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The relationship of stress, self-efficacy and sociodemographic factors among physicians during the COVID-19 pandemic

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The study was approved by Harran University Scientific Research Ethics Committee, 13.04.2020 and 10.
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Abstract

Background/Aim: During the COVID-19 pandemic, many health care workers had to perform jobs that were not in their area of expertise. That the disease is a newly defined disease and that it required health care workers to work outside of their fields may have affected their stress levels. In this study, we aimed to determine the relationship among sociodemographic characteristics, the sense of self-efficacy in the diagnosis and treatment of COVID-19, and perceived stress levels of physicians working in a university hospital.

Methods: This was a cross-sectional study. The population included in this study was 327 physicians working in a university hospital at the time of the pandemic. No sampling was performed for this study. This study was completed by a total of 108 physicians (participation level: 33.03%). After being informed about this study, the physicians were asked whether they agreed to participate. Research data were collected with a questionnaire and the Perceived Stress Scale. The questionnaire included questions about physicians' sociodemographic characteristics and feelings of self-efficacy in the diagnosis and treatment of COVID-19.

Results: The total number of skills physicians reported they could perform was higher among specialist physicians and faculty members, those 34 years and older, and those who received training on the diagnosis and treatment of COVID-19 and virus prevention (P=0.04; P=0.01; P<0.001; P<0.001; P<0.001, respectively). In addition, perceived stress levels (PSLs) were found to be lower among those who reported a high total number of skills they could perform, as assessed by the self-efficacy questions (P=0.04).

Conclusion: Although the PSLs of physicians were high, this is expected in a state of emergency such as the pandemic. The sense of self-efficacy regarding COVID-19 improved with training and professional experience. In-service training and shared experiences can both decrease PSLs and improve self-efficacy.

Keywords: COVID-19, physician self-efficacy, stress

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Introduction

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by a newly discovered type of coronavirus that spread worldwide, with over 200,800,000 cases and over 4,260,000 confirmed deaths [1]. COVID-19 was introduced worldwide with the reporting of pneumonia cases of unknown etiology in Wuhan city, China, in December 2019.

Spreading to nearly 230 countries and regions worldwide, COVID-19 has become a major public health problem, with more than 5,500,000 cases and approximately 50,000 deaths in Turkey alone [1,2]. In the fight against this disease, health care professionals have been at the forefront; they have been infected with the virus and have even lost their lives. Given physical and mental fatigue due to harsh working conditions, separation from families, stigmatization and the pain of losing colleagues, health care professionals have also had to deal with the intense stress of this tough fight [3,4]. Stress is common among physicians. Many studies have reported that the rate of physicians experiencing moderate and high levels of stress varies between 43% and 91%. Stress levels are known to be higher among women, younger people, hospital workers and single individuals [5-7]. Many studies have been conducted examining the mood of health workers during the pandemic. Depression, anxiety, insomnia, posttraumatic stress disorder, somatization, and obsessive-compulsive symptoms are common problems [8-11]. In studies conducted during the pandemic that examined stress and stress-related factors among physicians, there was no relationship between stress and age, but the stress levels of women were higher [12,13]. It has been reported that an increase in the level of education and professionalization are factors that reduce stress, while working in a pandemic clinic increases stress [14]. In studies that investigated stress and related factors among health care workers during the pandemic period in Turkey, women and single people experienced higher levels of stress, and stress decreased with increasing age and professional experience [15,16].

Stress is defined as a condition that causes the deterioration of individuals' physiological and psychological adjustment capabilities as a result of their interaction with their environment and changes in their daily lives [17]. Life- and work-related stressors are triggered by a stimulus and generate the perception of stress in the brain [18]. Self-efficacy, on the other hand, is defined as an individual's self-belief and confidence that he or she can take the necessary action to achieve their desired goals. According to self-efficacy theory, the main factor that motivates an individual to take action that results in a desired behavior is the belief that the individual has the power to exhibit this behavior. Self-belief in one's ability to deal with a situation affects one's moods and stress levels [19,20].

Exposure of individuals to stressors causes many behavioral and psychological responses. Self-efficacy plays a very active role in the body's fight against stressors [21]. High self-efficacy acts as a buffer to many stress-related diseases, such as the stress experienced by individuals that causes burnout syndrome. Both a general sense of self-efficacy and a professional sense of self-efficacy reduce an individual's level of stress. It is very important to promote self-efficacy as a part of health promotion programs, especially in high-risk occupations [19,22-24].

During the COVID-19 pandemic, many health care workers had to perform jobs that were not in their area of expertise. That the disease is a newly defined disease and that it required health care workers to work outside of their fields may have affected their stress levels. In this study, we aimed to determine the relationship among sociodemographic characteristics, the sense of self-efficacy in the diagnosis and treatment of COVID-19, and perceived stress levels of physicians working in a university hospital. The hypotheses of this study are as follows:

H0: Physicians' sense of self-efficacy in the diagnosis and treatment of coronavirus and their sociodemographic variables are not related to their perceived stress level (PSL).

H1: Feelings of low self-efficacy in the diagnosis and treatment of coronavirus among physicians cause an increase in PSL.

H2: Some sociodemographic variables of physicians are associated with PSLs.

Materials and methods

Research design

This was a cross-sectional study. The population included in this study was 327 physicians working in a university hospital at the time of the pandemic. No sampling was performed for this study. This study was completed by a total of 108 physicians (participation level: 33.03%). After being informed about this study, the physicians were asked whether they agreed to participate. Written consent was obtained from those who agreed to participate and were included in the current study. The questionnaire developed by the researchers and the Perceived Stress Scale were given to the physicians, and they were asked to complete it. It was explained that they had to fill in each question for the scale to be scored correctly.

Participants

Physicians who worked in the hospital during the pandemic were included. Physicians who were on maternity leave or on annual/health leave for more than 2 weeks and who did not work during the pandemic were excluded from this study. A total of 202 (61.77%) of 327 physicians in the study population were assistant physicians. Similarly, 66.6% (72 people) of the participants included in this study were resident physicians.

Measures

Research data were collected using a questionnaire and the Perceived Stress Scale.

A questionnaire consisting of two parts was administered to the participants. The first part of the questionnaire included questions about sociodemographic characteristics such as age, sex, marital status, title, hospital unit and professional experience. The second part included questions to determine physicians' feelings of self-efficacy in the diagnosis and treatment of COVID-19. More specifically, this part of the questionnaire consisted of 3 questions about whether the physicians received training on the diagnosis of COVID-19, the treatment for COVID-19, and the use of personal protective measures against COVID-19 infection and 10 questions about whether they felt qualified in the diagnosis, treatment and patient management of COVID-19. The questions were as follows:

1. Can you perform initial evaluation/triage for COVID-19?
2. Can you differentiate between possible/confirmed cases of COVID-19?
3. Can you perform emergency/outpatient management of COVID-19 cases?
4. Can you perform follow-up of patients diagnosed with COVID-19 at home?
5. Can you plan services for the treatment of patients diagnosed with COVID-19?
6. Can you plan intensive care treatment for patients diagnosed with COVID-19?
7. Can you plan services for the treatment of children diagnosed with COVID-19?
8. Can you plan intensive care treatment for children diagnosed with COVID-19?
9. Can you adjust the dosage of drugs used in the treatment of COVID-19?
10. Can you correctly use the materials/equipment in an isolation area for COVID-19?

Those who answered "yes" to these self-efficacy questions were considered to also perform those skills. The total number of skills the physicians could perform, as reflected by the self-efficacy questions, ranged from 0 to 10. Although the questions were not designed as a scale, the item total correlation value was greater than .30. The Kuder-Richardson 20 (KR-20) coefficient was 0.86. When explanatory factor analysis was performed, the questions clustered in one dimension and explained 44.53% of the variance. The Kaiser-Mayer-Olkin (KMO) value was 0.81, and the Bartlett's test of sphericity result was $P<0.001$.

The Perceived Stress Scale is a scale developed to measure the level of stress perceived by individuals in the last month. This 5-point Likert-type scale consists of 14 questions [25]. The Turkish validity-reliability of the scale was assessed by Eskin et al. in 2013, and the Cronbach's alpha internal safety coefficient of the scale was found to be 0.84. The total scores that can be obtained using the scale range from 0 to 56. The higher the score is, the higher the PSL. In this study, physicians' scores were made dichotomous by defining two groups based on the scale's median score. Those who scored 28 and below were coded as having low stress levels, and those who scored 29 and above were coded as having moderate-high stress levels.

Procedure

This study included all physicians who agreed to participate between 1 April 2020 and 30 April 2020. Both verbal and written consent were obtained from the participants after they had been informed about this study. Regarding the use of the Perceived Stress Scale in this study, permission was obtained from the authors who conducted the validity and reliability study of the scale. Approval was obtained from the Harran University Clinical Research Ethics Committee at session no. 07 dated 13.04.2020 with decision number 10. Institutional permission was obtained from the hospital for this study, and all procedures were carried out in accordance with ethical rules that must be followed in human studies.

Data analysis

After the hospital units were listed based on the answers from the physicians, the coronavirus quarantine unit, the emergency department and the intensive care unit were grouped as high-risk units; inpatient services and outpatient clinics were grouped as moderate-risk units; and laboratories and radiology and administrative units were grouped as low-risk units. The professional experience and age variables were treated as dichotomous by taking the median value as the cutoff point.

Statistical analysis

Statistical analyzes were performed using IBM SPSS 18.0 (SPSS Inc., Chicago, USA). The significance level for this study was set at $P<0.05$. The variables used in this study fit a normal distribution. Frequencies and distributions of the data were determined by performing univariate analyses. The chi-square test was used for categorical variables, while the t test and one-way ANOVA were used for continuous variables.

After this study was completed, its strength was evaluated. The PSL was made categorical by taking the median score as a cutoff. Physicians were divided into two groups: low and moderate/high PSLs. The relationship between PSLs and the total number of skills the physicians could perform, as measured by the self-efficacy questions, was evaluated. The average and standard deviation of the total number of skills physicians in the low PSL group could perform, based on the self-efficacy questions, were compared with the average and standard deviation of the total number of skills physicians in the moderate/high PSL group could perform. According to G power analysis, the power of this study was calculated as a 0.52 effect size, a 0.05% margin of error and 84.40%.

Results

A total of 108 physicians participated in this study. The mean age of the physicians was 33.2 (6.4) years, and the mean duration of their professional experience was 7.9 (6.4) years. A total of 64.8% of the participants were male, 62.0% were married, and 66.7% were resident physicians. The sociodemographic characteristics of the physicians are shown in Table 1.

Table 1: Sociodemographic characteristics of the physicians

Variables	Categories	Number	Percentage
Age	31 years and under	55	50.92
	32 years and over	53	49.08
Sex	Female	38	35.18
	Male	70	64.82
Marital status	Single	41	37.96
	Married	67	62.04
Position	Assistant physician	72	66.66
	Faculty member	32	29.62
	Specialist physician	4	3.72
Work unit	Inpatient services	33	30.56
	Polyclinic	26	24.08
	Intensive care	25	23.15
	COVID-19 quarantine unit	8	7.41
	Emergency	7	6.48
	Administrative unit	6	5.55
	Laboratory/radiology unit	3	2.77
Total		108	100.00

When the stress levels of the physicians who participated in this study were examined according to the Perceived Stress Scale, 42.6% had a low stress level, and 57.4% had a moderate/high stress level. The relationship between PSL and self-efficacy is shown in Table 2. The total number of skills the physicians could perform based on the self-efficacy questions of those with low PSLs was 4.32 (3.04), and that of those with moderate-high PSLs was 3.16 (2.82). The difference was statistically significant ($P<0.05$).

Table 2: Relationship of self-efficacy with physician PSLs

		Self-Efficacy	
Variables	**Categories**	**Mean (Standard deviation)**	**Statistical analysis**
PSL	Low	4.32 (3.04)	T=2.04 *P*=0.04
	Moderate-high	3.16 (2.82)	

Among the physicians, PSLs decreased with increasing age and professional experience ($P<0.001$ and $P<0.001$, respectively). The perceived stress level was found to be lower among specialist physicians or faculty members and those who had received training on the treatment of coronavirus ($P<0.001$ and $P=0.01$, respectively). The relationship of PSLs with the sociodemographic characteristics of the physicians is shown in detail in Table 3.

Table 3: Relationship of PSLs with the sociodemographic characteristics of the physicians

Variables	**Categories**	**PSL Low**		**PSL Moderate-High**	
		Number	**Percentage**	**Number**	**Percentage**
Age	31 years and under	13	28.26	42	67.74
	32 years and over	33	71.74	20	32.26
		$X^2=14.92$	$P<0.001$		
Sex	Female	15	32.60	23	37.09
	Male	31	67.40	39	62.91
		$X^2=0.23$	$P=0.62$		
Marital status	Single	16	34.78	25	40.32
	Married	30	65.22	37	59.68
		$X^2=0.34$	$P=0.55$		
Position	Assistant physician	22	47.82	50	80.64
	Faculty member/Specialist physician	24	52.18	12	19.36
		$X^2=12.79$	$P<0.001$		
Work unit	High-risk unit	25	54.34	33	53.22
	Moderate-risk unit	16	34.78	25	40.32
	Low-risk unit	5	10.88	4	6.46
		$X^2=0.83$	$P=0.65$		
Duration of professional experience	5 years and under	16	34.78	38	61.29
	Over 5 years	30	65.22	24	38.71
		$X^2=6.40$	$P=0.01$		
Diagnosis of COVID-19	Trained	24	52.18	24	38.70
	Untrained	22	47.82	38	61.30
		$X^2=1.93$	$P=0.13$		
Treatment of COVID-19	Trained	19	41.30	12	19.36
	Untrained	27	58.70	50	80.64
		$X^2=6.21$	$P=0.01$		
Protection against COVID-19	Trained	22	47.82	27	43.54
	Untrained	24	52.18	35	56.46
		$X^2=0.19$	$P=0.40$		

Of the physicians, 63.0% stated that they could perform initial evaluation/triage for COVID-19 cases, 44.4% stated that they could differentiate between possible/confirmed cases of COVID-19, 50.0% stated that they could perform emergency/outpatient management of COVID-19 cases, 53.7% stated that they could perform follow-up of patients diagnosed with COVID-19 at home, 38.0% stated that they could plan the service treatment of patients diagnosed with COVID-19, and 18.5% stated that they could plan the intensive care treatment of patients diagnosed with COVID-19. A total of 11.1% stated that they could plan the treatment of children diagnosed with COVID-19, 5.6% stated that they could plan the intensive care treatment of children diagnosed with COVID-19, 29.6% stated that they could adjust the dosage of drugs used in the treatment of COVID-19, and 51.9% stated that they could correctly use the materials/equipment in an isolation area for COVID-19.

Regarding the questions that assessed self-efficacy in the diagnosis and treatment of COVID-19, the total number of skills physicians reported they could perform was 3.6 (2.9). The relationship between physicians' sense of self-efficacy and their sociodemographic characteristics is shown in Table 4.

The total number of skills physicians reported they could perform was found to be higher among specialist physicians and faculty members, those 34 years and older, and those who received training on the diagnosis and treatment of COVID-19 and virus prevention ($P=0.04$; $P=0.01$; $P<0.001$; $P<0.001$; $P<0.001$, respectively). In addition, PSLs were lower among those who reported a high total number of skills they could perform, as assessed by the self-efficacy questions ($P=0.04$).

Table 4: Relationship of self-efficacy with the sociodemographic characteristics of the physicians

		Self-Efficacy	
Variables	**Categories**	**Mean (Standard deviation)**	**Statistical analysis**
Age	31 years and under	2.94 (2.69)	T=-2.60 *P*=0.01
	32 years and over	4.39 (3.07)	
Sex	Female	3.65 (3.33)	T=0.01 *P*=0.99
	Male	3.65 (2.77)	
Marital status	Single	3.56 (3.12)	T=-0.26 *P*=0.79
	Married	3.71 (2.89)	
Position	Assistant physician	3.23 (2.75)	T=-2.12 *P*=0.04
	Faculty member/Specialist physician	4.50 (3.22)	
Work unit	High-risk unit	3.82 (3.19)	F=0.49 *P*=0.61
	Moderate-risk unit	3.60 (2.63)	
	Low-risk unit	2.77 (3.03)	
Duration of professional experience	5 years and under	3.12 (2.77)	T=-1.87 *P*=0.06
	Over 5 years	4.18 (3.08)	
Diagnosis of COVID-19	Trained	4.81 (2.85)	T=3.84 *P*<0.001
	Untrained	2.73 (2.74)	
Treatment of COVID-19	Trained	5.96 (2.52)	T=5.85 *P*<0.001
	Untrained	2.72 (2.61)	
Protection against COVID-19	Trained	5.06 (2.73)	T=4.94 *P*<0.001
	Untrained	2.49 (2.64)	

Discussion

Two-thirds of the physicians who participated in this study were male. Approximately 60% of the physicians were resident physicians, the mean age was approximately 33 years, and the mean duration of professional experience was approximately 8 years. Similarly, in their study among physicians working at a university hospital, Unver et al. found the mean age to be 36.3 (10.1) years. In that same study, a total of 61.9% of the participants were resident physicians, and 55.7% were male [26]. Health care is an area in which the advanced age of physicians is often reflected in studies. However, it can be speculated that the mean age of the physicians in our study was low since our study was conducted in a training hospital.

In our study, the majority of physicians experienced moderate to high levels of stress. Younger age, little professional experience, being in the early stages of an academic career and a

lack of training led to increased PSLs. The profession of medicine is a branch of work that amplifies both physical and mental burdens caused by workload, long working hours, busy shifts and limited hours of rest. Many studies have revealed that physicians experience high levels of stress and burnout [27-31]. Many studies have demonstrated that gaining professional experience is a stress-relieving factor among health care professionals [32-34]. Increased knowledge and professional experience are thought to help physicians cope with emerging situations and events in work life, thereby reducing PSLs.

The answers to the self-efficacy questions about COVID-19 showed that nearly half of the physicians stated that they could perform initial evaluation/triage for COVID-19 cases, differentiate between possible/confirmed cases, perform emergency/outpatient management of the cases and perform the follow-up of diagnosed patients at home. In general, the physicians reported lower levels of self-efficacy with regard to the service and intensive care treatment planning of adults and children and the dosage adjustment of drugs. The mean of the total number of skills they could perform, based on the self-efficacy questions, was approximately 3.5. Considering that the total number of skills assessed by the self-efficacy questions ranged from 0 to 10, the mean number of skills physicians reported they could perform with regard to COVID-19 was below the median. In a study by Citak et al. [35] among resident physicians in 2012, physicians stated that they were overwhelmed by the service burden and that they went through a nonstandardized and unsatisfactory training process. In addition to harsh working conditions and a lack of training, the fact that COVID-19 is a newly identified disease and that the literature on the subject has just begun to emerge can help us better understand why the mean number of skills physicians reported they could perform, based on their self-efficacy answers, was low.

In this study, physicians' sense of self-efficacy regarding COVID-19 was found to increase with age, academic progress and training. Although self-efficacy is an inner sense, it is a concept that can be shaped by external factors. Further training and gaining experience are known to increase feelings of self-efficacy [36].

Those physicians with high self-efficacy regarding COVID-19 had lower PSLs. The relationship between the sense of self-efficacy and PSLs shows that self-confidence is a stress-relieving factor. Based on the relevant literature, increasing professional self-efficacy can improve psychological resilience [37-39].

Limitations

The study group comprised 33.03% of the total number of physicians. A limitation of this study is that not all physicians were included. To evaluate the individual skills of physicians in diagnosing and treating COVID-19, they were asked whether they felt competent in those areas and were asked to evaluate themselves subjectively. The questions were formulated by the researchers, but they were not a standard measurement tool or designed as a scale. As the questions did not constitute a scale, their validity and reliability were not evaluated. The questions were prepared to make a subjective and rapid assessment of competence in diagnosis and treatment, which was a variable that could not be measured directly.

Conclusion and recommendations

Although the PSLs of physicians were high, this is expected in a state of emergency such as the pandemic. Young physicians and those with little professional experience had higher PSLs. The sense of self-efficacy regarding COVID-19 improved with training and professional experience. In-service training and shared experiences can reduce PSLs and improve self-efficacy.

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