

# Mental status of healthcare professionals according to the level of exposure to COVID-19 patient during the pandemic

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## ABSTRACT

**Introduction:** The frontline healthcare workers during the coronavirus outbreak work under intense pressure while working in close contact with COVID-19 patients, and can subsequently develop mental health-related problems. This study aimed to evaluate the mental impact of COVID-19 on healthcare workers according to exposure level.

**Material and Method:** This cross-sectional study included a total of 282 participants. Healthcare workers were divided into two groups as low-risk contact and high-risk contact according to the degree of contact with the coronavirus. Anxiety, depression, and insomnia were evaluated among the groups using the Insomnia Severity Index (ISI), General Anxiety Disorder-7 (GAD-7), and Patient Health Questionnaire-9 (PHQ-9) scales.

**Results:** One hundred seventy eight (62.4%) women and 104 (36.8%) men, with a mean age of 24.59 years were included in this study. The number of low-risk patients was 180 (63.8%), while the number of high-risk patients was 102 (36.1%). In addition, according to the multivariate analysis, staff working in the department with high-risk contact had significantly lower high to suffer anxiety (OR 1.283, 95% CI 1.109-1.483,  $p=0.001$ ), depression (OR 1.052, 95% CI 1.019-1.088,  $p=0.001$ ) and insomnia (OR 3.460, 95% CI 2.506-4.784,  $p<0.001$ ).

**Conclusion:** Our results show that healthcare workers working in high-risk contact units for exposure to COVID-19 have high levels of anxiety, depression, and insomnia than healthcare workers working in low-risk contact units.

**Keywords:** COVID-19, medical staff, anxiety, depression, insomnia

## INTRODUCTION

In December 2019, a new coronavirus quickly spread as the cause of pneumonia cases in the Chinese city of Wuhan, causing an epidemic throughout China. Afterwards, it caused a worldwide pandemic with cases that were found positive as a result of tests performed on nearly two million people (1). In February 2020, the International health organizations named this disease coronavirus disease 2019 (COVID-19) and the virus causing this disease severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Severe COVID-19 can affect healthy individuals of all ages but has been found to predominantly occur in adults of advanced age and those with underlying medical conditions (2). After initial reports of COVID-19, the number of cases rapidly increased, and the disease was reported among healthcare workers, indicating person-to-person transmission (3). The frontline healthcare workers during the coronavirus outbreak work under intense pressure while working in close contact with COVID-19 patients

during diagnosis, taking nasopharyngeal swabs, and providing treatment and patient care in hospital wards or intensive care units (ICU), and can subsequently develop mental health-related problems (4). The continuous increase in the number of suspected and confirmed cases, heavy workload, shortages in personal protective equipment, widespread media coverage, shortage in certain medications, and inadequate access to mental support accumulate to cause the deterioration of mental status among health workers (5). Previous studies have shown that healthcare workers developed psychological symptoms in response to the severe acute respiratory syndrome (SARS) epidemic in 2003 (6). Recent studies concerning the SARS-CoV-2 epidemic report that healthcare workers express anxiety due to fear of transmitting COVID-19 to their families and friends. For these reasons, healthcare professionals may suffer long-term psychological consequences such as unwillingness to work, intent to resign, and high levels

of stress, anxiety, depression, and insomnia (7). This study aimed to evaluate the mental impact of COVID-19 on health care workers according to exposure level.

## MATERIAL AND METHOD

The study was carried out with the permission of Harran University Clinical Researches Ethics Committee (Date: 31.08.2020, Decision No: 20/15/22). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki

### Participants

This study was carried out in a total of three months between June 2020 and September 2020 at the Health Sciences University Şanlıurfa Training and Research Hospital. Our hospital is among the largest and most prominent hospitals of the region in terms of the number of wards, intensive care unit (ICU) beds, equipment and healthcare professionals, and plays an important role in the prevention and control of the COVID-19 epidemic. A questionnaire was prepared to investigate the impact of the COVID-19 epidemic on the healthcare professionals of our hospital and distributed to the medical staff to assess insomnia, anxiety, and depression. Demographic information of healthcare professionals was recorded with a standard form. Insomnia was evaluated with The Insomnia Severity Index (ISI) questionnaire, anxiety was evaluated with the General Anxiety Disorder-7 (GAD-7) questionnaire, and depression was evaluated with The Patient health questionnaire-9 (PHQ-9). Sample size calculation was performed via Roasoft sample size calculator. Using the total number of healthcare workers as 670, %5 margin of error and %95 confidence level, and the anxiety level of healthcare workers in the study of Lai et al. (8), the minimum number of sample size was calculated to be 245. Healthcare workers included in the study are doctors, nurses, medical secretaries and cleaning staff. Incomplete questionnaires and participants with a history of mental illness and cognitive impairment were excluded from the study. Participants were divided into low-risk contact group and high-risk contact group according to their departments. As high-risk contact health workers working in COVID-19-related units (respiratory diseases department, infectious diseases department, emergency department, intensive care), as low-risk contact health workers, not working in COVID-19-related units and working in non-clinical units (administrative unit, cleaning unit, technical operation) (7). The questionnaires were filled in by the healthcare professionals, giving them sufficient time. No interviewer was used.

### The Questionnaire Measurement of Anxiety, Insomnia and Depression

General Anxiety Disorder-7 is a well-established, satisfactorily reliable and valid scale that has been widely used to evaluate anxiety. It consists of 7 items and is scored over a total of 21 points. The results are evaluated as follows: 0-5 minimal anxiety, 6-10 mild anxiety, 11-15 moderate anxiety, 16-21 severe anxiety (8). The Insomnia Severity Index is a well-recognized index with confirmed reliability, sensitivity, and validity. It consists of 7 items and is scored over a total of 28 points. The total score is used to determine the degree of insomnia. Total scores are evaluated as follows: 0-7 no clinically significant insomnia, 8-14 subthreshold insomnia, 15-21 moderate clinical insomnia, 22-28 severe clinical insomnia (9). The Patient health questionnaire-9 is a 9-item scale scored over 27 points that measures depression. It is a well-established and reliable scale that is used to evaluate depression. The results are evaluated as follows: 0-4 no depression, 5-9 mild depression, 10-14 moderate depression, 15-19 moderately severe depression, 20-27 severe depression (10).

### Statistical Analysis

Written informed consent was obtained from the participants in the study. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) software package version 26. Visual and analytical methods were used to determine whether the variables were normally distributed. Normally distributed continuous variables are expressed as mean $\pm$ SD, non-normally distributed parameters as median values with minimum and maximum values and categorical variables as numbers and percentages. Normally distributed data were compared with the Student's t-test, and non-normally distributed data were compared with Mann-Whitney U test.  $p < 0.05$  was accepted as statistically significant. The variables were dichotomized for the presence of depression, anxiety, and insomnia and multivariate binary logistic regression models were performed identify variables with predictive capacity for the presence of these conditions.

## RESULTS

A total of 292 questionnaires were filled out in the scope of this cross-sectional study. Ten questionnaires were excluded due to being incomplete. Hence, 282 questionnaires were included in the study. The overall response rate of healthcare professionals was 96.57%. A total of 282 patients, 178 (62.4%) women and 104 (36.8%) men were included in this study. The number of low-risk patients was 180 (63.8%), while the number of high-risk patients was 102 (36.1%). The majority of the participants were under 30 years old. 74.5% of the low-

risk contact group and 71.7% of the high-risk contact group were aged below 30 years ( $p=0.073$ ). In both groups, the majority of the participants had worked for less than 5 years: 93.1% of the low-risk contact group and 82.2% of the high-risk group ( $p=0.002$ ). The number of marriages in high-risk contact workers was statistically higher than in low-risk contact workers ( $p=0.004$ ). The level of exposure was not significantly associated with other parameters such as education and occupation ( $p>0.05$ ) (Table 1).

**Table 1.** Baseline characteristics of the 282 enrolled participants in the study

Variables	Low-risk contact n (%)	High-risk contact n (%)	$\chi^2$	p
Sex			18.219	<0.001
Male	83 (46.1)	21 (20.6)		
Female	97 (53.9)	81 (79.4)		
Age (years)			5.223	0.073
<30	129 (71.7)	81 (74.5)		
31-40	39 (21.7)	20 (20.9)		
>40	12 (6.7)	1 (4.6)		
Working years			12.493	0.002
0-5	148 (82.2)	95 (93.1)		
6-10	27 (15)	2 (2)		
>10	5 (2.8)	5 (4.9)		
Education			4.42	0.110
Below university	13 (7.2)	9 (8.8)		
College	7 (3.9)	10 (9.8)		
Master's degree or above	160 (88.9)	83 (81.4)		
Marriage			8.517	0.004
Married	61 (33.9)	18 (17.6)		
Unmarried	119 (66.1)	84 (82.4)		
Profession			2.784	0.084
Doctor	33 (18.3)	12 (11.8)		
Nurse	125 (69.4)	77 (75.5)		
Cleaning staff	8 (4.4)	3 (2.9)		
Medical secretary	14 (7.8)	10 (9.8)		

According to the ISI, participants in the high-risk contact group had moderately severe and severe insomnia indexes than those in the low-risk contact group. (20 vs 38.3%, respectively) ( $p<0.001$ ). According to the GAD-7 scale, participants in the high-risk contact group had moderately severe and severe anxiety indexes compared to the participants in the low-risk contact group. (45% vs. 16.7% vs. 32.2%) ( $p<0.001$ ). According to the PHQ-9, participants in the high-risk contact group had moderately severe and severe depression indexes (25% vs. 35%) compared to the participants in the low-risk contact group ( $p<0.001$ ) (Table 2). We compared the mean insomnia, anxiety, and depression scores of the low-risk and high-risk contact groups obtained by the questionnaire, as presented in Table 3. The Insomnia Severity Index and PHQ-9 scores were significantly different between the two groups ( $p<0.001$ ). Also, the GAD-7 scores of the two groups were significantly different ( $p=0.017$ ) (Table 3).

**Table 2.** The different severity of insomnia, anxiety, depression among 282 enrolled participants in the study

Variables	Low-risk contact n (%)	High-risk contact n (%)	$\chi^2$	p
ISI			29.273	<0.001
0-7=No clinically	1 (0.6)	11 (10.8)		
8-14=Subthreshold	74 (41.1)	91 (89.2)		
15-21=Moderate severity	69 (38.3)	0 (0)		
22-28=Severe	36 (20)	0 (0)		
GAD-7			27.721	<0.001
0-5=Mild	11 (6.1)	0 (0)		
6-10=Moderate	81 (45)	54 (52.9)		
11-15=Moderately severe	30 (16.7)	36 (35.3)		
16-21=Severe	58 (32.2)	12 (11.8)		
PHQ-9			24.561	<0.001
0-4=None	0 (0)	0 (0)		
5-9=Mild	29 (16.1)	23 (22.5)		
10-14=Moderate	43 (23.9)	43 (42.2)		
15-19=Moderately severe	45 (25)	26 (25.5)		
20-27=Severe	63 (35)	10 (9.8)		

ISI=Insomnia Severity Index; GAD-7= General anxiety disorder-7; PHQ-9= Patient health questionnaire-9.

**Table 3.** Comparison of the average level of insomnia, anxiety and depression between low-risk contact and high-risk contact groups

Variables	Low-risk contact	High-risk contact	p*
ISI	10.0 (6.0-12.0)	15 (13.0-28.0)	< 0.001
GAD-7	8.0 (6.0-15.0)	10 (4.0-24.0)	0.017
PHQ-9	12.0 (6.0-21.0)	18.0 (8.0-27.0)	< 0.001

\*p value for two independent samples Mann-Whitney U tests; ISI=Insomnia Severity Index; GAD-7= General anxiety disorder-7; PHQ-9= Patient health questionnaire-9

In addition, according to the multivariate analysis, staff working in the department with high-risk contact had significantly high risk to suffer anxiety (OR 1.283, 95% CI 1.109-1.483,  $p=0.001$ ), depression (OR 1.052, 95% CI 1.019-1.088,  $p=0.001$ ) and insomnia (OR 3.460, 95% CI 2.506-4.784,  $p<0.001$ ) (Table 4).

**Table 4.** Multivariate analysis of insomnia, anxiety and depression between low-risk contact and high-risk contact

Variables	OR	CI (95%)	p
ISI			< 0.001
High-risk contact	3.460	2.506-4.784	
Low-risk contact	1 (Reference)	NA	
PHQ-9			0.002
High-risk contact	1.052	1.019-1.088	
Low-risk contact	1 (Reference)	NA	
GAD-7			0.001
High-risk contact	1.283	1.109-1.483	
Low-risk contact	1 (Reference)	NA	

ISI= Insomnia Severity Index; GAD-7= General anxiety disorder-7; PHQ-9= Patient health questionnaire-9; NA= Not applicable. \*Gender, Age, Working years, Education, Marriage, Profession were included as covariates in ordinal logistic regression model.

## DISCUSSION

This study was conducted to evaluate the mental impact of COVID-19 exposure levels on healthcare workers. Our results demonstrate that anxiety, depression, and insomnia are higher in medical staff who work in hospital units at high-risk for COVID-19 exposure than low-risk units. To the best of our knowledge, there are a limited number of studies concerning the healthcare workers involved in the 2003 SARS epidemic, and very few investigated the mental status of healthcare professionals. SARS-CoV-2 is a virus known to be highly contagious that can spread rapidly. Frontline healthcare workers suffer from a significantly increased workload. Confirmed and suspected cases, lack of protective equipment, and suspected patients concealing their medical history can all increase the risk of infection for healthcare workers. Health workers feared that if they themselves were infected, they could spread the virus to their families, friends, and relatives (11). Our results showed that healthcare workers working in units at high-risk for COVID-19 exposure were at higher risk for anxiety, depression, and insomnia compared to their colleagues working in lower-risk units. With the increasing number of COVID-19 infections in China, frontline healthcare professionals were required to wear protective masks and equipment to reduce the burden of stress (12). A combination of anxiety, stress, and self-esteem determines the sleep quality of healthcare professionals. Anxiety affects sleep quality because anxious people often have trouble falling asleep and frequently wake up during sleep (13). Anxiety has been shown to result in impaired sleep, and poor sleep quality has been shown to increase anxiety. The combination of anxiety with sleep disorders can make it difficult to fall asleep (14,15). Therefore, as in the COVID-19 outbreak in Wuhan, China, cohort studies with larger samples are needed to investigate the effects of increased stress and workload on healthcare professionals' sleep quality and function (16).

As a result of the increasing demands related to COVID-19, taking measures to increase social support for healthcare professionals may increase their productivity related to their work. For example, professional psychotherapy teams and other supportive practices must take responsibility and provide individually targeted interventions to support the mental health of healthcare professionals. Logistics assistance should be provided and support groups should be established for the directors of the relevant health institutions and health personnel (17).

A previous study reported that high-risk exposure during the SARS epidemic caused psychological symptoms in 89% of healthcare workers (18). A study investigating the impact of the COVID-19 pandemic on healthcare workers reported a significant correlation with age, region, education status, and work experience, and COVID-19

exposure. We found similar results in terms of age and years of working in our study. However, distinctively, we also found a significant relationship with gender and marital status. Despite using different anxiety and depression assessment scales, the same study indicated increased anxiety and depression among healthcare workers working in high-risk units for COVID-19 exposure, similar to our results (19,20).

A Chinese study by Xiao et al. (21) found that anxiety and depression were higher in healthcare workers dealing with COVID-19, similar to our study, and also self-esteem and sleep quality disorders were found to be more common compared to the normal population. Lai et al. (8) described a high prevalence of depression, anxiety, insomnia, and stress symptoms among healthcare workers dealing with COVID-19. We similarly found high levels of depression, anxiety and insomnia. The limitation of our study is that it is a single-centered study with a limited number of subjects.

## CONCLUSION

Our results show that healthcare workers working in high-risk contact units for exposure to COVID-19 have high levels of anxiety, depression, and insomnia than healthcare workers working in low-risk contact units. Protecting healthcare workers is an important component of public health measures that address the COVID-19 outbreak. Healthcare workers, especially those exposed to COVID-19, should be provided with psychological support to promote mental well-being. Future studies, including cohort studies with large samples that investigate objective indicators of stress along with questionnaires, such as serum cortisol levels, are needed (22).

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Harran University Clinical Researches Ethics Committee (Date: 31.08.2020, Decision No: 20/15/22).

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

**Referee Evaluation Process:** Externally peer-reviewed.

**Conflict of Interest Statement:** The authors have no conflicts of interest to declare.

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**Author Contributions:** All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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