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COVID-19 Patient Care Leading to Occupational Burnout in Resident Doctors: A Follow-up Study

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ABSTRACT

Objective: Burnout during residency may require reorganization of health services during the COVID-19 pandemic. This study mainly aimed to compare the burnout levels between resident doctors who cared and those who did not care for COVID-19 patients at the …. University Hospital, which has been serving as a pandemic hospital during the COVID-19 outbreak.

Methods: The study was designed as a cross-sectional study. One hundred resident doctors were recruited to the first phase of the current study between April 1, 2020 and June 30, 2020 (T1).These participants were then followed-up and re-called to participate in the second phase of the study between October 30, 2020 and November 30, 2020 (T2). Eighty-four resident doctors were available and agreed to participate in the second phase of the study. Once the participants accepted to participate in the study, they were asked to complete "the Evaluation Form," "the Patient Health Questionnaire-9 (PHQ-9)," "the Beck Anxiety Inventory (BAI)," and "the Maslach Burnout Inventory (MBI)."

Results: In both T1 and T2 periods, the resident doctors who provided care to COVID-19 patients had significantly higher BAI and PHQ-9 scores compared to the scores of those who did not care for COVID-19 patients ($P < .05$). Moreover, in the T2 period, the Maslach Burnout Inventory-Emotional Exhaustion (MBI-EE) and Maslach Burnout Inventory-Depersonalization (MBI-DP) scores of the resident doctors who cared for COVID-19 patients were detected as significantly higher than the scores of those who did not care for COVID-19 patients.

Conclusions: This study demonstrated that resident doctors who cared for COVID-19 patients face increased problems of burnout, anxiety, and depression levels.

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INTRODUCTION

The unstoppable rise of the COVID-19 pandemic and the increased workload have a significant impact on the psychology of healthcare professionals. The excessive workloads, insufficient information about the virus, difficult decision-making, insufficient supply of personal protective equipment, infection, and fear of transmitting the disease to their families and relatives cause distress in healthcare workers. All these negative effects of the pandemic can lead to burnout in healthcare workers.[1] According to Maslach, burnout is a condition that develops in individuals who work in professions that require excessive work with people. It consists of the individuals' negative attitudes and behaviors toward themselves and the people they serve, due to the difficulties they face in their profession.[2]

There is a struggle against the COVID-19 pandemic by all healthcare professionals working at the forefront in Turkey as well as all over the world. The first case of COVID-19 in Turkey was confirmed on March 11, 2020 by the Ministry of Health. After that, all hospitals served as pandemic hospitals.[3] A new working schedule was introduced by the hospital administration for the treatment of the COVID-19 patients in our hospital. During this period, outpatient clinics were closed, and only the patients with urgent health problems were accepted and surgeries that need to be handled urgently were performed. In accordance with the workload of their own departments, some of the residents from various departments were assigned to the COVID-19 clinics and emergency rooms. The remaining residents continued to work in their own

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departments, in accordance with the arrangements of the hospital administration.

As the COVID-19 pandemic process is being prolonged, the signs of burnout can be seen more prominently in healthcare professionals, especially doctors. However, studies handling this issue are extremely limited in the literature. The question of whether there have been changes in the anxiety and depression levels of doctors working in COVID-19 clinics in the current period compared to the period when the pandemic started is also vital. To find answers to these questions and to fulfill the gaps in the literature, we primarily aimed to examine the degree of occupational burnout in doctors who have been struggling for such a long time against a pandemic whose course of events is unpredictable.

Apart from this main purpose, we also aimed to compare the burnout levels between resident doctors who cared for and those who did not care for COVID-19 patients at the University Hospital, which has been serving as a pandemic hospital during the COVID-19 outbreak.

METHODS

Study Design and Subjects

The current study was designed as a cross-sectional study. To proceed with this study, 100 resident doctors from the Ege. University Medical Faculty Hospital were first recruited to the current study between April 1, 2020 and June 30, 2020 (T1 period). These participants were then followed-up and re-called to participate in the second phase of the study between October 30, 2020 and November 30, 2020 (T2 period). Eighty-four resident doctors were available and agreed to participate in the second phase of the study. Ethical approval was obtained from the Ege University Hospital Clinical Research Ethics Committee (July 10, 2020-E.167902) and written informed consent was granted by all the participants.

Once the participants accepted to participate in the study, they were asked to complete "the Evaluation Form," "the Patient Health Questionnaire-9 (PHQ-9)," "the Beck Anxiety Inventory (BAI)" and "the Maslach Burnout Inventory (MBI)." Although the Evaluation Form, the PHQ-9, and the BAI were filled out by the participants in both T1 and T2 periods, the MBI was filled out only in the T2 period.

Measurement Materials

The Patient Health Questionnaire-9 (PHQ-9) was used to measure depression levels.[4] The PHQ-9 is a measurement tool derived from the Patient Health Questionnaire and examines the frequency of symptoms of depression over the preceding 2 weeks, with 9 depression-scanning symptoms according to the Diagnostical and Statistical Manual of Mental Disorders-IV (DSM-IV) criteria. Each item is scored from 0 to 3 points and the total score ranges from 0 to 27. The scores between 0 and 4 are interpreted as indicating minimal depression, 5-9 as mild, 10-14 as moderate, 15-19 as moderately severe, and the scores between 20 and 27 are interpreted as indicating severe depression. The Turkish validity and reliability study of the scale was performed in 2016.[5]

The Beck Anxiety Inventory (BAI) was applied to measure the anxiety levels of the physicians who participated in the study.[6] The BAI has a total of 21 items examining the frequency of one's subjective, somatic, or panic-related symptoms of anxiety and includes Likert-type items ranging from responses of "not at all" to "severe." A high total score indicates a more severe level of anxiety. A total score ranging from 0 to 7 refers to minimal anxiety symptoms, 8-15 mild, 16-25 moderate, and a score of 26-63 indicates that the individual has severe anxiety symptoms. The validity and reliability study for the Turkish adaptation was conducted in 1998.[7]

The Maslach Burnout Inventory (MBI) was applied to the participants to measure burnout levels in only the T2 period. The MBI, which was developed by Maslach, is a 5-point Likert type self-report scale consisting of 22 items. The scale has 3 dimensions: emotional exhaustion (MBI-EE), personal accomplishment (MBI-PA), and depersonalization (MBI-DP).[8] The Turkish validity and reliability study of the MBI was conducted by Ergin.[9]

Statistical Analysis

The resulting data were transferred to Statistical Package for the Social Sciences (SPSS) version 22.0 (IBM SPSS Corp.; Armonk, NY, USA) database. Quantitative variables were evaluated by the Kolmogorov–Smirnov test in terms of appropriateness for normal distribution. Binary continuous variables were compared with the two-sample independent *t*-tests, if they were normally distributed; they were evaluated by the Mann–Whitney *U*-test if they were not normally distributed. Continuous variable values with normal distribution were presented as mean ± standard deviation, whereas those without normal distribution were shown as median [interquartile range]. The correlations among quantitative variables and scale scores were conducted using the bivariate Spearman correlation analysis. In our analyses, a correlation coefficient higher than 0.50 represented high-level correlation, 0.30-0.50 medium-level correlation, and 0.10-0.30 low-level correlation.[10] Finally, to examine the accurate association of MBI subscale scores with COVID-19 patient care, occupational features, depression and anxiety scores, and multiple linear regression analyses with hierarchically constituted models were performed. Possible predictive factors, which were determined as having association with MBI subscale scores via the Mann–Whitney *U*-test,

two-sample independent *t*-test, and Spearman correlation analysis, were entered to the regression models as independent variables. The multiple regression analyses did not have any issue on multicollinearity since all the variance inflation factors (VIF) for each variable were less than 3.0 in all the analyses. A *P* value less than .05 was considered as statistically significant.

RESULTS

Participant demographics, occupational features, and responses to COVID-19-related questions are presented in Table 1. The rates of resident doctors caring for COVID-19 patients were similar in the T1 and T2 periods (49% vs 48.8%). While the rate of the doctors who were assigned to a COVID-19 clinic was 65% in the T1 period, the rate decreased to 47.6% in the T2 period. However, the expectancy regarding an assignment to a COVID-19 inpatient or outpatient service increased throughout the 2 periods (64% vs 79.8%). While the rate of the participants who felt that occupational health and safety measures were not sufficient in the department where they work slightly decreased over time (56% vs 45.2%), the participants who received any psychiatric medication or psychological support remained at similar rates across T1 and T2 periods (13% vs 15.5%).

In both T1 and T2 periods, the resident doctors who cared for COVID-19 patients had significantly higher BAI and PHQ-9 scores compared to the scores of those who did not care for COVID-19 patients (all $P < .05$; Table 2). However, the BAI and PHQ-9 scores of the assistant doctors who cared for and those who did not care for COVID-19 patients did not change significantly across T1 and T2 periods (all $P > .05$; Table 3). Moreover, in the T2 period, the MBI-EE and MBI-DP scores of the assistant doctors who cared for COVID-19 patients were detected as significantly higher than the scores of those who did not care for COVID-19 patients ($t = -2.850$, $P = .006$; $Z = -2.569$, and $P = .010$; respectively; Table 2). Both BAI and PHQ-9, and all the MBI subscale scores showed no significant difference between the 2 genders, both in T1 and T2 (all $P > .05$).

According to the bivariate Spearman correlation analyses (Table 4), the MBI-EE scores were positively correlated at a high level with the BAI and PHQ-9 scores ($r = 0.596$; $r = 0.756$; all $P < .01$), and at a medium level with weekly working hours and monthly number of shifts ($r = 0.311$; $r = 0.333$; all $P < .01$). Similarly, the MBI-DP scores were positively correlated at a high level with the BAI and PHQ-9 scores ($r = 0.523$; $r = 0.609$; all $P < .01$), and at a medium level with weekly working hours and monthly number of shifts ($r = 0.442$; $r = 0.495$; all $P < .01$). Age and time spent in the job were not correlated with any scale scores. The Maslach Burnout Inventory-personal accomplishment scores were correlated with neither the BAI, PHQ-9, scores and weekly working hours nor the monthly number of shifts (all $P > .05$).

We conducted multiple linear regression analysis to find out whether COVID-19 patient care, weekly working hours, monthly number of shifts, and BAI and PHQ-9 scores have an impact on the MBI-EE scores. Accordingly, we examined the impacts of these factors in 4 models. The final model demonstrated a significant association (Adjusted $R^2 = 0.605$, $P < .001$), indicating that COVID-19 patient care, weekly working hours, monthly number of shifts, and BAI and PHQ-9 scores together accounted for 35.8% of the variance of emotional exhaustion score. Although COVID-19 patient care significantly predicted higher MBI-EE scores in the first and second models (ß = 0.30, $P = .006$; ß = 0.22, $P = .037$; respectively; Table 5), this association no longer remained after controlling for BAI and PHQ-9 scores. In the final model, the PHQ-9 score was the only significant predictor of MBI-EE scores (ß = 0.71; $P < .001$; Table 5). It was also determined that both BAI and PHQ-9 scores had mediating effects on the association between COVID-19 patient care and emotional exhaustion.

Another multiple linear regression analysis was performed by entering the possible predictive variables into the 4 models which were in a hierarchy similar to the first analysis and locating MBI-DP scores as a dependent variable. The final model demonstrated a significant association (Adjusted $R^2 = 0.444$, $P < .001$), indicating that COVID-19 patient care, weekly working hours, monthly number of shifts, and BAI and PHQ-9 scores together accounted for 44.4% of the variance observed in MBI-DP scores. Although COVID-19 patient care significantly predicted higher MBI-DP scores in the first model (ß = 0.22, $P = .042$; Table 6), this association no longer remained after controlling for weekly working hours, monthly number of shifts, and BAI and PHQ-9 scores. In the final model, the PHQ-9 score was the only significant predictor of MBI-DP scores (ß = 0.46; $P < .001$; Table 6). It was also determined that both monthly number of shifts, and the BAI and PHQ-9 scores had mediating effects on the association between COVID-19 patient care and depersonalization. Since the MBI-PA score was not found associated with possible predictive factors in the correlation analysis, it was not evaluated in the multiple linear regression analysis as a dependent factor.

DISCUSSION

This study mainly aimed to evaluate the burnout levels of resident doctors who cared for and those who did not care for COVID-19 patients in our hospital, which has been serving as a pandemic hospital during the COVID-19 outbreak. In accordance with this purpose, the findings showed that COVID-19 patient care led to higher levels of emotional exhaustion and the depersonalization dimensions of occupational burnout in resident doctors. However, the findings also indicated that COVID-19 patient

Table 1. Participant Demographics, Occupational Features and Responses to COVID-19 Related Questions

	T1 (n = 100)	T2 (n = 84)
	M ± SD	M ± SD
Age (years)	28.89 ± 4.73	28.54 ± 3.75
Sex		
Male	50 (50)	47 (56)
Female	50 (50)	37 (44)
Departments of the doctors		
Anesthesiology	48 (48)	38 (45.2)
Child psychiatry	23 (23)	22 (26.2)
Neurosurgery	6 (6)	6 (7.1)
Urology	5 (5)	5 (5.9)
General practice	4 (4)	4 (4.9)
Pediatric surgery	4 (4)	4 (4.9)
Cardiology	3 (3)	3 (3.7)
Neurology	2 (2)	2 (2.4)
Obstetrics and gynecology	2 (2)	2 (2.4)
Cardiovascular surgery	1 (1)	-
Thoracic surgery	1 (1)	-
Psychiatry	1 (1)	-
Marital status		
Single	67 (67)	62 (73.8)
Married	30 (30)	21 (25)
Divorced	3 (3)	1 (1.2)
Do you have a child?		
Yes	8 (8)	8 (9.5)
No	92 (92)	76 (90.5)
Do you care for COVID-19 patients?		
Yes	49 (49)	41 (48.8)
No	51 (51)	43 (51.2)
Where do you care for COVID-19 patients?		
Intensive care unit	44 (89.8)	37 (90.2)
Inpatient service	5 (10.2)	4 (9.8)
Were you assigned to a COVID-19 clinic in this period?		
Yes	65 (65)	40 (47.6)
No	35 (35)	44 (52.4)
Do you think that you will be assigned to a COVID-19 clinic in the near future?		
Yes	64 (64)	67 (79.8)
No	36 (36)	17 (20.2)
Do you think the occupational health and safety measures are sufficient in the department where you work?		
Yes	44 (44)	46 (54.8)
No	56 (56)	38 (45.2)
Do you receive any psychiatric medication or psychological support?		
Yes	13 (13)	13 (15.5)
No	87 (87)	71 (84.5)

COVID-19: Coronavirus disease-2019; T1: April-June 2020 period, T2: October-November 2020 period.

Table 2. Comparison of BAI, PHQ-9 and Maslach Burnout Inventory (MBI) Scores Between the Doctors Who Cared and Did Not Care for COVID-19 Patients in 2 Different Time Periods

	T1 (April-June 2020 Period)			T2 (October-November 2020 Period)		
	COVID-19 Patient Care (−) (n = 51) (1)	COVID-19 Patient Care (+) (n = 49) (2)	Test Statistics and Group Comparisons	COVID-19 Patient Care (−) (n = 43) (3)	COVID-19 Patient Care (+) (n = 41) (4)	Test Statistics and Group Comparisons
BAI score	3.00 [5.00]	7 [12.00]	**Z = −3.224; *P* = .001[a]; 2>1**	4.00 [7.25]	10.00 [10.25]	**Z = −2.378; *P* = .017[a]; 4>3**
PHQ-9 score	6.00 [7.00]	10.00 [9.00]	**Z = −3.323; *P* = .001[a]; 2>1**	7.00 [7.00]	11.00 [8.75]	**Z = −3.062; *P* = .002[a]; 4>3**
MBI-EE score	-	-	-	22.58 ± 8.65	27.43 ± 6.81	***t* = −2.850; *P* = .006[b]; 4>3**
MBI-DP score	-	-	-	10.00 [7.25]	12.50 [6.50]	**Z = −2.569; *P* = .010[a]; 4>3**
MBI-PA score	-	-	-	26.57 ± 5.07	26.12 ± 4.88	*t* = 0.411; *P* = .682[b]; 3 = 4

Data are presented as the means ± standard deviations. or medians [interquartile range] as appropriate.
Bold values mark statistically significant differences.
[a]Mann–Whitney *U*-test; [b]Two Independent Samples *t*-test.
BAI: beck anxiety inventory; PHQ-9: patient health questionnaire-9; MBI: maslach burnout inventory; EE: emotional exhaustion; DP: depersonalization; PA: personal accomplishment; COVID-19: coronavirus disease-2019.

Table 3. Comparison of BAI and PHQ Scores of the Doctors Between 2 Different Time Periods

	COVID-19 Patient Care (-)			COVID-19 Patient Care (+)		
	T1 (n = 51)	T2 (n = 43)	Test Statistics and Group Comparisons	T1 (n = 49)	T2 (n = 41)	Test Statistics and Group Comparisons
BAI score	3.00 [5.00]	4.00 [7.00}	Z = −0.778; *P* = .436[a]; T1 = T2	7.00 [12.00]	10.00 [10.00]	Z = −0.179; *P* = .858[a]; T1 = T2
PHQ-9 score	6.00 [7.00]	7.00 [7.00]	Z = −1.202; *P* = .229[a]; T1 = T2	10.55 ± 5.88	11.61 ± 6.02	T = −0.841; *P* = .402[b]; T1 = T2

Data are presented as the means ± standard deviations. or medians [interquartile range] as appropriate.
Bold values mark statistically significant differences.
[a]Mann–Whitney *U*-test; [b]Two Independent Samples *t*-test.
BAI: beck anxiety inventory; PHQ-9: patient health questionnaire-9; COVID-19: coronavirus disease-2019; T1: April-June 2020 period; T2: October-November 2020 period.

Table 4. Bivariate Spearman Correlation Matrix

Correlation Coefficients (Spearman's rho)	1	2	3	4	5	6	7	8	9
1.Age	-								
2. Years spent in the job	0.875**	-							
3. Weekly working hours	−0.267*	−0.230*	-						
4. Monthly number of shifts	−0.349**	−0.350**	0.845**	-					
5. BAI score	0.031	0.027	0.278*	0.343**	-				
6. PHQ-9 score	0.000	0.004	0.239*	0.332**	0.704**	-			
7. MBI-EE score	−0.052	0.012	0.311**	0.333**	0.596**	0.756**	-		
8. MBI-DP score	−0.205	−0.105	0.442**	0.495**	0.523**	0.609**	0.762**	-	
9. MBI-PA score	0.055	0.067	−0.010	−0.081	−0.185	−0.215	−0.248*	−0.239*	-

Spearman correlation analysis was performed.
*$P < .05$; **$P < .01$.
BAI: beck anxiety inventory; PHQ-9: patient health questionnaire-9; MBI: maslach burnout inventory; EE: emotional exhaustion; DP: depersonalization; PA: personal accomplishment.

Table 5. Four Linear Regression Models Which Demonstrate the Predictors of "Emotional Exhaustion"

Dependent Variable: MBI-Emotional Exhaustion Score Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	22.581	1.191		18.962	<0.001	20.212	24.950
	COVID-19 patient care	**4.858**	**1.705**	**0.300**	**2.850**	**0.006**	**1.467**	**8.249**
2	(Constant)	17.295	2.943		5.876	<0.001	11.438	23.153
	COVID-19 patient care	**3.707**	**1.751**	**0.229**	**2.117**	**0.037**	**0.222**	**7.193**
	Weekly working hours	0.042	0.069	0.113	0.602	0.549	-0.096	0.179
	Monthly number of shifts	0.585	0.533	0.212	1.098	0.276	-0.476	1.646
3	(Constant)	15.755	2.575		6.119	<0.001	10.630	20.880
	COVID-19 patient care	2.410	1.542	0.149	1.563	0.122	-0.660	5.480
	Weekly working hours	0.042	0.060	0.112	0.693	0.491	-0.078	0.161
	Monthly number of shifts	0.184	0.470	0.067	0.392	0.696	-0.750	1.119
	BAI score	**0.517**	**0.100**	**0.492**	**5.190**	**<0.001**	**0.318**	**0.715**
4	(Constant)	10.928	2.135		5.118	<0.001	6.678	15.179
	COVID-19 patient care	0.599	1.239	0.037	0.483	0.630	-1.867	3.064
	Weekly working hours	0.066	0.047	0.179	1.397	0.166	-0.028	0.160
	Monthly number of shifts	-0.110	0.371	-0.040	-0.296	0.768	-0.849	0.629
	BAI score	0.044	0.103	0.042	0.427	0.670	-0.161	0.249
	PHQ-9 score	**1.001**	**0.142**	**0.710**	**7.070**	**<0.001**	**0.719**	**1.283**

Model 1: $R^2 = 0.09$; $F = 8.121$; $P = .006$.
Model 2: Adjusted $R^2 = 0.152$; $F = 5.954$; $P = .001$.
Model 3: Adjusted $R^2 = 0.360$; $F = 12.648$; $P < 0.001$.
Model 4: Adjusted $R^2 = 0.605$; $F = 26.391$; $P < 0.001$.
Bold values mark statistically significant differences.
BAI: beck anxiety inventory; PHQ-9: patient health questionnaire-9; MBI: maslach burnout inventory; COVID-19: coronavirus disease-2019.

care, by itself, caused occupational burnout--not directly, but by causing an increase in anxiety and depression symptoms. On the flip side, we found that there were no significant changes between the 2 time points in anxiety and depression levels of the doctors, even though both anxiety and depression levels increased over time.

The health sector is one of the riskiest business lines in terms of health and safety, and healthcare professionals are the segment where the current risk reaches the highest level in pandemic processes. Shanafelt et al.[11] and Lai et al.[12] reported that frontline workers in Wuhan experienced the highest psychological burden in the early periods of the pandemic. A current global survey including 2707 healthcare professionals from 60 countries stated that 51.2% of the respondents from 33 countries reported emotional exhaustion and burnout related to their work during the COVID-19 pandemic.[13] Consistently, in our study, emotional exhaustion and depersonalization levels of the resident doctors who worked in the COVID-19 clinics were significantly higher compared to the resident doctors who did not. Interestingly, a precursor study conducted in the Hubei Cancer Hospital with 173 oncology-specialized physicians and nurses demonstrated that the frontline workers had a lower frequency of burnout (13% vs. 39%) and were less worried about being infected by SARS-CoV-2, compared to the workers in usual wards.[14] The lower level of burnout could be attributed to the high level of anti-infection precautions taken in COVID-19 clinics and a consequent reduction of anxiety among those working in these departments. In support of this assumption, adequate PPE has been found to be protective against burnout. A Spanish survey conducted during the pandemic with 1422 healthcare workers documented that anxiety and depression were positively associated with emotional exhaustion and depersonalization, and negatively associated with personal accomplishment.[15]

In the light of these clues, it can be claimed that anxiety and depression might have important places in the relationship between COVID-19 patient care and occupational burnout. In fact, this assumption was confirmed by what we found in our study. We estimated that caring for COVID-19 patients had an increasing effect on emotional exhaustion and the depersonalization dimensions of burnout. However, this was a total effect, not a direct effect. To explain in more detail, COVID-19 patient care might have shown its effects on these burnout dimensions through anxiety and depression in resident doctors. Unquestionably, there are intercorrelations of symptoms and overlaps among burnout, depression and anxiety. Nevertheless, there is still an ongoing debate as to which one derives from which. In

Table 6. Four Linear Regression Models Which Demonstrate the Predictors of "Depersonalization"

Dependent Variable: MBI-Depersonalization score Model		Unstandardized Coefficients		Standardized Coefficients	*t*	Sig.	95% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	10.977	0.712		15.413	<0.001	9.560	12.394
	COVID-19 patient care	**2.123**	**1.026**	**0.224**	**2.070**	**0.042**	**0.082**	**4.164**
2	(Constant)	7.164	1.660		4.314	<0.001	3.859	10.469
	COVID-19 patient care	0.982	0.996	0.104	0.986	0.327	-1.001	2.966
	Weekly working hours	0.015	0.039	0.071	0.390	0.698	-0.062	0.093
	Monthly number of shifts	**0.631**	**0.301**	**0.393**	**2.096**	**0.039**	**0.032**	**1.230**
3	(Constant)	6.426	1.526		4.211	<0.001	3.388	9.464
	COVID-19 patient care	0.330	0.923	0.035	0.357	0.722	-1.508	2.168
	Weekly working hours	0.015	0.036	0.070	0.421	0.675	-0.056	0.086
	Monthly number of shifts	0.448	0.278	0.279	1.611	0.111	-0.106	1.003
	BAI score	**0.243**	**0.059**	**0.396**	**4.104**	**<0.001**	**0.125**	**0.361**
4	(Constant)	4.600	1.482		3.103	0.003	1.648	7.552
	COVID-19 patient care	-0.331	0.867	-0.035	-0.382	0.704	-2.058	1.395
	Weekly working hours	0.024	0.033	0.113	0.743	0.459	-0.041	0.090
	Monthly number of shifts	0.334	0.258	0.208	1.294	0.200	-0.180	0.848
	BAI score	0.062	0.072	0.101	0.860	0.392	-0.081	0.205
	PHQ-9 score	**0.381**	**0.099**	**0.465**	**3.870**	**<0.001**	**0.185**	**0.577**

Model 1: $R^2 = 0.05$; $F = 4.284$; $P = .042$.
Model 2: Adjusted $R^2 = 0.213$; $F = 8.379$; $P < 0.001$.
Model 3: Adjusted $R^2 = 0.344$; $F = 11.754$; $P < 0.001$.
Model 4: Adjusted $R^2 = 0.444$; $F = 14.084$; $P < 0.001$.
Bold values mark statistically significant differences.
BAI: beck anxiety inventory; PHQ-9: patient health questionnaire-9; MBI: maslach burnout inventory; COVID-19: coronavirus disease-2019.

particular, it is reported that depression may be a cause or a consequence of burnout, and there are findings and studies supporting both assumptions.[16,17] In our study, the cause–effect relationship model was formed by considering depression and anxiety as a "cause" that mediates the COVID-19 patient care–burnout relationship, and burnout as a "result." We considered that the COVID-19 pandemic, which started suddenly in 2020, would primarily cause anxiety and depression, like a rapid psychological reaction in healthcare workers, as in all people, and burnout associated with COVID-19 would occur later as a consequence.

In addition to anxiety and depression, work life affecting life home life, feelings of inadequate education, end-of-life decisions for certain patients, and being exposed to COVID-19 patients were found to be associated with burnout.[13] In our study, although, age, gender and years spent in the job were not associated with any dimensions of burnout, the monthly number of shifts and weekly working hours showed positive association with emotional exhaustion and depersonalization. However, multiple linear regression models demonstrated that the monthly number of shifts predicted a greater risk for higher levels of depersonalization before controlling for anxiety and depression. This condition suggests that caring for COVID-19 patients has a worsening effect, being independent of occupation-related factors on emotional exhaustion but not on depersonalization. To our knowledge, studies examining the relationship between COVID-19 patient care and burnout have not previously revealed such outcomes while investigating the effect of occupation-related factors. Moreover, Luceño-Moreno et al.[15] reported that 12- or 24-hour shifts or on-call hours were positively associated with both anxiety and depression, while the number of guards per month were positively associated with depression during COVID-19 pandemic. Our findings regarding these associations were also supportively line with this study. Working in shifts seems to adversely affect the physiological health of employees, their social life, personal work safety, and also patient safety.

In our study, when we examined whether resident doctors' anxiety and depression levels changed as the pandemic process prolonged. We found both anxiety and depression levels among doctors who cared for and those who did not care for COVID-19 patients increased within the follow-up, but these increases were not statistically significant. This unsurprising outcome underlined the fact that working on the frontline against COVID-19 was associated with worse mental health consequences. Previous studies have supported this assumption.[18,19] However, the present study is important in terms of revealing that this trend has not changed over time.

Strengths and Limitations

By presenting the data obtained from only resident doctors, this study provides more specific information regarding resident doctors who have the highest responsibility in facing the challenge against the pandemic.

As for the limitations, the major limitation is definitely the small sample size. Besides, in the second phase of the study, we could not reach 16 out of 100 participants who were included in the first phase. This hindered accurately repetitive measurements.

CONCLUSIONS

This study demonstrated that resident doctors who cared for COVID-19 patients are being troubled by increased burnout, anxiety, and depression levels. COVID-19 patient care seems to cause increased symptoms of burnout, such as emotional exhaustion and depersonalization in doctors, though not directly, but by causing increased anxiety and depression levels. Moreover, this effect is independent of occupation-related factors of emotional exhaustion. Despite such negative consequences, it is pleasing that the anxiety and depression levels of doctors do not show significant increases during the prolonged pandemic. Health care institutions should give strong support to the doctors to deal with their occupational burnout symptoms, especially during this critical pandemic.

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Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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