



## Assessment of Anxiety in Healthcare Providers Working in ICU during COVID-19 Pandemics

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### Authors' contributions

This work was carried out in collaboration among all authors. Author HD designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors HD and ESKK managed the analyses of the study, managed the literature searches. Author BK performed the statistical analysis. All authors read and approved the final manuscript.

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### ABSTRACT

**Objective:** After onset of coronavirus disease (COVID-19), the risk for exposure or having the disease is increased among healthcare providers involved in the treatment of the disease. There are reports of healthcare providers died due to COVID-19 disease who became ill during work. This resulted in psychological distress in healthcare providers. In this study, we aimed to investigate anxiety in healthcare providers working at intensive care units, considered as an area at highest risk, and to confirm social psychological factors among healthcare providers working in hospitals.

**Materials and Methods:** The study included 106 healthcare providers working in intensive care unit who accepted participation to the survey. The healthcare providers responded to survey were stratified into 2 groups as those working in pandemic intensive care unit (pandemic group; n=55) and those working in remaining intensive care units (others; n=51). The relationship between sociodemographic characteristics and levels of anxiety and depression was evaluated using State-Trait Anxiety Inventory.

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**Results:** In our study, it was found that STAI anxiety scores were higher in healthcare providers working in pandemic intensive care unit during COVID-19 outbreak ( $p < 0.05$ ). In the pandemic group, anxiety scores were significantly higher in male healthcare providers when compared to female healthcare providers ( $p > 0.05$ ). However, it was seen that healthcare providers with work experience of 1-10 years had higher mean anxiety level in STAI-II scale. It was also seen that anxiety score was significantly higher in those with work experience of 1-10 years when compared to those work experience of 11-20 years or  $\geq 21$  years ( $p < 0.05$ ). Work setting, male gender, experience of intensive care and concerns about outbreak were identified as factors associated to anxiety.

**Conclusion:** Our study showed that STAI anxiety scores were higher in healthcare providers working in pandemic ICU during COVID-19 outbreak. The COVID-19 period has led psychological problems in healthcare providers working in ICU. It is important to provide psychological support and information, and to monitor psychological status in healthcare providers.

*Keywords: COVID-19; anxiety; psychology; mental health; emotional epidemiology; intensive care unit; STAI.*

## 1. INTRODUCTION

In December 2019, several pneumonia cases with unknown etiology have been reported from Wuhan Province, China and evolved to a global pandemic [1]. The causative agent was initially designated as acute respiratory distress syndrome-coronavirus-2 (SARS-CoV-2); subsequently, it was denoted as coronavirus disease-2019 by World Health Organization (WHO) [2,3]. Upon May 19, 2020, the disease affected more than 4,600,000 people and it caused more than 312,000 deaths worldwide [4]. The COVID-19 disease continues to spread in the world. The healthcare facilities and hospitals, where patients with COVID-19 presented and diagnosis and treatment interventions were performed, have become most risky areas for infection. The risk for exposure and being infected is increased in healthcare providers as they involve in the management of disease; in addition, it is also associated with risk for loss of healthcare providers dealing with COVID-19 outbreak [1-3]. This also resulted in psychological problems in healthcare providers [5]. Every day, many reports are being published about COVID-19 outbreak worldwide. In particular, disease and death reports of healthcare providers enhance concerns and personal hazard awareness among healthcare providers and their families. In addition, healthcare providers have concerns for both their own health and their families' health. Together with concerns regarding being infected, safety of co-workers and peers, solitariness and higher levels of expectations from many lead increased levels of anxiety in healthcare providers [5,6].

The anxiety is universal emotion occurring as an innate response against conditions where an individual feels himself/herself insecure. The anxiety is a state perceived and absorbed by conscious ego as herald of danger, alert and protection to a threat, attempt to seek uncertainty and indeterminate [7,8]. The anxiety can be seen as transient (state anxiety) or stable tendency (trait anxiety). The trait anxiety is characterized by prolonged (even lifetime) response of anxiety against changes in life and can be frequently seen in association with anxiety-related personality disorder [7-9]. The anxiety experienced during daily life of an individual is an essential strength for life and motivates for success [7]. The anxiety levels may vary across individuals and behaviors are affected by extent of stress [7]. Regardless of its level, anxiety leads alteration in physiology, perception, psychology and cognition of individuals [7-9]. Pandemics can enhance above-mentioned alterations in healthcare providers caused by anxiety.

The pandemics have negative effects on individuals and communities. The ICUs are settings which attempt to provide best care to patients with serious medical and surgical conditions. The ICUs are places where healthcare providers face many sources of physical and psychosocial stress. It is apparent that outbreaks increase the stress in the ICUs. Although many reports describing psychological effects of working in hospital were published during SARS outbreak [10], there is limited number of studies investigating risk factors that may cause anxiety in healthcare providers during COVID-19 outbreak. In our study, it was aimed to evaluate prevalence of anxiety symptoms in

healthcare providers working in ICU during COVID-19 outbreak and confirm socio-psychological factors among healthcare providers.

## 2. MATERIALS AND METHODS

The study was approved by Institutional Review Board. The study was conducted in accordance to tenets of Helsinki Declaration. This prospective study was planned as a descriptive, cross-sectional in order to identify organizational stress factors and coping strategies in clinicians and nurses working in intensive care units of a pandemic hospital. Data were collected in May, 2020. The study included 106 healthcare providers working in intensive care unit who accepted participation to the survey. The questionnaire was completed by healthcare providers working in intensive care unit via face-to-face interview method. The subjects declining to participate or those with incomplete questionnaire were excluded. Demographic information of the participants is shown in Table 1. The healthcare providers responded to survey were stratified into 2 groups as those working in pandemic intensive care unit (pandemic group; n=55) and those working in remaining intensive care units (others; n=51). The relationship between sociodemographic characteristics and levels of anxiety and depression were assessed using State-Trait Anxiety Inventory (STAI). All participants gave written informed consent. Data were collected anonymously in order to protect privacy of participants. The STAI was developed by Spielberger in 1970 and Turkish reliability and validity study was performed by Öner N and Le Compte A in 1983 [11,12,13]. The internal consistency and reliability for Turkish version was found to range from 0.94 to 0.96 at alpha consistency by Kuder Richardson et al. [12,13]. It consists of 2 scales including trait-anxiety and state-anxiety scales. Both scales include 20 items rated by using a 4-point Likert scale. Trait-anxiety scale assesses what an individual feel generally independent of conditions involved while state-anxiety scale assesses what an individual feels at a certain moment. The scores range from 20 to 80 in each scale. Higher scores indicate increased anxiety levels [11-13].

### 2.1 Statistical Analysis

Descriptive data are presented as arithmetic mean, standard deviation and minimum-maximum. Normal distribution was assessed using Kolmogorov-Smirnov test. Student's t test

was used to compare variables with normal distribution while Mann Whitney U test was used to compare variables with skewed distribution between groups. The work experience was classified into 3 groups and one-way analysis of variance was used to compare STAI scores among these groups. The variance homogeneity was tested in one-way analysis of variance using Level test. Multiple comparisons were performed using Least Significant Digit (LSD). Raw p values are presented and statistical significant level was set as 0.05. All statistical analysis were performed using SPSS version 25.0 and G\*Power software. Figures were created using MS Office Excel.

## 3. FINDINGS

Given the sample size of groups, the power and effect size of test was 85.40% and 0.528 for comparison of STAI-I scores while 80.4% and 0.489 for comparison of STAI-II scores between pandemic group and others, respectively. Table 1 presents descriptive statistics for age and work experience. No significant difference was found in age and work experience between pandemic group and others. Fig. 1 presents comparisons of STAI-I and STAI-II scores between groups. Both mean STAI-I and STAI-II scores were significantly higher in pandemic group ( $p < 0.05$ ). Comparison of genders in terms of anxiety scale is given in Fig. 2. In women, anxiety score is lower on both scales than men on average. However, the difference is not statistically significant ( $p > 0.05$ ). Table 2 presents comparison of genders according to anxiety scales within pandemic group and others. In pandemic group, anxiety scores were found to be significantly higher in men than women ( $p < 0.05$ ); however, anxiety scores were very close to each other [14-16]. Table 3 presents comparison of anxiety scores according to work experiences of healthcare providers regardless of group. In both scales, anxiety scores showed no significant difference according to work experience ( $p > 0.05$ ). However, it was seen that mean anxiety level in STAI-II scale was higher in healthcare providers with work experience of 1-10 years. Table 4 presents comparison of anxiety scores according to work experience within pandemic group and others. In the pandemic group, STAI-I anxiety scores showed no significant difference according to work experience ( $p > 0.05$ ). It was also seen that STAI-II anxiety scores were significantly higher in those with work experience of 1-10 years when compared to those experience of 11-20 years or  $\geq 21$  years ( $p < 0.05$ ).

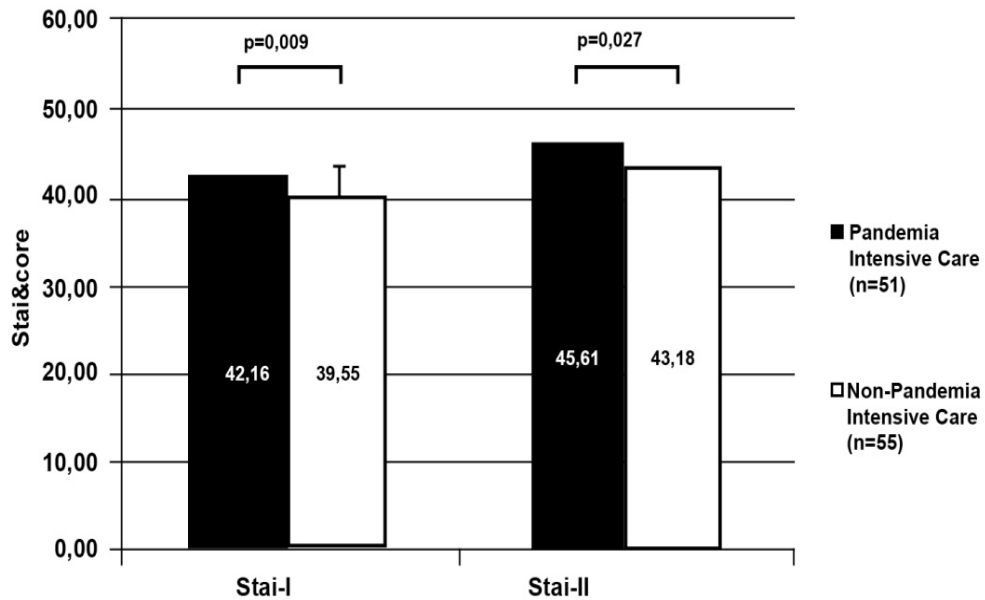


Fig. 1. Comparison of Pandemia and non-pandemia intensive care groups in terms of Stai-I and Stai-II scale scores (P <0.05)

Table 1. Comparison of groups in terms of age and time spent in the profession

	Pandemia (n=51)		Non-Pandemia (n=55)		p value
	$\bar{X} \pm S.S^*$	Min.-Max.	$\bar{X} \pm S.S^*$	Min.-Max.	
Age	34.57±7.86	22-49	33.44±7.80	21-48	0.459
Time in Profession	12.51±7.56	1-29	10.40±7.83	1-27	0.162

\*: $\bar{X} \pm S.S$  shows arithmetic mean±standart deviation

Table 2. Comparison of stai anxiety scores of genders in groups

	n	Pandemia intensive care		Non-pandemia intensive care	
		Stai-I	Stai-II	Stai-I	Stai-II
Gender		$\bar{X} \pm S.S$	$\bar{X} \pm S.S$	$\bar{X} \pm S.S$	$\bar{X} \pm S.S$
Female	45	41.40±5.20	45.00±6.16	41	39.80±3.61
Male	6	47.83±7.99	50.17±6.85	14	38.79±4.71
p value*		0.018***	0.045***	p value**	0.404

\*:Mann Withney U test p values

\*\* : Independent samples t test p values

\*\*\*P value <0.05

Table 3. Comparison of stai anxiety scales in terms of time spent in the profession

Time in profession	n	Stai-I		Stai-II	
		$\bar{X} \pm S.S$	Min.-Max.	$\bar{X} \pm S.S$	Min.-Max.
1-10 years	50	40.50±5.76	31-60	45.56±6.48	32-64
11-20 years	42	41.12±4.53	31-49	43.07±4.27	33-52
21 years +	14	40.93±4.38	36-50	43.86±5.08	35-55
p value		0.843		0.098	

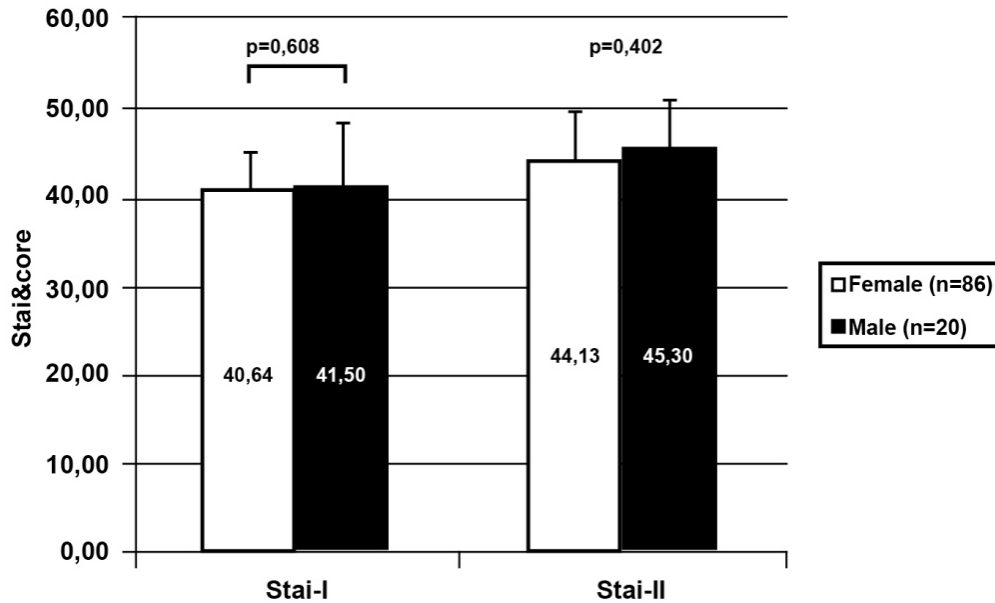


Fig. 2. Comparison of STAI anxiety scores according to gender

4. DISCUSSION

In the literature, STAI is considered as gold standard among tests used to determine preoperative anxiety [8]. STAI is generally used to measure anxiety in surgical departments. In our study, STAI was used in healthcare providers working in intensive care unit. It was found that anxiety level was higher in healthcare providers working in pandemic intensive care unit when compared to those working in other intensive care units. The pandemic group had significantly higher mean anxiety level as rated by STAI-I and STAI-II ( $p < 0.05$ ) (Table 2). In pandemic group, anxiety scores were significantly higher in male

healthcare providers than female healthcare providers ( $p < 0.05$ ).

In a study conducted in SARS intensive care unit, healthcare providers were concerned about their own health and effects of potential transmission on family members, peers and coworkers [17]. In our study, healthcare providers showed anxiety symptoms during COVID-19 outbreak. Previous studies demonstrated that duration of working in intensive care unit predicted anger and avoidance behavior [18]. In our study, it was shown that healthcare providers with longer experience in intensive care unit had lower anxiety score.

Table 4. Comparison of stai anxiety scales in groups in terms of time spent in the profession

Time in Profession	n	Pandemia intensive care				Non-pandemia intensive care				
		Stai-I		Stai-II		Stai-I		Stai-II		
		$\bar{X} \pm S.S$	Min-Max	$\bar{X} \pm S.S$	Min-Max	$\bar{X} \pm S.S$	Min-Max	$\bar{X} \pm S.S$	Min-Max	
1-10 years	22	43.55± 6.38	33-60	48.27± 6.63 <sup>A</sup>	37-64	28	38.11± 3.89 <sup>B</sup>	31-47	43.43± 5.60	32-55
11-20 years	22	40.95± 5.52	31-49	43.64± 5.20 <sup>B</sup>	33-52	20	41.30± 3.25 <sup>A</sup>	35-47	42.45± 2.96	38-48
21 years +	7	41.57± 5.06	36-50	43.43± 6.85 <sup>B</sup>	35-55	7	40.29± 3.86 <sup>AB</sup>	36-45	44.29± 2.93	41-50
p value		0.336		0.031		0.015 <sup>*</sup>		0.603		

\*P value < 0.05

As described in previous studies investigating psychological effects of working in hospitals during SARS outbreak, COVID-19 outbreak also has potential to cause severe psychiatric and psychosocial problems in healthcare providers working in high risk environment such as intensive care unit where they had close contact with patients [19,20]. We found that effect of outbreak was more severe in healthcare providers working in pandemic intensive care unit when compared to those working in other intensive care units and that COVID-19 had a significant effect on anxiety. In healthcare providers, being infected can lead concerns regarding transmitting disease to family members and relatives or fear of death for themselves and their relatives. In previous studies, it was found that greater anxiety about infection risk were associated to concerns about health of healthcare providers and their families [19,20].

The studies from Singapore and China during COVID-19 outbreak showed that clinicians had higher scores regarding post-traumatic stress when compared to nurses [5,20]. In our study, we did not analyze such outcome since number of clinicians working in pandemic intensive care unit was limited. During COVID-19, mortality of infection and frequent appearance of outbreak in the media enhance perception of threat [5]. Being obliged to wear air-sealed personal protective equipments over hours meant additional burden to increased workload. The hospitals have become highly stressful environment during outbreak [5]. The stress was increased by problems regarding equipment supply, materials and creating isolated areas as well as prolonged working hours in two-layer personal protective equipments with mask under high temperature and negative pressure [5]. Need for frequent contact with patient in isolation units caused physical and psychological fatigue and insomnia, which reflected to anxiety scores in our study. Our findings can help to early recognition of anxiety and timely managed before causing more severe psychological problems in healthcare providers with several socio-psychological risk factors. The identification of problems in individuals with high anxiety scores can help in providing effective mental health training among healthcare providers; thus, it also helps administrative organization of hospitals. It is unrealistic to think that healthcare providers working up front feel no fear or anxiety in period of COVID-a9 outbreak. As shown in our study, this high-risk group experienced anxiety. The pandemic affecting each individual in the society

causes an intensive anxiety among healthcare providers in high-risk group. The denial mechanisms including never feeling fear or anxiety aren't functional; however, excessive fear and anxiety about future are not also functional in such agenda. The altered rituals and behaviors due to intensive fear and anxiety experienced during COVID-19 pandemic can lead several negative thoughts (e.g. "if I lost my beloved ones" or "I will die"), emotions (fear, anger, anxiety) and somatic symptoms (shortness of breath, fatigue). This may become insoluble condition in patients with anxiety disorders (e.g. panic disorder, obsessive-compulsive disorder, generalized anxiety disorder). This anxiety state can predispose to both physical and psychological problems while it aggravates severity of potential problems. Thus, it seems very important to perform psychological assessment and provide psychological support and information as well as monitoring psychological status in healthcare providers. In addition to fatal disease, COVID-19 can cause psychological disorders in high-risk groups such as healthcare providers. It was shown informing before stress onset and better communication relieve anxiety [8]. It was suggested that a robust, evidence-based intervention strategy is required to cope with mental health problems effectively [20,21]. In many countries, healthcare authorities published guidelines including intervention directing emergent psychological crises in individuals affected by COVID-19. Almost in all countries, online platforms were created by healthcare facilities and academic centers in order to provide psychological counseling to patients, family members and other individuals affected by outbreak and published guidelines including coping strategies against COVID-19-related fear and anxiety for healthcare providers [22,23]. Recommendations and treatment protocols proposed by scientific committees should be followed [24,25].

Our study has some limitations. Firstly, only STAI was used to assess anxiety symptoms. The healthcare providers were dealing with increased workload; thus, complex assessment tools were avoided. There is no standardized treatment protocol in COVID-19, while there is no standard survey to investigate socio-psychological factors in the outbreak.

## 5. CONCLUSION

In conclusion, COVID-19 outbreak will have negative impacts on individuals and society. In

our study, it was found that STAI anxiety scores were higher in healthcare providers working in pandemic intensive care unit during COVID-19 outbreak. Work setting, male gender, experience of intensive care and concerns about outbreak were identified as factors associated to anxiety. The COVID-19 outbreak led psychological problems in healthcare providers. It is important to provide psychological support and information and to monitor mental health status in healthcare providers. Professional support should be provided in case of increased or worsened anxiety which healthcare provider may not even notice. Recommendations and treatment protocols proposed by scientific committees should be followed. We hope that we will return normal as soon as possible by multidisciplinary efforts.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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