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The Multi-Relationship Structure between Some Symptoms and Features Seen during the New Coronavirus 19 Infection and the Levels of Anxiety and Depression post-Covid

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ABSTRACT

The novel coronavirus (SARS-CoV-2 or COVID-19) epidemic and the measures taken to combat it have adversely affected the psychological health of societies and individuals. In this study, it was aimed to examine the multi-relationship structure between some symptoms, demographic characteristics during the infection period of individuals treated for COVID-19 infection and their anxiety/depression levels after discharge. One hundred individuals (n=100) who were treated with the diagnosis of COVID-19 participated in the study. Some symptoms and socio-demographic characteristics of the participants during the infection period were recorded and the Beck anxiety/depression scale was administered to the participants after discharge. Firstly, variables that create multicollinearity were removed from the data set via Explanatory Factor Analysis and the variable was reduced. Then, the independent principal components were determined and their attributes were found. The relationship structure between the features and the anxiety/depression levels of the patients was analyzed by reducing them to two dimensions via Multiple Correspondence Analysis. In this study, patients with chronic renal failure who received oxygen support during the infection process were positively associated with mild/moderate post-infection anxiety. Patients with chronic renal failure were found to have higher depression than those without. Patients with COPD who experienced loss of appetite and fever during the infection were positively associated with moderate to high levels of anxiety and moderate depression. In addition, these individuals received more oxygen support during the treatment process and the depression level of these individuals was higher than the other patients. Our study revealed the multi-relationships structure between some symptoms and features seen during COVID-19 infection and the levels of anxiety/depression post-COVID.
Keywords: COVID-19, beck anxiety and depression scales, multiple correspondence analysis, explanatory factor analysis

Introduction

Pandemics produce fear, one of the most primitive responses in humans on a psychological level. Fear is an emotion that allows us to react to a real or imagined event that we see as a threat on the physical as well as the psychological or socio-economic levels. In a sense, fear also ensures our survival. Like other emotions, fear activates three levels of response in our body: cognitive, physiological and motor (1).

Although fear is functional on its own as an emotion that we experience as unpleasant, it becomes dysfunctional when it dominates our lives. In some cases, we can't manage events by overreacting, while in other cases this feeling raises a state of alarm over something that could be our own system. With the realization, anticipation of adverse effects or the dramatization of the event we are exposed to, some situations can cause very high stress levels by exceeding our available resources. In such a situation, generalized anxiety disorder, panic disorder, agoraphobia, stress, post-traumatic stress disorder (PTSD), complex PTSD, long-term grief disorder may occur (1). In addition, in social disasters such as epidemics, the consequences of

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stress may be prolonged and result in depression or post-traumatic stress disorder (2, 3, 4).

Once a state of fear or distress persists, it may take time for high levels of anxiety and depression to go away. If we add other factors such as loss of health, friend environment, job position or quarantine, post-traumatic stress disorders may persist (1). The study of healthcare workers after the SARS epidemic reported that symptoms of post-traumatic stress and depression persisted for three more years after the crisis ended (5).

Similarly, it is expected that the treatment of COVID-19 and the measures taken may adversely affect the mental health of the communities. Also, persons afflicted with the disease, those at high risk of infection, people with medical, psychiatric or substance use disorder and especially healthcare workers are at high risk (6). The traumas experienced by high-risk groups in this epidemic not only affect the attention, understanding and decision-making capacity that can hinder the fight against COVID-19, but can also cause permanent damage to the general health of these individuals (7, 8).

Previous studies were generally related to psychiatric disorders, stress disorder and anxiety levels in healthcare workers during the epidemic (9-12). In this study, it was aimed to examine the multi-relationship structure between some symptoms, demographic characteristics during the infection period of individuals treated for COVID-19 infection and their anxiety/depression levels after discharge.

Material and Method

Participants Criteria, Study Design and Workflow: This cross-sectional quantitative study was conducted in the Republic of Türkiye Mengücek Gazi Training and Research Hospital between 25 September and 25 October, 2021. Individuals (n=100) who were hospitalized with the diagnosis of COVID-19 and then discharged participated in this study. Participants were selected by simple random sampling technique. In this sampling method, each population element has the same probability of entering the sample. Individuals younger than 18 years of age were not included in the study. Institutional ethics committee approved this study. The purpose of the study was explained to the participants and their written consent was obtained. The participants in this study were administered the Beck anxiety and depression scale on the day they were discharged. Thus, it was aimed to examine the relationship structure between the variables determined during the infection period and the anxiety and depression levels in this period of individuals. A questionnaire consisting of 21 questions was prepared about the socio-demographic characteristics of the participants during the infection process, and their knowledge of clinical and neurological symptoms. This information (predictive variables) was recorded through face to face interviews and from the hospital information system.

However, there may be high correlations between the predictors affecting the anxiety and depression level of individuals after infection. Also, the latent relationship structures may exist between the variables. In order that this situation would not adversely affect our results, we focused on a manageable subset of the data set by removing the principal components of the estimators with the exploratory factor analysis (EFA). After that the multiple concordance analysis (MCA) was run to understand the multi-correlation structure between the categories of variables in this subset obtained via EFA and the anxiety and depression levels of individuals.

Measurement: The anxiety and depression levels of all the individuals participating in this study were measured on the day they were discharged. Measurement results were reported as total score. The interpretation of the patient's Beck depression and anxiety scale scores is summarized in Table 1.

Output Measure: It is to determine the relationship structure between the clinical findings, neurological symptoms and socio-demographic characteristics of the participants during COVID-19 infection and their anxiety/depression levels in the post-treatment period.

Statistical Analysis: Quantitative data in this study were summarized as mean, standard deviation, median and quartiles, while Qualitative data were summarized as frequencies and percentages. The normality of the data set was checked with the Shapiro-wilk test and its homogeneity was checked with the Levene test. Man-whitney U test, which is one of the non-parametric methods, was used to compare the anxiety and depression levels that were not normally distributed. Power analysis was used to determine the sample size of this study. The internal reliability of the Beck anxiety and depression scale used in the study was evaluated with the Cronbach's α score. Firstly, the principal

Table 1. Anxiety and Depression Levels According to Beck Depression and Anxiety Scores

Beck depression score				Beck anxiety score			
0-9	10-16	17-29	30-63	0-7	8-15	16-25	26-63
no depression	mild depression	moderate depression	severe depression	no anxiety	mild anxiety	moderate anxiety	severe anxiety

Table 2. Comparison of Anxiety and Depression Levels According to Gender

	Female (N=43)			Male (N=57)			
	Mean	St. d.	Median (IQR)	Mean	St. d.	Median (IQR)	*P
Beck anxiety level	11.23	5.29	9.00 (7.00-13.00)	10.37	6.00	8.00 (6.00-12.00)	0.15
Beck depression level	12.84	4.70	5.00 (5.00-18.50)	11.63	4.15	6.00 (5.00-17.00)	0.45

*P<0.05 was considered significant; IQR: inter quartile range; St. d.: standard deviation

components were extracted by applying EFA to the data set and independent factors were found. By finding the characteristics of the factors, the variables with a latent relationship structure were determined and the number of variables was reduced. Then, the multi-relationship structure between the categories of the features determined as a result of the EFA and the levels of anxiety and depression was analyzed by reducing it to two dimensions with multiple correspondence analysis (MCA). Principal component analysis (varimax with Kaiser Normalization) was performed to test the validity of the sub-dimensions obtained via EFA. In the evaluation of the fit of the MCA model, the variance explanation ratios of the dimensions in the diagram were taken into account (13). P<0.05 was considered significant. Data were analyzed using the SPSS IBM (SPSS, Inc., Chicago, IL, version: 25, USA) package program.

Exploratory Factor Analysis (EFA): EFA Analysis is primarily used for data reduction or structure detection. The purpose of data reduction is to remove redundant (highly correlated) variables from the data file, perhaps replacing the entire data file with a smaller number of uncorrelated variables. The purpose of structure detection is to examine the underlying (or latent) relationships between the variables (14).

Multiple Correspondence Analysis (MCA): In cases where the number of categories in the variables is high, it becomes difficult to evaluate the cross tables. With MCA analysis, the relationship structure between categorical and continuous variables can be easily interpreted on a diagram by reducing the dimension. MCA quantifies nominal (categorical) data by assigning numerical values to the cases (objects) and categories so that objects within the same category are close together and objects in different categories are far apart. Each object is as close as possible to the category points of categories that apply to the object. In this way, the categories divide the objects into homogeneous subgroups (15, 16).

Results

The sample size of this study was determined as one hundred (n=100) individuals with a power of 75.6%. In this study, the Cronbach α score of Beck depression scale was 0.854 and Beck anxiety scale was 0.901. The power analysis result of the sample included in this study was 0.88. Of the participants 57% (n=57) represented men and 43% (n=43) women. When Table 2 was examined, although the anxiety and depression levels of women were slightly higher than that of men, no significant difference was observed between them (p>0.05). When the mean anxiety and depression levels of all patients were examined, it was found that they had mild levels.

The socio-demographic characteristics of the participants in this study and their neurological and clinical symptoms during the infection period (21 variables in total) are summarized in Table 3. The mean number of hospitalization days of the patients in this study was 9.8 ± 0.5 days and their mean age was 45.89 ± 16.58 years.

Prerequisites were met before applying the EFA to this data set. The Kaiser meyer olkin measurement result for sampling adequacy was 0.550 and the Bartlett's test of sphericity result was 0.000. After the prerequisites were met, EFA was run to understand the hidden relationship structures between the variables and to reduce the number of variables. By principal component extraction method, the 9 principal components were found summarizing 66.80% of this data set (Table 4). The percentage of variation explanation for each component is shown in Table 4. In

Table 3. The descriptive features of the participants' clinical, neurological and socio-demographic data and anxiety/depression levels

		Mean		St. d.	Median (IQR)			
Quantitative Variables								
NHD		9.80		5.05	9.00 (7.00-13.00)			
Age		45.89		16.58	47.00 (33.00-57.00)			
Qualitative Variables			N	Percent	Qualitative Variables		N	Percent
BMI	Weak		3	3.0%	Loss of appetite	There is no	94	94.0%
	Normal		30	30.0%		There is	6	6.0%
	Overweight		42	42.0%		Total	100	100.0%
	Obese		21	21.0%	Fever	There is no	75	75.0%
	Morbid Obese		4	4.0%		There is	25	25.0%
	Total		100	100.0%		Total	100	100.0%
Sex	Female		43	43.0%	Loss of smell	There is no	77	77.0%
	Male		57	57.0%		There is	23	23.0%
	Total		100	100.0%		Total	100	100.0%
Cigarette	Does not consume		76	76.0%	Taste loss	There is no	72	72.0%
	Consuming		24	24.0%		There is	28	28.0%
	Total		100	100.0%		Total	100	100.0%
Alcohol	Does not consume		93	93.0%	OSDTP	Received	75	75.0%
	Consuming		7	7.0%		Not received	25	25.0%
	Total		100	100.0%		Total	100	100.0%
Diabetes	There is no		78	78.0%	SDAD	There is no	92	92.0%
	There is		22	22.0%		There is	8	8.0%
	Total		100	100.0%		Total	100	100.0%
Hypertension	There is no		76	76.0%	Muscle pain	There is no	87	87.0%
	There is		24	24.0%		There is	13	13.0%
	Total		100	100.0%		Total	100	100.0%
Chronic kidney disease	There is no		96	96.0%	PS	There is no	28	28.0%
	There is		4	4.0%		There is	72	72.0%
	Total		100	100.0%		Total	100	100.0%
COPD	There is no		91	91.0%	Headache	There is no	57	57.0%
	There is		9	9.0%		There is	43	43.0%
	Total		100	100.0%		Total	100	100.0%
Asthma	There is no		97	97.0%	Cardiovascular Disease	There is no	96	96.0%
	There is		3	3.0%		There is	4	4.0%
	Total		100	100.0%		Total	100	100.0%

addition, components were rotated with Varimax Kaiser Normalization due to the assumption that some of the variability in the data could not be explained by the components (Table 4). When the Extraction Sums of Squared Loadings and the Rotation Sums of Squared Loadings are analyzed, it is understood that it would be more appropriate to use the rotated components matrix to determine the variables represented by the principal components (Table 4). When examining the rotated components matrix (Table 5), variables representing the principal components can be seen. Variables representing the principal components are indicated in bold.

Accordingly, the first principal component represented hypertension, the second principal component represented alcohol, the third principal component represented COPD, the

Table 4. Principal components obtained as a result of EFA

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.781	13.241	13.241	2.781	13.241	13.241	1.809	8.612	8.612
2	2.142	10.200	23.441	2.142	10.200	23.441	1.781	8.480	17.092
3	1.843	8.776	32.217	1.843	8.776	32.217	1.682	8.008	25.100
4	1.371	6.530	38.747	1.371	6.530	38.747	1.644	7.828	32.928
5	1.355	6.451	45.198	1.355	6.451	45.198	1.610	7.668	40.595
6	1.261	6.004	51.202	1.261	6.004	51.202	1.497	7.131	47.726
7	1.170	5.574	56.776	1.170	5.574	56.776	1.491	7.099	54.825
8	1.071	5.102	61.878	1.071	5.102	61.878	1.263	6.015	60.839
9	1.033	4.917	66.795	1.033	4.917	66.795	1.251	5.955	66.795

Table 5. Variables Represented Via Principal Components

Rotated Component Matrix	Component								
	1	2	3	4	5	6	7	8	9
NHD	.199	-.177	-.039	-.067	-.109	.605	-.199	.099	-.061
BMI	.585	-.104	.145	.048	-.156	.062	.294	.264	.263
Sex	-.342	.503	-.069	-.187	-.044	.240	.027	.472	-.204
Cigarette	.085	.810	.101	-.062	.024	-.111	-.019	.073	.089
Alcohol	.033	**.819**	.009	.058	-.068	-.038	-.057	-.066	-.062
Diabetes	.414	.093	.353	.098	-.048	.330	.330	-.193	-.320
Hypertension	**.856**	.087	.067	-.074	.084	.180	-.018	.010	.051
Chronic kidney disease	.113	.026	.034	.043	-.019	.110	-.119	-.064	**.843**
COPD	.080	-.109	**.793**	-.160	.008	-.023	.123	.154	.222
Cardiovascular disease	.395	.179	.201	-.100	.215	.319	-.261	-.032	-.335
PS	-.323	-.121	.083	.185	.617	.031	.120	-.160	.119
SDAD	.172	-.148	.099	.283	-.193	-.116	.607	.277	-.109
Loss of appetite	-.019	.004	-.026	-.127	.154	.053	**.772**	-.156	-.053
Fever	.103	.015	.025	-.015	.061	.095	-.039	**.801**	-.008
Loss of smell	-.074	-.045	-.030	**.823**	-.048	-.187	-.103	.126	-.025
Taste loss	.021	-.012	-.104	.716	.254	.104	.114	-.236	.110
Muscle pain	.146	.055	-.044	.152	**.719**	-.061	-.143	.161	-.134
Headache	.105	-.070	-.070	-.156	.615	-.419	.166	.009	.003
Asthma	.205	-.630	.258	.598	-.554	-.458	.178	.683	.226
OSDTP	.104	-.013	.099	-.042	-.087	**.718**	.234	.087	.202

NHD: Number of hospitalization days; BMI: Body mass index; COPD: Chronic obstructive pulmonary disease; PS: Presence of someone (who has COVID-19 infection in their immediate surroundings); SDAD: Sleep disturbance after discharge; OSDTP: Oxygen support during the treatment process; Bold texts show the variable with the highest representation of each principal component

fourth principal component represented loss of smell, the fifth principal component represented muscle pain, the sixth principal component represented OSDTP, the seventh principal component represented loss of appetite, the eighth principal component represented fever and the ninth principal component represented chronic kidney disease (Table 5). As a result of EFA, 22 variables in our data set were reduced to 9 variables as a result of

Table 6. Performance Result of MCA Diagram Models

Model Summary for Anxiety				Model Summary for Depression		
Dimension	Cronbach's Alpha	Variance Accounted For: Total (Eigenvalue)	Variance Accounted For: % of Variance	Cronbach's Alpha	Variance Accounted For: Total (Eigenvalue)	Variance Accounted For: % of Variance
1	.795	1.644	58.3	.745	2.006	52.6
2	.638	1.429	25.9	.680	1.814	25.0
Total		3.073	84.2		3.820	77.6

minimizing the hidden relationship structures between them. MCA analysis was used to determine the relationship structure between the nine variables obtained and the anxiety and depression levels of the individuals.

MCA analysis revealed 84.2% of the relationship between nine explanatory factors and anxiety level, and 77.6% of the relationship between these factors and depression level (Table 6). As a result of the MCA analysis, the relationship structure between the variables was reduced to two dimensions and summarized in Fig 1 and Fig 2.

The multi-relationship structure between the variables obtained as a result of EFA and the post-discharge anxiety levels of the patients was summarized by reducing them to two dimensions by MCA analysis (Fig 1). When Fig 1 is examined, it is seen that there is a high correlation between the taking oxygen support during the treatment process and the variables of chronic renal failure. In addition, individuals who received oxygen support during the treatment process were usually patients with chronic renal failure and mild/moderate anxiety was observed in these individuals. In addition, a high correlation was found between moderate and high anxiety levels and the variables of fever, loss of appetite and COPD. Accordingly, it can be said that moderate and the high levels of anxiety are observed in the individuals with COPD, loss of appetite, and fever during the infection period. Moreover, mild anxiety was observed in individuals with the muscle pain. It was also found that individuals who consumed alcohol experienced muscle pain and loss of smell and had mild anxiety.

The multi-relationship structure between the variables obtained as a result of EFA and the post-discharge depression levels of the patients was summarized by reducing them to two dimensions by MCA analysis (Fig 2). When Fig 2 was examined, moderate depression and loss of appetite, fever and COPD variables were found to be highly correlated. Patients with the high fever and loss of appetite during the infection period and those with COPD had higher depression levels and these individuals received more oxygen support during the treatment process. In addition, individuals with chronic kidney disease were associated with mild depression levels. Also, individuals with the chronic kidney disease generally had higher depression than those without. It was observed that those who consumed alcohol received less oxygen support during infection, but these individuals experienced muscle pain and loss of smell. However, there was no relationship between the alcohol consumption status and depression level.

Discussion

The emergence, prevalence and transmission of COVID-19 go beyond physical health. The problems such as the emotional distress, anxiety, fear, depression, anxiety, suicidal tendencies, stigma in society, discrimination, racism, post-traumatic symptoms and sleep disorders are some of the effects of the epidemic on psychological health (17).

Physical interventions such as early detection of suspected cases, biological/clinical data collection and specialist medical interventions in the management of COVID-19 have proven to be effective in combating the pandemic (18). However, this epidemic has had and will continue to have serious psychological effects on groups such as the healthcare workers and those who have recovered from the disease (19). Studies so far have generally investigated the level of anxiety and depression in the healthcare workers during the COVID-19 outbreak (20, 21).

In this study, the relationship structure between the socio-demographic characteristics, clinical/neurological findings during COVID-19 infection with the anxiety/depression levels in the post-illness period was examined (Table 3, Fig 1 and Fig 2). The findings of this study were obtained from individuals with an average age of 45 years. Therefore, the findings can be associated with adults. In this study, we focused on a subset of the dataset to identify structures that are latent

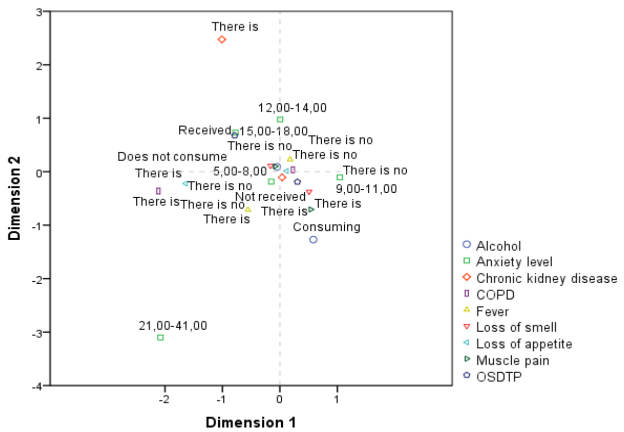

Fig 1. MCA result of the variables associated with anxiety level
COPD: Chronic obstructive pulmonary disease; OSDTP: Oxygen support during the treatment process

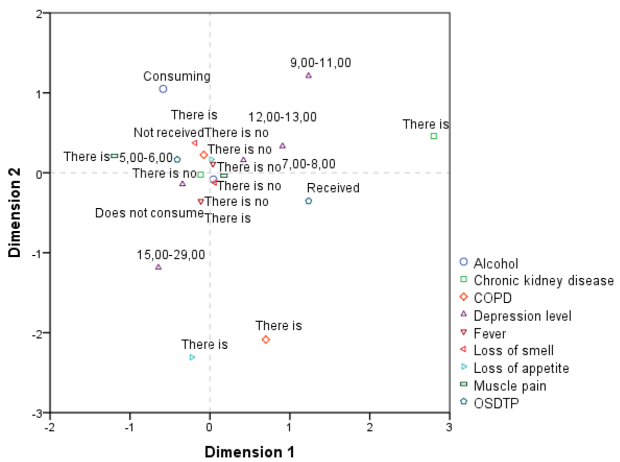

Fig 2. MCA result of the variables associated with depression level
COPD: Chronic obstructive pulmonary disease; OSDTP: Oxygen support during the treatment process

associated with the level of anxiety and depression. For this, the variables in the data set (Table 3) were reduced by EFA method and a subset of the data set was found (Table 5). The multi-relationship structure between the variables in the subset and the levels of anxiety and depression was summarized by reducing the size with the MCA method (Fig 1 and Fig 2).

In this study, significant correlations were found between the post-discharge anxiety and depression levels of COVID-19 patients and many symptoms and characteristics of these patients during the infection period (Fig 1 and Fig 2). As a result of the events experienced within the scope of physical therapy and precautions during the disease process, mild depression and anxiety as well as sleep disorders were observed in general (Table 2 and Table 3). This situation revealed the severity of emotional distress in patients during the epidemic. Similarly, one study reported hyper-conditions such as sleep difficulties, poor concentration, and movement disorders in sick individuals during the COVID-19 outbreak (1). In addition, it was stated that individuals with hyper-states may show dissociative symptoms while trying to avoid anxiety due to events such as epidemics (1).

In this study, a high correlation was found between taking oxygen support during the treatment process and the variables of chronic renal failure (Fig 1). In addition, individuals with chronic renal failure who received oxygen support during the treatment period had mild to moderate anxiety after infection (Fig 1). In addition, patients with chronic renal failure were highly associated with mild depression in this study (Fig 2). Individuals with chronic kidney disease were found to have higher depression than those without (Fig 2). Similarly, many studies have stated that acute heart and kidney failure and hypertension are common complications of COVID-19 and may be associated with the acute respiratory distress syndrome (22-24). In another study, it was reported that the anxiety and depression disorders and mood disorders are common in patients with the chronic kidney disease (25, 26). In another study, it was stated that although the mechanical ventilation is a life-saving treatment, it can cause physiological and psychological distressing experiences for patients (27). Similarly, one study reported a high prevalence of depression and poor outcomes of depression in patients with chronic renal failure and recommended integrating depression screening into the routine patient care (28). Another study confirmed that patients older than 60 years and those with chronic kidney disease are at higher risk of depression than younger patients (26).

In this study, a high correlation was observed between the moderate and severe anxiety/depression levels and the variables of fever, loss of appetite and COPD (Fig 1 and Fig 2). Moderate/severe anxiety was observed in the patients with COPD who experienced loss of appetite and fever during the infection period (Fig 1). In addition, mild anxiety was found in patients with muscle pain (Fig 1). In addition, individuals with COPD and who had anorexia and high fever during the infection period had higher depression levels and these individuals received more oxygen support than others (Fig 2). Similarly, a study of COVID-19 patients with chronic respiratory distress found that adults were more likely to the report physical symptoms such as runny or stuffy nose, chest congestion, fever, loss of appetite and chills (29). In addition, Wei et al. found that adults with COVID-19 who have COPD are more likely to experience physical and mental health symptoms than other patients (29). In another study, somatic symptoms such as abdominal discomfort, changes in the sense of taste or smell, fatigue, loss of energy, decreased appetite, sleep disturbance and difficulty concentrating suggestive of a depressive effect were reported in adult COVID-19 patients with asthma (30)

Other studies have reported that adults with COPD and asthma experience more anxiety (eg, generalized anxiety disorder, social phobia, and panic disorder) and depressive symptoms (eg, major depression and dysthymia) (31, 32). Similarly, it was stated in many studies that COPD and asthma patients carry a greater symptom burden, which may put them at higher risk for COVID-19 morbidity (31). Another study noted the importance of establishing strategies for screening and diagnosing anxiety and depression in individuals with the chronic renal failure, COPD and particularly the elderly (28). In addition, it was emphasized that it is necessary to determine whether the treatments are effective and safe in patient populations with these comorbidities and then to apply effective treatment algorithms (28). Similarly, in a study, it was recommended to apply a treatment that would prevent depression and anxiety in these patients and improve their quality of life (25). Similarly, another study reported the depressive symptoms such as stress, distress, fear and anxiety and the devastating psychosocial health problems such as sleep disorders, denial, anger, frustration and insecurity in the general population during the COVID-19 pandemic (33, 34). However, in one study, it was stated that more studies should be done to determine the relationship between COVID-19 and physical symptoms such as abdominal discomfort, skin rash, chills, fever, decreased appetite and headache, which can be seen in individuals with chronic respiratory distress (29).

While the impact of this pandemic on the global psychological health has yet to be documented and measured, the information from the previous research studies may provide an explanation and insight. In order to cope with the emergence of infectious diseases with a high mortality, early and timely psychiatric interventions should be made by mental health practitioners (10, 33). In addition, it is vital to emphasize the psychological health and well-being of the population (physical, economic, social, mental, emotional, psychological, spiritual, developmental and engaging activity, quality of life, life satisfaction, etc.) through proactive psychological methods. Indeed, one study indicated that people who lag behind in the social activities and who are socially isolated are more likely to be depressed. Similarly, in a study, it was stated that the psychological interventions and psycho-social support during the COVID-19 epidemic would improve the mental health of the community (18).

In addition, it was stated that psychological health problems arising due to the COVID-19 pandemic can turn into long-term health problems (6). It is recommended to use global health measures to cope with psycho-social stress factors such as isolation/quarantine, fear, anxiety, psychological distress, post-traumatic symptoms, stigma, xenophobia and vulnerability (6).

In this sense, the activities such as psychological crisis intervention (PCI) and psychological first aid (PFA) can provide the psycho-social support and reduce global discomfort via focusing on the psychological health of individuals affected by epidemics such as COVID-19. Indeed, one study reported the need to intervene in the stress-related responses with emergency management (PCI and PFA) in individuals recovering from the COVID-19 but emotionally overwhelmed (33). In a study on the ventilator-dependent patients, music therapy was applied as a non-pharmacological nursing intervention to facilitate relaxation and reduce the physiological symptoms of anxiety (27). Similarly, a moderate-intensity regular an exercise has been reported to have various benefits for the mental health as well as a physical health (35).

While the COVID-19 pandemic remains a public health emergency in Turkey, the findings from this study may inform clinical practice and improve knowledge on the management of mental health symptoms. In addition, this work can help develop targeted interventions to measure the mental distress of vulnerable populations in the COVID-19 and improve their physical and mental health.

However, a knowing that the prevalence of anxiety and depression is high in patients with the chronic renal failure and chronic respiratory distress is a serious concern. A serious and systemic routine screening for these disorders of these patients is required. In addition, more research is needed to understand the relationship between anxiety and depression and chronic kidney failure and chronic respiratory distress.

Limitation: The fact that this manuscript was a retrospective study limited our ability to examine the causal relationships between the independent variables and depression/anxiety levels in our dataset. Furthermore, we were unable to explain or interpret possible changes in anxiety levels that may have developed over time due to the cross-sectional design. Studies with longer follow-up periods are needed to determine the effects of clinical findings and neurological symptoms seen during COVID-19 infection on post-illness anxiety and depression levels.

Author contributions:

Huyut MT: conceived and designed the study; scanned the literature; determined and implemented the method; organized analyzed and interpreted data, wrote and revised the work. Soygüder S: collected material scanned the literature.

Competing interests: Authors state no conflict of interest.

Informed consent: Informed consent was obtained from all individuals included in this study.

Ethical approval: The study protocol was approved by the Institutional Ethics Review Board of Erzincan Binali Yıldırım University after being approved by the Ministry of Health of the Republic of Turkey in accordance with the Declaration of the Helsinki World Medical Association.

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