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Original Article

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Prevalence and Influencing Factors of Anxiety in Healthcare Professionals in Hemodialysis During the COVID-19 Pandemic

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ABSTRACT

Objective: During the COVID-19 pandemic, working in hemodialysis (HD) can be a source of anxiety. In this study, the anxiety status of HD healthcare professionals (HCPs) during the COVID-19 pandemic and the associated factors were investigated.
Materials and Methods: The data were collected through a web-based questionnaire. The questionnaire consisted of 3 parts: (1) demographic features, (2) questions about the causes and consequences of anxiety, and (3) general anxiety disorder-7 survey.
Results: One hundred eighty-three HCPs completed the survey, mostly nurses and dialysis technicians (71.6%). Two-thirds of the participants stated that preventive measures increase workload and cause physical harm (68.3%, 62.3%). One-third of participants reported a lack of communication with the patients and a decrease in desire to work (31.1%, 35.6%). A moderate-severe anxiety was detected in 24.6%. Physical contact with infected people, being physically harmed by preventive measures, decreased desire to work, and a lack of communication with the patients were found to be significantly more in participants with anxiety ($P = .036$, $P < .001$, $P < .001$, $P < .001$). In multivariate analyzes, being physically harmed by preventive measures was the only risk factor for anxiety (OR = 7.423, CI: 2.050-26.877, $P = .002$).
Conclusion: During the pandemic period, anxiety was observed in one-fourth of HCPs. Being physically harmed by preventive measures is the only risk factor for anxiety.
Keywords: Anxiety, healthcare professionals, COVID-19, preventive measures, physical damage

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INTRODUCTION

Coronary virus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2), emerged in Wuhan, China by the end of 2019 and then spread all over the world.[1] The World Health Organization (WHO) described COVID-19 as a pandemic in March 2020. The rapid spread of the disease from person to person and the inability to identify asymptomatic cases shows that the disease was quite complicated. Serious preventive measures have been implemented all over the world with the understanding of the severity of the disease.

In a recent study, high mortality rates (31%) have been reported in hemodialysis patients who have had COVID-19 infection.[2] Chronic kidney disease patients undergoing hemodialysis have to come together with both healthcare professionals (HCPs) and other hemodialysis patients at least 2-3 times a week as part of the treatment and this poses a serious risk for infection. A study from the United Kingdom reported that 19.6% of 1530 hemodialysis patients were infected with COVID-19 in a 6-week period.[3] Hemodialysis units are closed areas and all staff has an increased risk of COVID-19 infection. Therefore, a range of preventive

measures must be taken in all steps of HD treatment, including patient transport.[4-6]

Patient care and daily working routine become more complicated because of preventive measures and the use of personal protective equipment during the pandemic in HD centers. In addition, the fear of both getting sick and infecting others can increase the likelihood of developing psychological problems in healthcare workers. Studies conducted in the previous epidemic periods have shown that healthcare workers are exposed to negative psychological effects, such as anxiety and fear, and have a negative effect on patient care quality.[7-9] Anxiety and other psychological disorders were reported commonly in Turkey[10-12] and in various countries of the world[13-16] during the COVID-19 pandemic.

In this study, it is aimed to determine the state of anxiety and related factors in HCPs in HD centers during the COVID-19 pandemic.

MATERIALS AND METHODS

The study was planned cross-sectionally and voluntary HCPs were included in the study. The data were collected through a web-based questionnaire consisting of 29 questions.

Study Participants

The study was performed in 4 hemodialysis units (1 university hospital and 3 state hospital hemodialysis units). Doctors, nurses, dialysis technicians, cleaning staff, secretaries, and technicians/operators were included in the study. According to the level of contact with the patient, physicians, nurses, and dialysis technicians were evaluated in the "direct contact group," whereas cleaning staff, secretaries, and technicians/operators were evaluated in the 'non-direct contact group' in the analyses.

Materials

The questionnaire filled by the participants consisted of 3 parts: (1) Questions related to demographic features: age, gender, marital status, education level, number of children, work experience, etc. (2) Questions about the causes that can lead to anxiety during the pandemic period and the effects of anxiety on hemodialysis workers and their work: Have you had COVID infection? Has anyone had a COVID infection in your hemodialysis unit? Did increased hygiene practices and protective equipment increase your workload? Did hygiene practices and preventive measures physically damage you (skin damage due to frequent use of disinfectants (hand or face) and/or damage due to mask use (cheek, ear, or nose) or any damage due to protective prevention other than these)? Did you worry about transmitting COVID to your family? Did your communication with patients change during the pandemic? Was there any change in your desire to work in hemodialysis during the pandemic? When do you think the pandemic ends? (3) The last 7 questions of the study consisted of General Anxiety Disorder-7 (GAD-7) questionnaire. The Turkish version of this questionnaire was previously tested for reliability and consisted of 7 questions.[17] According to the answers given to the questionnaire, answers were scored between 0 and 3. As a result of the scoring, 0-4 points were evaluated as no anxiety, 5-9 points as mild anxiety, 10-14 points as moderate anxiety, and 15-21 points as severe anxiety. Participants were asked to give informed consent at the beginning of the study with a yes-no question confirming their willingness to participate in the study. The data were collected on June 12–15, 2020.

MAIN POINTS

- Approximately a quarter (24.6%) of HCPs in hemodialysis units had moderate-to-severe anxiety during the COVID-19 pandemic period.
- Their workload was increased and the majority experienced physical damage from preventive measures.
- Twenty-nine percent of the HCPs had a decrease in their desire to work in dialysis.
- Physical harmed by preventive measures was determined as the only independent variable associated with anxiety.

Ethical Considerations

Ethical approval was obtained from the local ethics committee. All study procedures were conducted in accordance with the Declaration of Helsinki. All participants were informed and their consent was obtained.

Statistical Analysis

The conformity of data to normal distribution was evaluated by Kolmogorov–Smirnov and Shapiro–Wilk tests. Descriptive data were given using median (minimum–maximum values) for non-normally distributed variables. Mann–Whitney *U* test was used to compare 2 independent groups. Categorical data were given as frequency (percent). A chi-square test was used to compare categorical data. Binary logistic regression analysis was performed for the factors related to anxiety. Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM SPSS Corp.; Armonk, NY, USA) was used for data analysis. The statistical significance level was accepted as $P < .05$.

RESULTS

One hundred eighty-three (median age 38 [20-55], 75.4% female) HCPs participated in the study and most of the participants (71.6%) were nurses and dialysis technicians. Two-thirds were university graduates, and in terms of work experience, those in the first 5 years (27.9%) and those working 20 years or more (24.6%) constituted half of the total participants. The socio-demographic characteristics of HCPs are shown in Table 1.

Participants' data specific to the COVID-19 period and their anxiety states are presented in Table 2. One hundred twenty-five HCPs (68.3%) stated that isolation and hygiene precautions increased their workloads, and 114 (62.3%) participants stated that preventive measures and hygiene practices physically

Table 1. Demographic Characteristics of Healthcare Professionals

		All Group ($n = 183$)
		Median (Minimum–Maximum)
Age (years)		38 (20-55)
Number of children		1 (0-5)
		n (%)
Sex (female)		138 (75.4)
Marital status (married)		129 (70.5)
Status/working position	Doctor	9 (4.9)
	Nurse	95 (51.9)
	Dialysis technician	36 (19.7)
	Secretary	8 (4.4)
	Cleaning personnel	30 (16.4)
	Technician/operator	5 (2.7)
Educational status	High School	65 (35.5)
	University	118 (64.5)
Work experience	0-5 years	51 (27.9)
	6-10 years	32 (17.5)
	11-15 years	32 (17.5)
	16-20 years	23 (12.6)
	>20 years	45 (24.6)

damaged them. Most of the participants (91.8%) were worried about transmitting the disease to their families or relatives.

Sixty-five (35.6%) HCPs answered that their desire to work in hemodialysis has decreased compared to the pre-pandemic period or they want to leave hemodialysis if possible. When asked whether their communication with patients changed, 57 (31.1%) of the participants stated that their communication with patients decreased during this period compared to the pre-pandemic period. One-third of the HCPs considered the patients' anxiety related to COVID-19 as "no anxiety, inadequate or exaggerated." It was seen that 27.3% of HCPs responded to the question "When do you think the pandemic will end?" as "It will never be taken under control."

In the GAD-7 test, 45 (24.6%) of HCPs had moderate or severe anxiety disorders (Table 2). The presence of moderate-to-severe anxiety was numerically higher in the direct contact group than the non-direct contact group, but no statistical difference was seen (25.9% vs. 20.4%, $P = .465$).

When HCPs were divided into 2 groups according to their anxiety level (low anxiety, no or mild anxiety – high anxiety, moderate or severe anxiety), no difference was seen between the 2 groups in terms of age, gender, marital status, educational level, and work experience. The presence of contact with people with COVID-19 infection (34% vs. 31.4%; $P = .036$) and the presence of COVID-19 patients in the hemodialysis unit (48.9% vs. 30.4%; $P = .024$) was significantly higher in the higher anxiety group. In the group with high anxiety, the presence of physically harmed by preventive measures (88.9% vs. 53.6%; $P < .001$) decreased the desire to work in the hemodialysis (64.4% vs. 26.1%; $P < .001$), and decreased communication with patients (55.6% vs. 23.2%; $P < .001$) were significantly higher than the group with low anxiety (Table 3).

In multivariate regression analysis (Table 4), only physical damage due to preventive measures was found to be associated with anxiety ($B = 2.005$, odds ratio = 7.423 (CI: 2.050-26.877), $P = .002$, Nagelkerke $R^2 = 0.310$).

DISCUSSION

In this study, 24.6% of HCPs had moderate-to-severe anxiety during the COVID-19 pandemic period. They stated that their workload was increased and the majority experienced physical damage from preventive measures. Physically harmed by preventive measures was determined as the only independent variable associated with anxiety. One-third of HCPs had a decrease in their desire to work in hemodialysis units during the COVID-19 pandemic period. This is the first study that evaluated the anxiety level of HCPs in hemodialysis unit during the COVID-19 pandemic period.

The COVID-19 pandemic started in Wuhan Province, China at the end of 2019 and spread rapidly all over the world. Both the rapid increase in the number of cases and the inevitable increase of deaths brought fear and anxiety to the whole society. The first COVID-19 case reported in Turkey was on March 10, 2020. In the first reports from China, anxiety rates in the general population varied between 6.33% and 28.8%[18-21], and anxiety rates were higher in healthcare workers (44.6%) compared to the general public.[22] Especially, frontline HCPs have a higher risk for anxiety, depression, sleep disorders, and stress.[22-24] In the studies conducted in Turkey during the COVID-19 outbreak, anxiety in the general population was found to be 20-45.1%, whereas it was 40% and 51.6% in healthcare workers.[10-12] In our study, the moderate-to-severe anxiety rate was 24.6% in HCPs in the hemodialysis unit. In the study of Elbay et al., when cases with mild anxiety were removed, 35.2% were shown to have moderate-to-severe anxiety. The reasons for our anxiety rates to be lower in our study may be that the population studied and the pandemic period in which the study was performed is different. In the early period of the pandemic (March 10-15, 2020), Elbay et al. conducted their studies only on doctors. Our study was performed at a later period and the majority of the participants were nurses and technicians. However, when mild anxiety cases are included in our study, total anxiety rates are at similar levels in other

Table 2. Participants' Data Specific to the COVID-19 Period and Their Anxiety States

		Whole Group ($n = 183$), n (%)
Have you had a COVID-19 infection? (Yes)		7 (3.8)
Have you had any COVID-19 positive patients in your unit? (Yes)		64 (35.0)
Do you have a contact history with a person with COVID-19? (Yes)		50 (27.3)
Are adequate preventive measures provided in your hemodialysis unit? (Yes)		145 (79.2)
Did the isolation and hygiene practices increase your workload? (Yes)		125 (68.3)
Have you been physically damaged by preventive measures? (Yes)		114 (62.3)
Have you ever been worried about transmitting the disease to your family? (Yes)		168 (91.8)
Has there been any change in communication with patients?	None	97 (53.0)
	Increased	29 (15.8)
	Decreased	57 (31.1)
Has your desire to work in hemodialysis changed?	Increased	18 (9.8)
	Not changed	100 (54.6)
	Decreased	53 (29.0)
	I want to quit the job	12 (6.6)
When do you think the pandemic will end?	<1 month	2 (1.1)
	1-3 months	40 (21.9)
	3-6 months	47 (25.7)
	>6 months	44 (24.0)
	It can be never taken under controlled	50 (27.3)
What do you think about the anxiety of hemodialysis patients?	None	35 (19.1)
	Insufficient	19 (10.4)
	Exaggerated	6 (3.3)
	Sufficient and expected level	123 (67.2)
Which makes you feel better?	Taking all precautions in the dialysis unit	72 (39.3)
	Being able to apply preventive measures meticulously with those around me	91 (49.7)
	No deterioration in my financial situation	2 (1.1)
	Being able to stick to my religious beliefs and praying	10 (5.5)
	Being able to eat enough and balanced	8 (4.4)
Anxiety level	None-Minimal	84 (45.9)
	Mild	54 (29.5)
	Moderate	26 (14.2)
	Severe	19 (10.4)

studies in our country. It can be surprising to see such high anxiety rates in HCPs. However, chronic kidney disease is among the most important risk factors for the COVID-19 infection.[25] It is an expected finding that hemodialysis treatment, which requires close contact with this high-risk patient group and is provided in a relatively closed environment, may cause high anxiety rates in the workers.

Following previous outbreaks, serious psychiatric disorders have been shown to continue both in the short term and long run. In one study, the rates of post-traumatic stress disorder in the second month after the severe acute respiratory syndrome (SARS) outbreak was 20%.[26] In the studies in which the HCPs were evaluated mentally in the third year after the SARS outbreak, the frequency of post-traumatic stress disorder[8] was

Table 3. Comparison of Groups According to Anxiety Level

		Low Anxiety (GAD7 ≤ 9) (*n* = 138)	High Anxiety (GAD 7 ≥ 10) (*n* = 45)	
		Median (Minimum–Maximum)		*P*
Age (years)		37.5 (20-55)	39 (21-53)	.724
Number of children		1 (0-5)	2 (0-3)	.565
GAD 7 score		4 (0-9)	14 (10-21)	-
		n (%)		
Gender (female)		105 (76.1)	33 (73.3)	.710
Marital Status (married)		95 (68.8)	34 (75.6)	.391
Educational Status (university)		87 (63)	31 (68.9)	.477
Direct contact with the patient		103 (74.6)	36 (80.0)	.465
Presence of anxiety to transmit the disease to family		124 (89.9)	44 (97.8)	.092
Have COVID-19 infection		5 (3.6)	2 (4.4)	.803
COVID-19 contact history		33 (31.4)	17 (34.0)	**.036**
Have COVID-19 positive patients in the unit		42 (30.4)	22 (48.9)	**.024**
Having adequate preventive equipment		113 (81.9)	32 (71.1)	.122
An increase in workload		93 (67.4)	32 (71.1)	.641
Physical damage from preventive measures		74 (53.6)	40 (88.9)	**<.001**
Decreased desire to work in hemodialysis		36 (26.1)	29 (64.4)	**<.001**
Presence of decreased communication with patients		32 (23.2)	25 (55.6)	**<.001**
Forecasting for the end time of the pandemic (>6 months)		69 (50.0)	25 (55.6)	.517
Work experience	0-10 years	62 (44.9)	21 (46.7)	
	11-20 years	42 (30.4)	13 (28.9)	.975
	>20 years	34 (24.6)	11 (24.4)	

*Doctor, nurse and dialysis technicians constitute direct contact group. Bold values: $P < .05$

10% and the frequency of depression[27] 22.8%. Determining and monitoring the anxiety levels of healthcare workers can be important in order to foresee psychiatric problems that may develop in the future.

In our study, two-thirds of the HCPs stated their workloads were increased and preventive measures (such as masks, glasses, and hand hygiene practices) caused physical damage to them. Damage from preventive measures was the only important variable associated with anxiety in multivariate analysis with a 7-fold increased risk for the development of moderate-to-severe anxiety. It is well known that preventive measures increase the workload during the COVID-19 pandemic, and Elbay et al. have shown that increased workload is associated with psychological symptoms.[10] However; it is an unprecedented result in any study that preventive measures are a risk factor for anxiety.

Table 4. Results of Multivariate Regression Analysis on Factors Associated Anxiety

	Anxiety		
	B	OR (95% CI)	*P*
Contact history with COVID-19 people (yes)	0.067	1.069 (0.312-3.661)	.915
Have COVID-19 positive patients in the unit (yes)	0.600	1.823 (0.529-6.283)	.342
Physical damage due to measures (yes)	2.005	7.423 (2.050-26.877)	**.002**
Decreased desire to work in hemodialysis (yes)	0.786	2.195 (0.844-5.706)	.107
Decreased communication with patients (yes)	0.823	2.278 (0.872-5.950)	.093

OR, odds ratio. Reference values were the absence of the situations (Nagelkarke $R^2 = 0.310$, $P < .001$).

Although, in our study, there was not a relationship between the increased workload and anxiety, the physical damage due to preventive measures may indicate the cumulative effect of the workload increase.

Remarkably, in our study, 29% of the HCPs had a decrease in their desire to work in dialysis, and even 6.6% had a desire to quit their jobs. Approximately one-third of the HCPs were found to have reduced communication with the patients. In those with anxiety, both the decrease in the desire to work and the communication with the patients were found at high rates. Although it is difficult to draw a conclusion here, these results, which are reflections of anxiety, should be taken into consideration as they may affect both the HCPs anxiety management and the quality of dialysis presented.

In our study, at approximately the same rate as anxiety, it was found that approximately a quarter of the HCPs thought that the outbreak could not be controlled. In our study, no relationship was detected between anxiety and the presence of this thought, but Lu et al. found that this is associated with psychological pressure.[24]

In previous studies, the presence of contact with infected patients was shown as a risk factor for anxiety both in the general population and in HCPs, but in our study, it was not detected as a risk factor in multivariate analysis. Likewise, although the risk of anxiety seemed to be high in HCPs who have closer contact with the patients in previous studies,[22-24] no difference was seen between the direct contact group with the non-direct contact group in our study. In addition, we could not find a relationship between gender, age, marital status and education level, and anxiety status.

This study has several limitations. First, the study is cross-sectional and it is difficult to draw conclusions about long-term effects. Secondly, it was done during the study pandemic period and we had to use a web-based method to avoid infection risk. The possibility of selection bias should always be kept in mind, as this type of questionnaire study is voluntary. Thirdly, although we tried to learn the effect of pandemics on anxiety through questionnaires, the fact that the anxiety status of the HCPs before the pandemic period was unknown and it may also have affected our results. However, despite these limitations, our study is important since it is the first study on the level of anxiety and factors affecting anxiety in HCPs in the hemodialysis unit during the COVID-19 pandemic period and in terms of shedding light on taking measures to minimize the anxiety of HCPs in the future.

CONCLUSION

In our study, anxiety rates were found to be high in HCPs during the COVID-19 pandemic period. Physical damage due to preventive measures is a serious risk factor for anxiety. The decrease in their desire to work in hemodialysis and communication with patients are important consequences of anxiety in HCPs that may affect the care given to patients. For these reasons, it may be useful to monitor the anxiety levels of the HCPs and to take regulatory approaches to reduce the anxiety level.

Ethics Committee Approval: Ethics committee approval was received from the Ondokuz Mayis University Clinical Research Ethics Committee (Date: 9 May, 2020; Approval number: 2020/327).

Informed Consent: Informed consent was obtained from the participants who participated in this study.

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