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A comparative study on acute stress levels of healthcare professionals and public in COVID-19 pandemic

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Abstract

COVID-19 pandemic has resulted in important consequences for healthcare workers, such as long shifts, staying away from family members due to the risk of illness, and working under intense stress. Outbreaks are considered as traumatic factors like other natural disasters and are expected to cause trauma-related disorders. In this study, it was aimed to determine the acute stress levels and stress responses of both the community sample and healthcare workers via using the National Stressful Events Survey Acute Stress Disorder Short Scale (NSESSS). A total of 1027 volunteers, including 387 healthcare workers and 640 non-healthcare workers, participated in the study. The NSESSS levels of non-healthcare workers were significantly higher than healthcare worker, females compared to males, and singles than married ones. As the thought that work justice was provided in healthcare workers increased, NSESSS levels decreased. As the difficulty of finding protective equipment in healthcare workers decreased, NSESSS levels decreased. Nurses' ages, time spent on duty, and NSESSS levels were significantly higher than physicians and other healthcare workers. In the pandemic period, it can be a guide in determining the risk factors and risk groups in terms of acute stress, taking preventive mental health measures, and providing early intervention.

Keywords: Acute stress, pandemic, healthcare workers

Introduction

Pandemics are outbreaks that occur over a wide geographic area and affect a very high proportion of the population simultaneously [1]. New Coronavirus disease that occurs with unexplained cases of pneumonia in Wuhan, China, reached a pandemic level that affected all countries of the world in a short time and was defined as the COVID-19 epidemic by the World Health Organization [2]. In the world, as of the eighth month of the epidemic (12 November 2020), 51,251,715 people were infected, 1,270,930 people died [3]. In Turkey, the first case was reported on 11 March 2020, 402 053 people were infected, and 11 145 people died until now (12 November 2020) [4].

During the pandemic period, people may have problems with food, shelter, and meeting many basic needs due to illness. It is known that epidemic diseases that threaten the physical health of society and individuals significantly affect mental health [5]. During the pandemic period, one's concerns about the health of himself and his loved ones, being under quarantine, decreased social interactions, uncertainty about the future, financial anxiety may appear as symptoms of depression, anxiety, stress, and trauma [6–8].

Many healthcare workers fell ill and unfortunately died due to the COVID-19 all over the world and in our country, many. COVID-19 pandemic caused extraordinary measures to be taken nationally and globally and has resulted in important consequences for healthcare workers, such as long shifts, staying away from family members due to the risk of illness, and working under intense stress. Factors such as the prevalence of the COVID-19 pandemic and the lack of a known treatment method, increased number of patients, risky working conditions, and transmission anxiety for the disease have been important sources of stress for healthcare workers. This stressful environment can cause mental effects on both the community and healthcare workers in a prolonged period.

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In this traumatic process, strategies to strengthen mental health can reduce the negative psychological effects [9]. For this reason, plans should be made for mental support for high-risk groups. Being aware of this need, World Health Organization declared the theme of World Mental Health Day as "Mental Health for All" and tried to explain the importance of the issue to the whole world [10].

It is known that there are psychological effects after the COVID-19 pandemic such as anxiety and hopelessness in healthcare workers [11]. Outbreaks are considered as traumatic factors like other natural disasters and are expected to cause trauma-related disorders. After traumatic stress, many diseases such as post-traumatic stress disorder (PTSD), major depression, anxiety disorders, somatization disorder can occur [12,13]. PTSD is a disorder characterized by re-experiencing the event after a traumatic event, pessimistic thoughts, avoidance, and irritability experiences. PTSD causes impairment in the person's functionality, and one month must pass after the traumatic event to meet the diagnostic criteria. On the other hand, acute stress disorder defines the symptoms in which dissociation symptoms can be seen in addition to similar symptoms, starts immediately after the trauma and lasts up to one month. Studies have shown that acute stress disorder is a predictor of post-traumatic stress disorder [14–16]. In acute stress disorder or PTSD, the person does not need to be directly exposed to a traumatic event but a traumatic life to witness. People involved in relief efforts may fall into this second group and experience indirect or secondary trauma. People who are exposed to secondary trauma may experience psychological effects, as in the person directly experiencing the event. Studies conducted with healthcare workers who have been involved in the 2003 SARS (SARS-CoV) and 2012 MERS (MERS-CoV) outbreaks have reported that these people are in the high-risk group for developing PTSD. Considering that the same risks are also present in this pandemic period, it was pointed out that effective intervention strategies should be developed in order to minimize the negative psychological effects that may occur in healthcare workers [17,18]. In our study, it was aimed to determine the acute stress levels and stress responses of both the community sample and healthcare workers. The data of our study are thought to be a guide for risk assessment for mental disorders and planning protective interventions. We hypothesize that healthcare workers will have higher acute stress levels than the community sample. Our second hypothesis is that the acute stress levels of healthcare workers whose working conditions deteriorate will increase. Our final hypothesis is that acute stress levels will differ according to gender.

Materials and Methods

The study was approved by the Yozgat Bozok University Ethics Committee (2017-KAEK-189_2020.05.19_17). The data collection process was performed in accordance with the rules of the Declaration of Helsinki. All participants were informed that their information was coded and was kept confidential.

Procedure

This research is a cross-sectional study in which scales are applied online to evaluate the acute stress levels of healthcare workers and community members in the COVID-19 pandemic and determine the factors affecting them. Sociodemographic data form created by the researchers, Severity of Acute Stress Symptoms—Adult (National Stressful Events Survey Acute Stress Disorder Short Scale [NSESSS]) was created in Google Forms and delivered to both healthcare workers and non-healthcare workers via social media. As social media agents, survey invitations were sent to WhatsApp groups and Facebook groups consisting of psychiatrists. No sponsored or advertising-mediated promotion was done.

Sample selection

In the power analysis before the study, when alpha 0.05 and power were determined as 80%, it was found sufficient to enroll 762 people in the study. The forms for the study were sent to three thousand non-healthcare workers and two thousand healthcare workers via social media. A total of 1027 volunteers, including 387 healthcare workers and 640 non-healthcare workers, participated in the study (Figure 1).

Measurement tools

All data collection tools were delivered to participants with the Google Forms application between 15-30 May 2020, and they were filled online. Those whose sociodemographic data and scales were completely filled were evaluated, and incomplete or abandoned forms were not included. The individuals who agreed to participate in the study were informed about the study and were asked to provide their electronic informed consent. After informed consent, those who agreed to participate in the study were able to continue to filling the scales. The electronic form consists of 2 parts and a total of 28 questions. In the study, identity control or e-mail address registration was not requested in order to collect data anonymously.

Sociodemographic data form

It was created by researchers. In addition to information such as age, gender, and occupation of the participants, it also includes questions such as whether there are individuals from the risky group at home and whether there are difficulties in child care.

Severity of Acute Stress Symptoms—Adult (National Stressful Events Survey Acute Stress Disorder Short Scale [NSESSS])

The American Psychiatric Association recommends various scales for use in initial interviews with patients and for evaluating the treatment process. These scales are used as auxiliary tools in diagnosis. One of them is "Severity of Acute Stress Symptoms-Adult (National Stressful Events Survey Acute Stress Disorder Short Scale [NSESSS])" developed to evaluate the severity of acute stress symptoms in DSM 5. It is a 7-item scale that measures the symptom severity of acute stress disorder occurring after an extremely stressful event or experience in individuals aged 18 and over, based on DSM-5 acute stress symptoms [19]. Each item in the scale is graded over 5 points. (0 = Not at all; 1 = A little; 2 = Fair; 3 = Quite a lot; 4 = Extremely). The total score can range from 0 to 28, and higher scores indicate that acute stress disorder is more severe. The average total score is calculated by dividing the raw total score by the number on the scale. In 2017, a validity and reliability study was carried out by Aşçıbaşı et al., and it was adapted to Turkish [20]. In the Turkish validity and reliability study, Cronbach's alpha coefficient for internal consistency was 0.95.

Statistical analysis

The data analysis was performed using the SPSS 22.0 (Statistical Package for the Social Sciences, IBM Inc., Chicago, IL, USA) program. Kolmogorov-Smirnov test, histogram, Skewness, and Kurtosis values were used for normality distribution. Chi-square (x2) for the comparison of categorical groups, Pearson correlation analysis for the correlation analysis of values with normal distribution, and Spearman correlation analysis for those not showing normal distribution was performed. Independent samples t-test was used to compare the means of two independent groups with normal distribution, and the Mann-Whitney U test was used to compare the median of two independent groups that did not show normal distribution. One Way ANOVA test was used for comparisons of 3 independent groups showing normal distribution. Analysis of Variance (ANOVA) was applied to eliminate the effect of gender on NSESSS levels in healthcare workers, and gender covariant was taken. In the comparison of 3 independent groups, if the distribution of variances was not homogeneous, Welch statistic was used (Levene's p <, 05). The Kruskal Wallis H Test was used for comparing three independent groups of scales that did not show normal distribution. In cases where there was a significant difference between the groups, comparisons of the two groups were made, and Bonferroni correction was applied to determine which groups the difference was between. The significance level was accepted as 0.05.

Results

One thousand twenty-seven people participated in the study. 64.6% of the participants were female (n: 670), 35.4% were single (n: 366), 37.7% were healthcare workers (n: 387). Other sociodemographic data of the participants are shown in Table 1

46.8% of the participants in the study were physicians (n: 181; female / male: 87/94), 30.5% were nurses (n: 118; female / male: 112/6). 69.0% of them were working in a hospital where COVID-19 monitoring was performed. Other findings of healthcare workers are shown in Table 2

Table 1. Sociodemographic variables of the participants (n: 1027)

Gender	n	%	x^2	p
Male	364	35.4	8.746	0.004
Female	663	64.6		
Marital status				
Single	364	35.4	8.746	0.004
Married	663	64.6		
Place of residence				
Metropolitan	811	79.0	33.566	<0.001
City or county	216	21.0		
Number of child				
None	424	41.3		
1	206	20.1		
2	326	31.7		
3	64	6.2		
4 or more	7	0.7		
Difficulty in child care (n:595)				
Yes	212	35.6	49.145	<0.001
No	383	64.4		
Individual for high risk at home				
Yes	347	33.8	10.514	<0.001
No	680	66.2		
History of psychiatric disorder				
None	858	83.5		
Previous mental illness none, but have after pandemic	18	1.7		
Have previous mental illness and still there is.	56	5.5		
Have previous mental illness, but still there is not.	55	5.5		
Others	39	3.8		
Employment status				
Healthcare worker	387	37.7	6.069	0.014
Non-healthcare worker	640	62.3		

Table 2. Working conditions of healthcare workers (n: 387)

Occupation	n	%	x^2	p
Physician	181	46.8	9.026	0.011
Nurse	118	30.5		
Others	88	22.7		
Covid-19 treatment in the hospital				
Yes	267	69.0	14.429	<0.001
No	120	31.0		
Change in working hours in pandemic				
Increased	42	10.9	43.800	<0.001
Decreased	245	63.3		
No change	100	25.8		
Place of work				
Family Health / Community Health Center	30	7.8		
Operating room	11	2.8		
Non-covid outpatient unit	46	11.9		
Non-covid intensive care	8	2.1		
Covid outpatient unit	58	15.0		
Covid intensive care	14	3.6		
Pharmacy	9	2.3		
Covid emergency service	23	5.9		
Non-covid emergency service	3	0.7		
Hospital, others	185	47.9		
Working with shifts				
Shifts for four hours	6	1.6		
Shifts for eight hours	55	14.2		
Shifts for 12 hours	24	6.2		
Shifts for 24 hours	72	18.6		
Others	97	25.1		
No shifts	133	34.3		
Shifts for four hours	Frequency	%		
None	79	20.4		
Some	125	32.3		
Quite	114	29.5		
Completely	69	17.8		
Difficulty in obtaining protective equipment or supplies	Frequency	%		
None	107	27.6		
Some	194	50.1		
Quite	66	17.1		
Completely	20	5.2		

The NSESSS levels of non-healthcare workers were significantly higher than those of a healthcare worker, females compared to males, and singles than married ones (Table 3).

As the thought that work justice was provided in healthcare workers increased, NSESSS levels decreased ($r = -0.229$, $p < 0.001$). As the difficulty of finding protective equipment in healthcare workers decreased, NSESSS levels decreased ($r = -0.199$, $p < 0.001$).

The NSESSS levels of those working in the hospital where COVID-19 patients were followed were similar to those working in the hospital where COVID-19 patients were not followed (Table 4).

Table 3. Comparison of sociodemographic variables among healthcare workers and non-healthcare workers

	Healthcare worker (37.7%; n:387) (Mean±SD)		Non-healthcare worker (62.3%; n:640) (Mean±SD)		Comparison	
					t+	p
Age	37.57±8.88		38.52±13.49		1.237	0.217
NSESSS	9.08±5.31		10.12±5.18[a]		3.107	0.002
Gender	n	%	n	%	x2++	p
Female	259	66.9	404	63.1	1.522	0.217
Male	128	39.1	236	36.9		
Gender	Female (64.6%; n:663)		Male (35.4%; n:364)		t+	p
Age	37.12±10.92		40.05±13.49[a]		3.783	<0.001
NSESSS	10.76±5.30[a]		7.86±4.61		-8.777	<0.001
Marital status	Married (64.6%; n:663)		Single (35.4%; n:364)		t+	p
Age	42.08 ±10.72[a]		31.02±10.81		-15.766	<0.001
NSESSS	9.17±5.04		10.75±5.48[a]		5.651	<0.001
Place of residence	Metropolitan (79.0%; n:811)		City or county (21.0%; n:216)		t+	p
Age	38.42 ±11.92		37.17 ±12.14		1.366	0.172
NSESSS	9.56±5.11		10.35±5.70[a]		-1.979	0.048

+Independent samples t-test; ++ Chi-square; SD: Standard deviation; n: Number of participants; NSESSS: Severity of Acute Stress Symptoms—Adult (National Stressful Events Survey Acute Stress Disorder Short Scale; aSignificantly higher than other groups

Table 4. The effect of working hospital whether COVID-19 is treated or not on NSESSS levels

	Working hospital where COVID-19 is treated (69.0%; n:267)		Working hospital where COVID-19 in not treated (31.0%; n:120)		Comparison+	
					t	p
Age	36.96±8.23[a]		38.93±10.07		-2.038	0.042
Duration in profession (year)	13.84±9.10		15.71±10.28		-1.790	0.074
NSESSS	8.91±5.42		9.44±5.04		-0.905	0.366
Weekly working hours	%	n	%	n	x2++	p
Decreased	65.9	176	57.5	69	8.736	0.015
Stay same	21.7	58	35.0	42		
Increased	12.4	33	7.5	9		

+Independent samples t-test; ++ Chi-square; NSESSS: Severity of Acute Stress Symptoms—Adult (National Stressful Events Survey Acute Stress Disorder Short Scale; aSignificantly lower than other groups

Nurses' ages, time spent on duty, and NSESSS levels were significantly higher than physicians and other healthcare workers (Table 5). NSESSS levels of other healthcare workers were significantly higher than physicians (Table 5). During the COVID-19 pandemic, the NSESSS levels of those whose weekly working time increased were significantly higher than those who did not change and decreased their weekly working time (Table 5).

When post-hoc power analysis is performed for comparation of NSESSS level in healthcare workers and non-healthcare workers with alpha 0.05, the effect size was 0.200, and the power of the study was found to be 0.958. For NSESSS level in healthcare workers effect size was 0.459, and the power of the study was found to be 0.999.

Table 5. Comparison of age, duration in profession, and NSESSS levels of healthcare workers according to their occupations and weekly working hours

	Physician (46.8%; n:181) (Mean±SD)	Nurse (30.5%; n:118) (Mean±SD)	Other health-care workers (22.7%; n:88) (Mean±SD)	Comparison[+]		Post Hoc test (Tukey HSD) (p-values)		
				F	p	Physician-Nurse	Physician-Other healthcare workers	Nurse-Other healthcare workers
Age	37.14±9.12	39.97±8.43[a]	35.23±8.29	7.833	<0.001	0.018	0.213	<0.001
Duration in profession (year)	13.02±9.30	19.29±9.3[a]	10.78±7.49	27.099	<0.001	<0.001	0.133	<0.001
NSESSS[+]	6.82±4.31	11.82±5.7[a]	10.03±84.57[b]	40.380	<0.001	<0.001	<0.001	0.024
NSESSS[++]	6.88*	10.74*	10.01*	18.093	<0.001	<0.001	<0.001	1.000
Weekly working hours	Decreased (63.3%; n:245)	Stay same (25.8%; n:100)	Increased (10.9%; n:42)	F	p	Decreased-Stay same	Decreased-Increased	Stay same-Increased
Age	36.17±8.20[c]	40.94±9.79	37.69±8.45	10.770	<0.001	<0.001	0.544	0.104
Duration in profession (year)	12.91±8.59[c]	17.95±10.87	14.81±9.12	10.490	<0.001	<0.001	0.441	0.158
NSESSS	8.42±5.07	9.58±4.80	11.74±6.77[d]	7.900	<0.001	0.146	<0.001	0.064

[+]Analysis of Variance (ANOVA); [++]Analysis of Covariance (ANCOVA); *Estimated means; NSESSS: Severity of Acute Stress Symptoms—Adult (National Stressful Events Survey Acute Stress Disorder Short Scale; SD: Standard deviation; n: Number of participants [a]Significantly higher than physicians and other health care workers; [b]Significantly higher than physicians; [c]Significantly lower than those with weekly working hours stay same; [d]Significantly higher than those with weekly working hours decreased

Discussion

The main findings of this study are:

a) NSESSS levels among non-healthcare workers are higher than those of healthcare workers

b) Whether working in hospitals where COVID-19 patients are admitted does not affect NSESSS levels.

c) Nurses' NSESSS levels, age, and time spent on duty were significantly higher among healthcare workers than physicians and other healthcare workers. NSESSS levels of other healthcare workers are significantly higher than physicians.

d) The NSESSS levels of healthcare workers whose weekly working hours are increased are significantly higher than those whose weekly working hours are decreased.

e) NSESSS levels were significantly higher in females than males and in singles compared to married ones.

f) The increase in the idea that work justice is ensured among healthcare workers decreases the NSESSS levels.

Although healthcare workers being at the forefront of coping against the epidemic is an important risk factor for psychological problems [21–23], studies are showing that non-healthcare workers feel the more psychological burden in the COVID-19 outbreak than healthcare workers [24]. In a previous study evaluating the psychological effects of the COVID-19 pandemic on healthcare workers, it was reported that more than half of the participants had high-stress levels [25]. In another study evaluating health workers and non-healthcare workers, the hopelessness and state anxiety levels of healthcare workers were found to be higher than non-healthcare workers [11]. We hypothesized that healthcare workers trying to cope with a situation of uncertainty would have higher acute stress levels compared to the community sample. Unexpectedly, non-healthcare workers were found to have higher NSESSS levels than healthcare workers in our study. The fact that healthcare professionals have more information about the pandemic and understand the process more easily may be the reason for the lower acute stress levels [26]. Consistent with the data of our study, in a study conducted in Australia in terms of levels of depression, anxiety, stress, and quality of life, HCWs were found to fared the best. This has been interpreted as HCWs better managing their mental health-related well-being in the face of a pandemic, which is a medical crisis [27].

It is an expected finding and consistent with the literature that the NSESSS levels of nurses who are in contact with patients for a long time and who provide primary care to them are significantly higher than physicians and other healthcare professionals [28,29]. The fact that COVID-19 is a highly contagious disease increases the risk of infection of those who provide direct health care to patients [30]. The significantly higher NSESSS levels of other healthcare workers compared to physicians can also be explained by their physical contact with infected patients. The fact that nurses have more close physical contact, especially with patients receiving inpatient services, compared to physicians, may be a predictive factor [21]. In the Covid-19 pandemic, many healthcare workers work in pandemic services and polyclinics outside of their own units. Close contact with infected patients is a new and negative working condition for many of them. A study conducted with physicians and nurses indicated that negative life events were associated with anxiety and depression, and it was revealed that physicians experienced more work-related negative events than nurses, but nurses had higher symptoms of anxiety and depression compared to physicians [31]. The reason for the

higher NSESSS levels of nurses compared to physicians and other healthcare workers can also be explained by the higher female gender in nurse groups and because of women report higher stress symptoms [23,32,33]. In our study, 48.1% of the physicians were women, while 94.9% of the nurses were women. Considering that gender may have an effect on these results, Analysis of Covariance (ANCOVA) statistics were applied, and gender covariant was taken. When the gender effect excluded as a result of the analysis, NSESSS levels in nurses were significantly higher than in physicians.

In our study, it was found that the NSESSS levels of women were significantly higher than men in all participants. The literature shows that women report more severe depression, acute stress disorder, and PTSD symptoms [34–37].

In our study, it was found that the NSESSS levels of healthcare workers with increased weekly working hours were significantly higher than those whose weekly working hours did not change or decreased. The increase in working hours, which can be considered as an occupational challenge in a period of high uncertainty and stress factors such as a pandemic, may have caused the stress levels of healthcare workers to be high. Increasing working hours bring along the increase of time spent with infected patients, increase of time spent away from the family, decrease in social support, and physical fatigue [38].

In a study, a significant increase was observed in the perceived stress levels of nurses who observed an increase in weekly working hours [39].

Our study should be evaluated with some limitations. Firstly, identity control or e-mail address registration was not requested in order to collect data anonymously. For this reason, no measures were taken to prevent more than one form being filled. Secondly, in our study, the participants were evaluated cross-sectionally in the early days of the pandemic. How factors such as the prolongation of the pandemic and vaccination affect the stress levels of people in the long term can be investigated in future studies. Finally, the forms and scales used in the study were applied online, and a face-to-face psychiatric evaluation could not be made with the participants. Although studies in which clinical interview and scale scores were evaluated together allowed us to obtain stronger data, they could not be conducted considering that it could increase the risk of infection transmission.

As a result, in the COVID-19 pandemic, the NSESSS levels of non-healthcare workers were found to be higher than healthcare workers, and women than men. The increase in working hours in healthcare workers and NSESSS levels in nurses are higher than in other healthcare workers. As a result of the current scientific data, there is no effective treatment and vaccine yet for COVID-19 infection. Therefore, it is estimated that the effects of the pandemic will affect the whole world in the coming years. In the pandemic period, it can be a guide in determining the risk factors and risk groups in terms of acute stress, taking preventive mental health measures, and providing early intervention. This study was conducted in the early stages of the COVID-19 pandemic. The protracted pandemic, uncertainties regarding treatment and vaccination, increased working hours, and the abolition of leaves and resignations can affect people's acute stress symptoms. Therefore, by planning a long-term follow-up study on the same group, more contributions can be made to the literature data.

Conflict of interests
The authors declare that they have no competing interests.

Financial Disclosure
All authors declare no financial support.

Ethical approval
The study was approved by the Yozgat Bozok University Ethics Committee (2017-KAEK-189_2020.05.19_17). The data collection process was performed in accordance with the rules of the Declaration of Helsinki. All participants were informed that their information was coded and was kept confidential.)

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