiety and depression, the results of which showed a significant correlation with the total score of anxiety and depression ($P = 0.0001$, $r = 0.91$) and with the depression score ($P = 0.0001$, $r = 0.61$).

Among the qualitative variables, Chi-square test revealed a significant correlation between anxiety level and clinical symptoms of weakness and lethargy ($P = 0.001$, $\chi^2 = 15.42$) and history of hypertension ($P = 0.004$, $\chi^2 = 13.33$), history of lung disease ($P = 0.043$, $\chi^2 = 17.36$) and history of HLP ($P = 0.008$, $\chi^2 = 11.92$). There was no significant

correlation between quantitative variables and anxiety level ($P > 0.05$). *T*-test statistics indicated a significant difference in the anxiety level between the two gender, males with a mean level of 4.82 ± 4.93 and females with a mean level of 8.25 ± 4.87. So that the anxiety level in women was higher than in men ($P < 0.001$, $t = 4.22$) [Figure 1].

In the analysis of qualitative variables with Chi-square test, there was a significant correlation between the depression level and the clinical signs of weakness and lethargy ($P = 0.006$, $\chi^2 = 12.41$), anorexia ($P = 0.017$, $\chi^2 = 10.17$), and underlying heart disease ($P = 0.002$, $\chi^2 = 21.44$). In the study of the correlation between quantitative variables and depression score, the depression score had a significant correlation with total anxiety and depression score ($P = 0.0001$, $r = 0.88$), respiration rate ($P = 0.032$, $r = -0.17$), and temperature ($P = 0.014$ and $r = 0.19$). There was no significant correlation between other qualitative and quantitative variables with depression score ($P > 0.05$). Previously, Kolmogorov–Smirnov test examined the normality of the data including anxiety and depression and found that the data had a normal distribution with $P > 0.05$.

Enter method of multiple linear regression was performed to investigate the correlation between anxiety and the variables of weakness and lethargy, history of hypertension, history of hyperlipidemia, history of lung disease, gender, and depression ($R^2 = 0.42$). As seen in Table 1, the model is fit ($P < 0.001$ and $F = 19.44$). It was indicated that depression and gender explain 42% of the variance changes in anxiety.
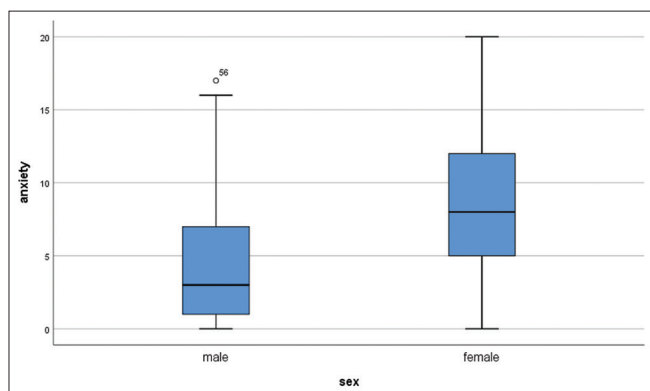
Figure 1: Comparison of anxiety in men and women

Table 1: Determine the appropriateness of the statistical model (anxiety)

ANOVA[a]					
Model 1	Sum of squares	df	Mean square	*F*	Significance
Regression	1787.586	6	297.931	19.443	0.001[b]
Residual	2191.247	143	15.323		
Total	3978.833	149			

[a]Dependent variable: Anxiety

On the other hand, among the mentioned variables, the depression with standardized regression coefficient beta of 0.53 (ß =0.53) explains a higher level of anxiety than gender (ß =0.21) and ($P < 0.05$). The correlation of other variables was not statistically significant [Table 2].

$$Y = 2.65 + 0.53 \text{ depression} + 0.21 \text{ gender}.$$

Enter method of multiple linear regression was tested to evaluate the correlation between depression and the variables of temperature, respiration rate, weakness and lethargy, anorexia, history of cardiovascular disease, and total anxiety and depression score. Table 3 shows that the model is fit ($P < 0.001$ and $F = 19.03$). Tables 2 and 4 show that the model is suitable.

According to $R^2 = 0.45$ and $P < 0.001$, the following variables explain 45% of the variance changes in depression. On the other hand, among the above variables, anxiety ($\beta = 0.56$), temperature ($\beta = 0.2$), anorexia ($\beta = 0.18$), and respiration rate ($\beta = 0.12$), respectively, explain higher level of depression according to ß value and $P < 0.05$ [Table 4].

$$Y = 55.25 + 0.56 \text{ anxiety} + 0.12 \text{ res. rate} + 0.2 \text{ temp.} + 0.18 \text{ anorexia}.$$

DISCUSSION

The purpose of this study was to investigate the correlation of hospital anxiety and depression with related factors in COVID-19 patients. The results of which demonstrated that the prevalence of COVID-19 causes cognitive problems such as anxiety and depression. There is ample evidence that the spread of communicable diseases and the associated quarantine can have devastating psychological effects. During the infection outbreak and its socioeconomic consequences such as the closure of businesses and educational institutions, many issues arise in the community that can lead to feelings of tension and anxiety.[20] The COVID-19 outbreak in Iran has endangered the physical and mental health of people, increased the fear of possible death due to viral infections, and led to psychological stress.[21] According to the available databases, no study has been published about hospital anxiety and depression and its associated factors in COVID-19 patients. However, hospital anxiety and depression were assessed in some other patients, which will be analyzed below. Consistent with the present study, similar results have been separately reported by Ghaleeha *et al*.[13] and Bairaghi *et al*.[22] on depression and anxiety among hospitalized cardiac patients. The same result was obtained in a

Table 2: Analysis of correlation between anxiety and some variables using multiple linear regression with enter method test

	Unstandardized coefficients				
Variables	*B*	SE	Standardized regression coefficient beta	*t*	Significance level
Constant value	2.655	0.774		3.432	0.001
Depression	0.636	0.079	0.538	8.086	0.001
History of hypertension	−0.224	0.764	−0.020	−0.293	0.770
Weakness and lethargy	1.361	0.740	0.120	1.839	0.068
History of lung disease	0.658	0.566	0.075	1.164	0.246
History of hyperlipidemia	1.337	1.027	0.086	1.303	0.195
Gender	−2.253	0.682	−0.215	−3.302	0.001

SE: Standard error

Table 3: Determine the appropriateness of the statistical model (depression)

	ANOVA^a				
Model 1	Sum of squares	df	Mean square	*F*	Significance
Regression	1377.918	7	196.845	19.031	0.001^b
Residual	1468.775	142	10.343		
Total	2846.693	149			

^{a}Dependent variable: Depression

study entitled "Levels of Anxiety and Depression in Hospitalized COPD patients,"[12] while inconsistent findings were reported by Farrokhnejad *et al*.[23] who examined hospital anxiety and depression in elderly with chronic heart failure, which can be attributed to the nature of the disease because cardiovascular disease is a chronic condition and that the patient would feel less risk of death due to getting used to the disease. However, the patients in the present study were faced with an acute illness that is still unknown and has no definitive cure and that the fear of death and lack of known treatment could be a reason for the increase in anxiety and depression level.

Regression analysis results demonstrated that depression and gender accounted for 42% of the variance changes in anxiety, and the mean anxiety level in female participants was higher than in men. This finding is consistent with studies by Zhang *et al*.[24] and Krammer *et al*.,[25] who both examined COVID-19 anxiety-related psychological disorders in hospital staff, and a study by Haug *et al*.[26] who evaluated anxiety and depression in the general population. No difference was reported in another study on anxiety and depression in hospitalized patients with rheumatoid arthritis.[27] This difference may be due to the fact that women are more affected during epidemics[28] and are exposed to stress due to a lack of financial and emotional support and their great responsibilities in caring for children, leading to an increased risk of mental disorders such as anxiety and depression in women compared with men.[29] In contrast, men have higher social support from those around (spouse and children), which reduces their anxiety.[30-32] On the other hand, the anxiety is a major feature of critical situations,[33] which can be exacerbated by

fear of death, fear of financial issues, and unemployment as causes of anxiety.[34] The higher level of anxiety in women in the present study seems to be justifiable given the critical situation given that 43% of women were housekeepers.

In this study, the correlation between anxiety and depression was significant, meaning that increasing the severity of depression elevates the simultaneous risk of anxiety, which in turn can lead to more physical and mental problems in COVID-19 patients if left untreated, consistent with studies by Kawachi *et al*.,[35] Moradian *et al*.,[15] and Ghaleeha *et al*.[13] on depression and anxiety among heart patients.

In the present study, the variables such as anxiety, temperature, respiration rate, and anorexia could explain 45% of the variance changes in depression; no consistent study was found in this field. Wang *et al*. examined immediate psychological responses and related factors in the general population during the initial phase of the COVID-19 outbreak. In this study, the physical symptoms of myalgia, dizziness, coryza, cough, respiratory distress, and sore throat were significantly associated with high levels of anxiety and depression.[36] Özdin and Bayrak Özdin[37] also conducted a study to assess the level of depression, anxiety, and health anxiety and related effective factors in the community during the COVID-19 epidemic. According to their research, which was conducted by online HADS and HAI scales, gender (female) and history of mental illness were correlated with anxiety; and gender, underlying illness, and history of mental illness with health anxiety, as well as residence (suburbs) with depression and anxiety. The discrepancy among the studies of Wang *et al*. and Özdin and Bayrak Özdin with the present study may be due to differences in the study population, as these studies were performed on the general public while the present study on hospitalized patients. On the other hand, apart from the mentioned cases, different cutoff points, type of disease, sampling method, and type of evaluation tools are also important for measuring the level of anxiety and depression, which can report different results. The important point of the aforementioned studies is the correlation of clinical

Table 4: Analysis of correlation between depression and some variables using multiple linear regression test

Variables	Unstandardized coefficients		Standardized regression coefficient beta	t	Significance level
	B	SE			
Constant value	−55.251	18.785		−2.941	0.004
Weakness and lethargy	1.112	0.609	0.116	1.824	0.070
Gender	0.474	0.582	0.054	0.814	0.417
Anxiety	0.481	0.057	0.569	8.517	0.001
Temperature	1.641	0.502	0.200	3.268	0.001
Respiration rate	−0.154	0.074	−0.128	−2.072	0.040
Cardiovascular disease	0.463	0.512	0.055	0.905	0.367
Anorexia	2.136	0.705	0.186	3.030	0.003

SE: Standard error

symptoms with the severity of anxiety and depression, which can be considered to confirm the results of the present study.

CONCLUSION

Although there is a small number of psychological studies in Iran on the epidemiology of communicable diseases in general, and COVID-19 patients in particular, the major role of anxiety and depression and related factors in social crises can be considered and recruited to explain these results. Due to the prevalence of anxiety and depression in COVID-19 patients, appropriate prevention and screening measures should be performed in such patients. According to the results of the present study, since women are more prone to anxiety and depression, further support and education seem to be necessary in this group. In the present study, the correlation of anorexia, respiration rate, and temperature with depression suggests special attention to physical issues in addition to mental problems in educational planning to reduce depression so that reducing the physical problems can mitigate the mental health problems such as anxiety and depression in patients. Therefore, the priority in future psychiatric planning may depend on these. Investigating the effect of counseling and training by treatment staff on reducing hospital anxiety and depression in COVID-19 patients is a question that can be answered with future studies and reviews.

Limitations
Unfortunately, the clinical conditions of several patients suffering from COVID-19 admitted to the intensive care units were critical and they were unable to participate in the study.

This study was performed on patients with COVID-19 admitted to three teaching hospitals based on the cities of Sari and Ghaem Shahr, northern Iran, so the generalizability of the results to all patients affected with this pandemic should be done with caution.

Since the present study was a descriptive-correlational research, causal relationships could not be inferred.

Suggestions
Similar studies should be conducted, recruiting larger sample size as well as patients affected with other infectious diseases of the respiratory system all over Iran.

Conflicts of interest
There are no conflicts of interest.

Authors' contribution
Mrs M. Alishah and Babaei contributed with the study conception, data collection, and drafting the manuscript. M. Bagheri supervised the study design and helped with conducting this study. Alishah was the study advisor. All the authors critically evaluated the paper and provided the final draft.

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