

RESEARCH ARTICLE

Araştırma Makalesi

Yazışma adresi

Correspondence address

Hasan Huseyin AVCI

Department of Family Medicine,
School of Medicine,
Akdeniz University,
Antalya, Türkiye

hasanavci@akdeniz.edu.tr

Geliş tarihi / Received : December 05, 2024

Kabul tarihi / Accepted : March 26, 2025

Bu makalede yapılacak atf

Cite this article as

Ozcelik H, Avcı HH.

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Akd Med J 2026;12: 1-12

Habibe OZCELİK

Department of Public Health Nursing,
Faculty of Nursing,
Akdeniz University,
Antalya, Türkiye

Hasan Huseyin AVCI

Department of Family Medicine,
School of Medicine,
Akdeniz University,
Antalya, Türkiye

Assessment of the Impact of Healthcare Professionals' Health Behaviors, Working Conditions, and Social Life on Their Perceived Stress Levels During the COVID-19 Pandemic: A Cross-Sectional Study

COVID-19 Pandemisi Sürecinde Sağlık Çalışanlarının Sağlık Davranışları, Çalışma Koşulları ve Sosyal Yaşamlarının Algıladıkları Stres Düzeyine Etkisinin Değerlendirilmesi: Kesitsel Bir Çalışma

ABSTRACT

Objective

The aim of our study is to determine the possible factors that affected the level of stress perceived by healthcare professionals during the COVID-19 pandemic.

Material and Methods

This cross-sectional study was conducted with 223 healthcare professionals. The study data were obtained via electronic questionnaires between October 2020 and February 2021.

Results

Of the healthcare professionals, 40.8% (91) were female; their mean age was 39.39±8.92. Some sociodemographic characteristics affected perceived stress. The participants stated that they paid attention to their nutrition (72.2%, n=161), sleep patterns (36.8%, n=82), and physical activities (22.9%, n=51) to protect themselves from COVID-19. We identified those with higher levels of perceived stress as those who looked after COVID-19 patients, those who worked in surgical units, those who had a change in their working hours and locations, those who worked on the COVID-19 frontlines reluctantly, and those whose teammates were receiving COVID-19 treatment. The most common difficulties encountered while working in COVID-19 units were putting on and taking off personal protective equipment (PPE), experiencing heavy sweating because of the PPE, and other conditions such as redness, sores, and edema.

Conclusion

It is evident that healthcare professionals work under risk and stress, highlighting the necessity for employers to assess employees' stress levels. Developing practical and field-applicable measurement tools for continuous assessment, avoiding the use of inappropriate supportive products, and providing education on healthy lifestyle behaviors—particularly for nurses but also for all healthcare workers—are essential. Additionally, the establishment of institutional policies and the conduction of more comprehensive studies would be beneficial.

Key Words

Occupational health, COVID-19 pandemic, Perceived stress, Healthcare professionals, Health Behavior, Working conditions, Social life, Personal protective equipment, Employer

ÖZ

Amaç

Bu çalışmanın amacı COVID-19 salgını sırasında sağlık çalışanlarının algıladıkları stres düzeyini etkileyen faktörleri belirlemektir.

Gereç ve Yöntemler

Kesitsel tipteki bu çalışma 223 sağlık çalışanı ile yapılmıştır. Veriler Ekim 2020 ile Şubat 2021 arasında elektronik anketler aracılığıyla elde edilmiştir.

Bulgular

Sağlık çalışanlarının %40,8'i (91) kadındır ve yaş ortalamaları 39.39 ± 8.92 'dir. Bazı sosyodemografik özellikler algılanan stresi etkilemiştir. Katılımcılar COVID-19'dan korunmak için beslenmelerine (%72.2, n=161), uyku düzenlerine (%36.8, n=82) ve fiziksel aktivitelerine (%22.9, n=51) dikkat ettiklerini belirtmişlerdir. COVID-19 hastalarına bakanlar, cerrahi ünitelerde çalışanlar, çalışma saatleri ve yerleri değiştirilenler, COVID-19 ile ilgili alanda isteksizce çalışanlar ve ekip arkadaşı COVID-19 tedavisi alanların algılanan stres düzeyleri daha yüksektir. COVID-19 ünitelerinde çalışırken karşılaşılan en yaygın zorluklar kişisel koruyucu ekipmanı (KKE) giyme ve çıkarma zorluğu, KKE nedeniyle terleme, kızarıklık, yaralar ve ödem gibi durumlardır.

Sonuç

Sağlık çalışanlarının risk ve stres altında oldukları, iş verenler tarafından çalışanın stres düzeyinin değerlendirilmesi gerektiği, buna yönelik pratik ve döngü içinde sahada kullanılabilir ölçüm araçlarının geliştirilmesi, uygunsuz destek ürünlerinin kullanılmaması, sağlıklı yaşam biçimi davranışları hususunda başta hemşireler olmakla birlikte tüm çalışanların bu konuda eğitilmesi ve kurumsal politikalar oluşturulması ve daha kapsamlı çalışmaların yapılması faydalı olacaktır.

Anahtar Sözcükler

İş sağlığı, COVID-19 pandemisi, Algılanan stres, Sağlık çalışanları, Sağlık davranışları, Çalışma koşulları, Sosyal yaşam, Kişisel koruyucu ekipman, İşveren

INTRODUCTION

During the COVID-19 pandemic, healthcare workers faced COVID-19 infection and related death, a phenomenon they had never experienced before (1). Moreover, they were among the groups most frequently infected with COVID-19 (2). Approximately 14% of COVID-19 cases reported to World Health Organization (WHO) were healthcare workers (3). Healthcare workers experienced many emotional, psychological, physiological, and social problems during the COVID-19 pandemic (4-9). Health workers faced with difficult decisions and were working under extreme pressure. Examples of these decisions included issues such as how to allocate insufficient resources to patients and how to establish a balance between the health worker's own physical and mental needs and the needs of the patient. This resulted in moral or mental stress for some healthcare professionals (1). In addition, being separated from the family during the quarantine process, feeling embarrassed for contracting the disease, requiring extended periods of quarantine also affected health workers (10). Changes in family relationships and perceived family cohesion during the COVID-19 pandemic were exacerbated by the perceived stress felt by healthcare professionals (11).

It is thought that there may have been a correlation between the working conditions of health workers and the health problems they experienced (4-6, 9, 11, 12). The fear, depression, and anxiety scores of frontline healthcare workers in close contact with infected patients were higher than those who did not work in the clinic (6). As seen in the studies, there are many factors that affect the stress levels of healthcare workers. One of the main factors could be the pandemic itself, as a disaster, and the unpredictability of whether this disaster will lead to positive or negative changes over time. Indeed, the high stress levels of healthcare workers serving COVID-19 patients on the frontlines confirm this. Furthermore, factors directly influencing stress levels may include the phase of the pandemic (early, middle, or late), the rates of transmission and mortality in society, the availability of effective treatment modalities, the existence of a vaccine against the infectious agent, and its protective efficacy.

It has been reported that healthcare professionals use various methods to protect themselves from COVID-19. They stated that they consumed supplements such as ginger, turmeric, royal jelly/propolis, herbal beverages, vitamin C, vitamin D, multivitamins, zinc, honey, and fish oil (omega-3). Additionally, they emphasized paying greater attention than usual to their nutrition, exercise, and sleep (13-16). On the other hand, some studies investigated the use of hydroxychloroquine to prevent COVID-19 infection (15, 17).

These problems varied depending on the working conditions and were related to matters of expertise, professional experience, specific tasks, and caring for patients diagnosed with COVID-19. In addition, some of the health workers' health behaviors and social lives may have

changed, and they may have used various methods to protect themselves from the COVID-19 infection. In short, changes in health behaviors, working conditions, social lives and other supporting factors may have altered their perceived stress. The aim of this study was to determine the possible factors that affected the level of stress perceived by healthcare professionals during the COVID-19 pandemic. The following are some of the research questions that were posed in the study:

- Did the health behaviors of healthcare workers affect their perceived level of stress during the COVID-19 pandemic?
- Did the working conditions of healthcare workers affect their perceived level of stress during the COVID-19 pandemic?
- Did the changes in the social lives of healthcare professionals affect their perceived level of stress during the COVID-19 pandemic?
- Did additional methods of support their health drawn from complementary and additional medicine affect the level of stress perceived by healthcare professionals during the COVID-19 pandemic?

MATERIAL and METHODS

Study Design

This research is a cross-sectional study. The study is structured according to the STROBE Statement that includes a checklist of items that should be included in reports of cross-sectional studies.

Setting and study sample

This research study was conducted at Akdeniz University Hospital, which is an institution providing tertiary care. The 4070 healthcare professionals serving here as of May 2020 constituted the study population. The perceived stress level of healthcare workers was used in the calculation of the sample size. The sample was calculated with the formula in which the mean of the event was analyzed and the number of elements in the population was known. Taking the perceived stress level mean and standard deviation (18.03 ± 6.12) of a previous study as a reference the minimum sample size was calculated as 177 at a 95% confidence interval (18). The study data were collected between October 2020 and February 2021 with electronic survey. A convenience sampling method was used. The healthcare professionals who volunteered to participate in the study were included. The study was completed with 223 healthcare professionals who agreed to participate in the time interval when the data were collected.

Data collection procedure

Firstly, a pilot study was conducted with online questionnaires. The questionnaire was applied to 30 healthcare workers at Akdeniz University Hospital. The pilot study was completed by making the necessary improvements in line with the recommendations. After the pilot study was completed, the data of the study were obtained by sending

an electronic survey link to the mobile phones of healthcare professionals who met the inclusion criteria. The data obtained during the pilot study were excluded from the final analysis. To ensure data completeness, only questionnaires completed in their entirety were accessible to the researchers.

Ethical approval

Ethical approval for the study was granted by the Clinical Studies Ethics Committee of Akdeniz University Faculty of Medicine (Approval Date: 24.06.2020; Approval No: 430), and institutional permission was obtained from Akdeniz University Hospital. Written informed consent was obtained from all participants prior to their involvement. The study was conducted in full compliance with the principles outlined in the Declaration of Helsinki.

Outcome Measures

The primary outcome measures of the study are perceived stress, health behaviors, working conditions and social life. Secondary outcome measures are complementary and additional methods used for support to protect against COVID-19. Dependent variable of this study is perceived stress. The researchers created questionnaires that included socio-demographic characteristics, health behaviors, working conditions, and additional supporting techniques that were employed in line with the literature.

Descriptive form of participants' sociodemographic and health behaviors history: The participants' age, sex, education, occupation, marital status, state of having a child, presence of chronic or psychiatric disease, drug use, any psychiatric support, smoking, and alcohol use, time for oneself, nutrition, and exercise were noted (13, 19, 20).

Perceived Stress Scale: This scale was developed by Cohen, Kamarck, and Mermelstein (1983) to measure how stressful a person perceives certain situations and adapted into Turkish by Ergen et al. (21, 22). Forms of the scale contain 14, 10, or 4 items. The internal consistency coefficient of the 10-item version we used in this study is 0.82. We did not prefer to use the 4-item version because of its internal consistency coefficient of 0.66 (22). We did not prefer to use the 14-item version because it was longer. Each item is rated on a 5-point Likert scale ranging from "Never (0)" to "Very Often (4)." Since the 10-item version was used, the total score ranges from 0 to 40. Four of the items with positive expressions are scored in reverse. The higher the total score, the higher the perceived stress. In this study, Cronbach's alpha coefficient was found to be 0.77.

Descriptive form on participants' working conditions and social lives: Here, the most frequently encountered challenges the participants faced in the workplace were defined as caring for a potential or definitively diagnosed COVID-19 patient, the unit of employment, whether the health worker took time off, the working shift, changes in working locations and working time, whether care was

given in units designated for COVID-19 patients, whether the health worker or any teammate contracted COVID-19, and being diagnosed with COVID-19. In addition, the participants were asked about their social lives; that is, whether they had been exposed to positive or negative behavior as healthcare workers as a result of COVID-19 by other persons in public, where and with whom they lived during the COVID-19 pandemic, and how COVID-19 had affected their lives (1, 4-6, 9-12, 23).

Questionnaire describing complementary and additional methods of support to protect against COVID-19: Participants were asked whether they used specific products or drug treatments to protect themselves from COVID-19, what happened if they did, or why they didn't (13-17).

Statistical methods

The research data were evaluated using the IBM SPSS 23 statistical program. The distribution of the data was assessed using Q-Q plots, histograms, skewness, and kurtosis. Additionally, the Shapiro-Wilk test was employed for small sample sizes ($n < 50$), while the Kolmogorov-Smirnov test was used for larger sample sizes ($n \geq 50$). Parametric tests were applied when the data followed a normal distribution, whereas nonparametric tests were used for non-normally distributed data. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were utilized in the analysis. Parameters that did not follow a normal distribution were presented as the median and interquartile range (25th–75th percentile). For inferential statistics, the Independent Samples t-test and Mann-Whitney U test were applied. Correlation analysis was performed to examine the relationship between the two variables. One-way ANOVA was used to compare independent groups, with the Bonferroni test employed to identify differences between groups when variances were equal, and the Games-Howell post hoc test used when variances were unequal. A p-value of <0.05 was considered statistically significant for comparisons between groups.

RESULTS

Of the participants, 40.8% (91) were women; their mean age was 39.39 ± 8.92 . A negative relationship existed between the perceived stress level and age with correlation analysis ($p < 0.05$, $r: -0.365$). Sociodemographic characteristics such as sex, education, occupation, marital status, and having children affected perceived stress. Those with a psychiatric condition, those who needed but were not receiving psychological support, those who were increasing their smoking, those with limited spare time for themselves, who were not eating or exercising regularly had a higher perception of stress. The participants stated that they paid attention to their nutrition (72.2%, $n=161$), sleep patterns (36.8%, $n=82$), and physical activities (22.9%, $n=51$) to protect themselves from COVID-19 (Table I).

The perception of stress was higher among: healthcare professionals caring for patients with a probable or definitive diagnosis of COVID-19 compared to those who were not working with such patients; those working in surgical units compared to those working in administrative departments; those who experienced a change in their working hours and locations compared to those who did not experience a change; those who were unwillingly working in the relevant field compared to those who had never worked in this field; and those who had a colleague being treated for COVID-19 compared to those who did not have a colleague with COVID-19.

The most common difficulties the health workers encountered while working the COVID-19 units were the difficulty of wearing PPE, including putting on and taking off the equipment (13.5%, $n=30$), heavy sweating caused by PPE use (13.5%, $n=30$), and conditions such as redness, sores, edema experienced by health workers wearing PPE (9.4%, $n=21$) (Table II).

Being told that the virus could be carried home to the family or to others, having to live in separation from their family due to exposure risk while working with patients with COVID-19 were factors that contributed to perceived stress. Those who were isolated at home with their families had higher perceived stress than those who were not isolated at all. In addition, being exposed to negative behaviors due to COVID-19 as a healthcare worker also increased the level of stress (Table III).

Those who used a specific product or drug therapy to protect themselves from COVID-19 had higher levels of perceived stress. The products used to protect against COVID-19 included vitamins (36.3%, $n=81$), vitamin C (31.8%, $n=71$), herbal tea (21.5%, $n=48$), and beta-glucan (15.2%, $n=34$). Recommending hydroxychloroquine to relatives to protect them from COVID-19 also affected perceived stress (Table IV).

Table I. Comparison of the participants' perceived stress level with their sociodemographic characteristics and some health behaviors

		n	%	M±SD	t/F	p value
Sex	Men	132	59.2	2.06±0.40	3.611	<0.001 ^a
	Woman	91	40.8	1.86±0.44		
Educational status	Elementary school, high school (1)	51	22.9	1.89±0.45	4.035	0.019 ^b
	Undergraduate (2)	118	52.9	2.05±0.43		
	Graduate (3)	54	24.2	1.90±0.37		
Profession	Medical Doctor (1)	41	18.4	1.92±0.41	4.334	0.005 ^b
	Nurse (2)	46	20.6	2.17±0.36		
	Other medical professions (3)	29	13.0	1.88±0.42		
	Non-medical professions (4)	107	48.0	1.94±0.44		
Marital Status	Married	156	70.0	1.93±0.42	-2.693	0.008 ^a
	Single	67	30.0	2.10±0.43		
Status of having children	Yes	154	69.1	1.91±0.42	-3.397	0.001 ^a
	No	69	30.9	2.12±0.40		
The state of having a chronic disease	Yes	85	38.1	2.02±0.43	0.998	0.319 ^a
	No	138	61.9	1.96±0.42		
Continuous drug use	Yes	78	35.0	2.01±0.45	0.684	0.495 ^a
	No	145	65.0	1.96±0.41		
Presence of psychiatric illness	Yes	184	82.5	1.95±0.42	-2.553	0.011 ^a
	No	39	17.5	2.14±0.47		
Getting any psychological support	I'm getting support (1)	28	12.6	2.05±0.44	22.993	<0.001 ^b
	I don't get support and I don't need it (2)	131	58.7	1.84±0.42		1>2
	I don't get support but I need support (3)	64	28.7	2.24±0.28		3>2
Smoking	I don't use (1)	141	63.2	1.99±0.42	5.548	<0.001 ^b
	I quit smoking (2)	22	9.9	1.89±0.39		3>1.2.4.5
	I increased the use (3)	13	5.8	2.43±0.26		
	I did not change the usage (4)	32	14.3	1.80±0.41		
	I reduced the use (5)	15	6.7	1.97±0.36		
Alcohol use	No	169	75.8	2.01±0.42	1.682	0.094 ^a
	Yes	54	24.2	1.89±0.42		
The state of taking time for yourself	Yes (1)	35	15.7	1.71±0.42	15.096	<0.001 ^b
	No (2)	121	54.3	2.10±0.40		
	Partly (3)	67	30.0	1.89±0.39		2>1.3
Regular nutritional status	Yes	190	85.2	1.95±0.41	-2.645	0.009 ^a
	No	33	14.8	2.16±0.47		
Regular exercise status	Yes	48	21.5	1.80±0.40	-3.336	0.001 ^a
	No	175	78.5	2.03±0.42		
					n	%
Applications made to protect from COVID-19	I ate healthy. I paid attention to what I ate				161	72.2
	I paid attention to my sleep pattern. tried to get enough sleep				82	36.8
	I exercised or tried to engage in regular physical activity				51	22.9
	I quit or cut down on smoking				11	4.9
	I stopped or reduced alcohol consumption				5	2.2
I didn't do any				50	22.4	

Abbreviations: SD, standard deviation.

^aIndependent t test^bOne-way ANOVA was performed with post-hoc tests and according to the post-hoc analysis, it was indicated which groups caused the difference.^cParticipants were able to tick more than one option.

Table II. Comparison of the perceived stress level of healthcare professionals and their working conditions

		n	%	M±SD	t/F	p value		
The status of serving a possible COVID-19 patient [†]	Yes (1)	110	49.3	2.07±0.42	5.574	0.004^a 1>2		
	No (2)	85	38.1	1.90±0.40				
	I don't know	28	12.6	1.86±0.47				
Serving the definitive COVID-19 patient [‡]	Yes	84	37.7	2.07±0.43	3.153	0.045^a		
	No	110	49.3	1.93±0.40				
	I don't know	29	13.0	1.91±0.47				
Working Unit (Currently)	COVID-19 Units (1)	27	12.1	2.08±0.45	4.410	0.005^a 2>4		
	Surgical units (2)	34	15.2	2.11±0.40				
	Non-Surgical Units (3)	51	22.9	2.06±0.39				
	Administrative units (4)	111	49.8	1.88±0.42				
Status of using leave	Yes	100	44.8	1.99±0.41	0.456	0.649 ^b		
	No	123	55.2	1.97±0.44				
Working shift	Daytime	164	73.5	1.97±0.40	-0.607	0.545 ^b		
	Night or day	59	26.5	2.01±0.49				
Status of changing working hours	Increased (1)	32	14.3	2.18±0.45	4.683	0.010^a 1>3		
	Decreased (2)	16	7.2	2.03±0.36				
	Hasn't changed (3)	175	78.5	1.94±0.42				
Status of changing the working unit	Yes	63	28.3	2.17±0.38	4.255	<0.001^b		
	No	160	71.7	1.90±0.42				
Working status in a unit related to COVID-19	I didn't work (1)	162	72.6	1.93±0.42	4.291	0.015^a 3>1		
	I worked willingly by being assigned (2)	27	12.1	2.01±0.40				
	I worked unintentionally by being assigned (3)	34	15.2	2.17±0.41				
Status of being diagnosed with COVID-19 of a teammate works with	Yes	166	74.4	2.04±0.41	3.615	<0.001^b		
	No	57	25.6	1.81±0.41				
					n	%		
The most common difficulty encountered while working in the COVID-19 clinic/outpatient clinic/intensive care/emergency department ^d	No PPE				14	6.3		
	Difficulty getting in and out of PPE				30	13.5		
	Difficulty visiting patients while wearing PPE				14	6.3		
	Sweating with PPE				30	13.5		
	PPE causing redness. Wound, eczema etc.				21	9.4		
	Excess number of vigils				7	3.1		
	Length of vigils periods				9	4.0		
	I do not have any difficulties				20	9.0		
		n	%	M±SD	t/F	p		
PCR test with suspicion of COVID-19	Yes, it was done. The result was negative	106	47.5	2.00±0.42	0.751	0.473 ^a		
	Yes, it was done. The result was positive	25	11.2	2.05±0.38				
	No, not done	92	41.3	1.94±0.44				
		n	%	%25 Percentiles	Median	%75 Percentiles	U	p
Status of being diagnosed with COVID-19		27	12.1	1.80	2.10	2.40	2210.50	0.164 ^c
		196	87.9	1.62	2.00	2.30		

Abbreviations: SD, standard deviation.

^aOne-way ANOVA was performed with post-hoc tests and according to the post-hoc analysis, it was indicated which groups caused the difference.

^bIndependent t test

^cMann-whitney U

^dParticipants were able to tick more than one option.

[†]Possible COVID-19 patient:

- At least one of the signs and symptoms of fever, cough, shortness of breath, sore throat, headache, muscle aches, loss of taste and smell, or diarrhea.
- The clinical picture cannot be explained by another cause/disease
- Persons in close contact with a confirmed case of COVID-19 within 14 days of onset of symptoms

[‡]Definite COVID-19 patient: Cases in which SARS-CoV-2 was detected by molecular methods from patients that fit the probable case definition,

Table III. The perceived stress level of healthcare professionals and the impact of COVID-19 on their social lives

		n	%	M±SD	t/F	p value		
Have they been told or implied by their family or friends that they may carry the virus?	Yes	159	71.3	2.06±0.41	4.621	<0.001 ^a		
	No	64	28.7	1.78±0.40				
Has she/he or her/his family members had to live in a different place due to COVID-19?	Yes	34	15.2	2.19±0.44	3.215	0.002 ^a		
	No	189	84.8	1.94±0.41				
Where did you live during the COVID-19 Pandemic?	I stay at home with my family, nothing changes	146	65.5	1.90±0.41	9.555	<0.001 ^b 2>1		
	I am staying at my house with my family. I had to do home isolation during this process.	46	20.6	2.19±0.35				
	Other	31	13.9	2.06±0.50				
Time to follow the daily developments regarding COVID-19	I never follow	43	19.3	2.05±0.48	1.713	0.165 ^b		
	Up to 1 hour	115	51.6	1.92±0.42				
	1-3 hours	53	23.8	2.03±0.40				
	Over 3 hours	12	5.4	2.10±0.34				
	Total	223	100.0	1.98±0.42				
Exposure to negative behaviors as a healthcare worker due to COVID-19	Yes	66	29.6	2.20±0.39	5.316	<0.001 ^a		
	No	157	70.4	1.88±0.40				
Have you been exposed to negative behaviors from your environment because you were a health worker during the COVID-19 Pandemic process? ^d	My babysitter quits work				n	%		
	My charwoman quits work				7	3.1		
	Discrimination because I am a healthcare professional while shopping				18	8.0		
	Prohibition of using the elevator in the apartment				24	10.7		
	Refusal to be admitted to the hotel / guesthouse				9	4.0		
	Other				2	0.9		
					22	9.8		
		n	%	M±SD	t/F	p		
Exposure to positive behavior as a healthcare worker due to COVID-19	Yes	174	78.0	1.99±0.42	0.823	0.412		
	No	49	22.0	1.93±0.47				
Have you been exposed to positive behaviors from your environment because you are a healthcare worker during the COVID-19 Pandemic process? ^d	Appreciation by the patient/patient relatives				n	%		
	Appreciation by family/relatives				81	36.3		
	Appreciation and thanks from neighbours				133	59.6		
	Priority or convenience in shopping				62	27.8		
	Other				31	14.4		
					7	3.1		
		n	%	%25 Percentiles	Median	%75 Percentiles	U	p
Thinking that she/he is more likely to get an infection because she/he works in a hospital	Yes	197	88.3	1.70	2.00	2.30	2341,00	0.539 ^c
	No	26	11.7	1.57	1.90	2.32		

Abbreviations: SD, standard deviation

^aIndependent t test^bOne-way ANOVA was performed with post-hoc tests and according to the post-hoc analysis, it was indicated which groups caused the difference.^cMann-whitney U^dParticipants were able to tick more than one option.

Table IV. Healthcare professionals' perceived stress and their use a supportive product/drug treatment to protect against COVID-19 (n=223)

		n	%	M±SD	t/F	p value		
The situation of using a supportive product or drug therapy to protect against COVID-19	Yes	118	52.9	2.05±0.39	2.644	0.009^a		
	No	105	47.1	1.90±0.45				
					n	%		
Have you used a supportive product or medication to protect yourself from COVID-19? ^c	Vitamin Complex	81	36.3					
	Vitamin C	71	31.8					
	Herbal tea	48	21.5					
	Beta glucan (imunex)	34	15.2					
	Pollen, royal jelly, honey	22	9.9					
	Pro-prebiotics	15	6.7					
	Plaquenil (Hydroxychloroquine), Daflon (flavonoid), Tamiflu/Enfluvir (osteltamavir)	15	6.7					
	Fish oil	12	5.4					
	Pilates	5	2.2					
	Echinacea (sambucol)	5	2.2					
	Music therapy	2	0.9					
	Ozone therapy	2	0.9					
	Pelargonium sidoides (umca)	1	0.4					
	Phytotherapy	1	0.4					
Other	1	0.4						
Have you used a supportive product or medication to protect yourself from COVID-19? ^c	I didn't feel the need to be protected	66	29.6					
	I don't think it provide the necessary protection	25	11.2					
	I don't know enough	10	4.5					
	I was undecided	10	4.5					
	I didn't get it because it was expensive	6	2.7					
	I was afraid of the side effects	4	1.8					
I could not obtain the drug or preparation	1	0.4						
If you could use a supportive product or medication to protect yourself from COVID-19, which would you prefer? ^c	Vitamin C	28	12.6					
	Vitamin Complex	26	11.7					
	Pollen, royal jelly, honey	19	8.5					
	Ozone therapy	9	4.0					
	Tamiflu/Enfluvir (osteltamavir) etc.	4	1.8					
	Plaquenil	3	1.3					
Daflon (flavonoid)	1	0.4						
		n	%	%25 Percentiles	Median	%75 Percentiles	U	p
The use of hydroxychloroquine (Plaquenil) to protect against COVID-19	Yes	15	6.7	1.60	2.10	2.30	1465.5	0.694 ^b
	No	208	93.3	1.70	2.00	2.30		
The situation of recommending hydroxychloroquine (Plaquenil) to your relatives in order to protect against COVID-19	Yes	10	4.5	1.50	1.60	1.85	613.000	0.023^b
	No	213	95.5	1.70	2.00	2.30		
The use of hydroxychloroquine (Plaquenil) by relatives to protect against COVID-19	Yes	27	12.1	1.60	1.60	2.30	2440.500	0.512 ^b
	No	196	87.9	1.70	1.70	2.30		
		n	%					
Dose of hydroxychloroquine (Plaquenil) to protect from COVID-19	I did not use	208	93.3					
	1 tablet daily	6	2.7					
	2 tablets per day	3	1.3					
	1 tablet in 21 days	6	2.7					
If you have not used hydroxychloroquine (Plaquenil) to protect against COVID-19, what is the reason ^c	I don't know enough	80	35.9					
	I didn't think I should use	51	22.9					
	I was afraid of the side effects	31	13.9					
	I don't think it's effective	37	16.6					
	I was undecided	18	8.1					
	I couldn't get the cure	9	4.0					
Where did you get information about the use of hydroxychloroquine (Plaquenil)?	I read scientific article	27	12.1					
	My doctor recommended	15	6.7					
	I heard from the media	12	5.4					

Abbreviations: SD, standard deviation.

^aIndependent t test^bMann-whitney U^cParticipants were able to tick more than one option.

DISCUSSION

This study was conducted to determine the possible factors affecting the level of stress perceived by healthcare workers during the COVID-19 pandemic. It can be seen that the level of perceived stress decreases as the age of the participants increases. We determined in our study that the perceived stress of nurses was higher than in other professions. Similar to our research, other studies also show that one's profession has an impact on the level of perceived stress, and nurses are more affected than other healthcare workers (4, 5, 9, 11, 24). Our study showed that men, unmarried individuals, and those without children had higher stress levels. In a study conducted with healthcare professionals caring for COVID-19 patients, stress levels were reported higher in women and unmarried individuals and also that stress increases as the number of children increases (19). When the literature is examined, similar to our study, sociodemographic factors affecting the stress level of healthcare workers are found (25, 26).

In our study, the participants stated that they often paid attention to their nutrition, sleep, and physical activities to protect themselves from COVID-19. Similarly, it was reported in a study carried out with health workers and students that the participants focused on their nutrition, exercising and sleeping patterns to protect themselves from COVID-19 (13). We found in our study that smokers, those who did not take time out for themselves, who did not eat and exercise regularly had higher perceived stress levels. The above two results are consistent, and it is seen that the health behaviors of health workers with higher perceived stress levels are more positive.

In our study, we saw that those who cared for a probable/definitively diagnosed COVID-19 patient had higher perceived stress levels than those who did not, those who worked on the COVID-19 frontlines had higher perceived stress compared to those who did not work in this area. Those who worked in surgical units had higher perceived stress than those in administrative departments. At Akdeniz University, where the study was conducted, the first cases of COVID-19 were seen in the surgical units, which resulted in placing all members of the team in quarantine from time to time. This situation led to increased stress levels among the health workers, demonstrating that employees' stress levels were affected by the location they worked in. These three results are consistent with each other, and it can be seen that serving a patient diagnosed with COVID-19 increases stress, pointing to the importance of working conditions in terms of protecting not only the physical health of health workers but also the individual's psychological state. There are studies with similar results in the literature (5, 6, 19). Even having a colleague diagnosed with COVID-19 was cause for experiencing a higher level of stress, again providing evidence of the negative impact of the COVID-19 pandemic on healthcare workers. In addition, higher stress was detected in those whose working place and hours changed. A study shows that healthcare

workers who rotated from other units to the COVID-19 frontlines experience higher levels of stress (19).

In our study, the most common difficulties encountered during working in the COVID-19 Units were the difficulty of putting on and taking off PPE, sweating heavily because of the equipment, and experiencing redness, sores, edema, and other conditions. There are studies in the literature showing that there are similar problems related to PPE. A study examining the effect of PPE on facial skin determined that healthcare workers experienced more severe facial skin lesions than others (12). A study examining the physical problems of healthcare workers that were associated with wearing PPE during the COVID-19 outbreak revealed skin, respiratory, musculoskeletal, nervous, urinary, and circulatory system problems. However as stated earlier, the most common physical problems were skin problems (27). It should not be forgotten that the problems the health workers had with the frequent use of PPE were likely to cause them to avoid using the equipment, resulting in leaving the individual unprotected.

Due to the COVID-19 pandemic, many healthcare workers lived in different places from their families or had to engage in home isolation. It has been suggested that those who may carry the virus can be exposed to the negative behavior displayed by the people in the environment. We concluded in our study that all of these situations increased the stress perceived by the participants. It should not be overlooked that during the pandemic, healthcare professionals struggled not only in the health institutions where they worked but in a social context as well. Being separated from the family during the quarantine period, being stigmatized in society, and living more extended quarantine periods adversely affected health workers (10). Changes in family relationships and cohesion during the COVID-19 pandemic affected the perceived stress of healthcare professionals (11).

In our study, 53% (118) of participants had used a supplement or medication to protect themselves from COVID-19, and the perceived stress of this group was higher. Similar to our study, it has been reported in other research that approximately 50% of participants use a specific product to protect themselves from COVID-19 (13, 16). The participants in our study stated that they frequently made use of a vitamin complex supplement, vitamin C, herbal tea, beta-glucan, pollen, royal jelly, honey, pre-probiotics, and drugs such as Plaquenil (Hydroxychloroquine), Daflon (flavonoid), Tamiflu/Enfluvir (oseltamivir) as protection against the virus. Similar to our study, that healthcare professionals used products such as vitamin C, vitamin D, vitamin complex, zinc, honey, fish oil (omega-3), ginger, turmeric, royal jelly/propolis, herbal tea, and hydroxychloroquine (13, 14, 16, 17). Health workers can feel that they are at risk as a result of the type of work they are engaged in and they can be pressured into taking various precautions without regard to whether the product they are relying on is effective or not. An important factor to con-

sider is the potential danger that threatens health workers when they try to make use of products and means whose degree of protection against COVID-19 has not yet been proven.

Limitations

A limitation of this study is that the data were collected from a single center, which may limit the generalizability of the findings. Another limitation is that the random sampling method was not used. Additionally, the perceived stress levels of healthcare workers may vary over time, and fluctuations in stress levels might not have been fully captured during the dynamic course of the pandemic. However, the data for this study were obtained during the peak period of the COVID-19 pandemic, minimizing the potential for recall bias.

CONCLUSIONS

Protecting the health of healthcare professionals is just as crucial as safeguarding the well-being of all workers. During periods of increased demand for healthcare services, such as pandemics, preserving the healthcare workforce becomes even more critical. Although healthcare workers are exposed to multiple risk factors, psychosocial risks are among the most significant. Our study revealed that perceived stress levels were higher among those with inadequate health behaviors (such as failing to seek psychological support, poor nutrition, and lack of exercise), those providing care to suspected or confirmed COVID-19 patients, individuals whose colleagues had been diagnosed with COVID-19, those who experienced changes in their working hours and/or locations, those involuntarily assigned to COVID-19 units, individuals living separately from their families, those in home isolation, those stigmatized as virus carriers, and those using supportive products or medications. Conversely, participants who did not experience these conditions reported lower levels of perceived stress. Furthermore, nurses exhibited higher perceived stress levels compared to other healthcare professionals. Participants also reported challenges in the use of PPE.

Given the high levels of risk and stress inherent in their profession, it is crucial to implement appropriate preventive measures for healthcare workers. Employers should systematically assess employees' stress levels and develop practical, field-applicable, and sustainable measurement tools to facilitate this assessment. As healthy lifestyle behaviors positively influence perceived stress, all healthcare workers—particularly nurses—should receive targeted training on this subject, and institutional policies should be established accordingly. Additionally, designing and producing more ergonomic personal protective equipment (PPE) may improve both its usability and comfort. Furthermore, our findings indicate that elevated stress levels may prompt healthcare professionals to use so-called 'protective products' without scientific evidence supporting their efficacy. Therefore, targeted educational initia-

tives are essential to prevent misinformation and promote the safe use of health-related products. Finally, we recommend conducting large-scale, multi-center studies to assess healthcare professionals' post-pandemic stress levels, health behaviors, working conditions, social lives, and the protective products they use to prevent illness

Ethical approval

Institutional approvals for the conduct of the study were obtained from the Akdeniz University Faculty of Medicine Clinical Studies Ethics Committee (24.06.2020/430) and Akdeniz University Hospital. Written informed consent was received from all participants.

Informed Consent

All the participants' rights were protected and written informed consents were obtained before the procedures according to the Helsinki Declaration.

Author Contributions

Concept – HHA, HO; Design - HHA, HO; Supervision - HHA, HO; Resources HHA, HO; Materials - HHA, HO; Data Collection - HO; Analysis and Interpretation - HHA, HO; Literature Search - HHA, HO; Writing Manuscript - HHA, HO; Critical Review - HHA, HO.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

The authors declare that they have no conflicts of interest in this paper.

Acknowledgments

We are grateful to the individuals who volunteered to participate in this study.

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