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Original Article

The Prevalence of Depression, Anxiety, and Stress among Nurses during the Coronavirus Disease 2019: A Comparison between Nurses in the Frontline and the Second Line of Care Delivery

Majid Heidarijamebozorgi, Hamid Jafari, Reza Sadeghi, Hojjat Sheikhbardsiri[1], Mohammad Kargar[2], Majid Amiri Gharaghani[3]

Department of Public Health, Sirjan School of Medical Sciences, Sirjan, Iran, [1]Health in Disasters and Emergencies Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran, [2]Department of Healthcare Management, School of Public Health, Kerman University of Medical Science, Kerman, Iran, [3]Department of Environmental Health, Sirjan School of Medical Sciences, Sirjan, Iran

ORCID:

Majid Heidarijamebozorgi: 0000-0003-4792-2718

Hamid Jafari: 0000-0002-9632-4338

Reza Sadeghi: 0000-0002-5162-6316

Hojjat Sheikhbardsiri: 0000-0002-3264-6792

Mohammad Kargar: 0000-0001-6923-6300

Majid Amiri Gharaghani: 0000-0003-2404-7746

ABSTRACT

Background: The coronavirus disease 2019 (COVID-19) can significantly affect mental health among healthcare providers, particularly nurses in the frontline (FL) and the second line (SL) of care delivery to afflicted patients. **Objective:** This study aimed at evaluating the prevalence of depression, anxiety, and stress among FL and SL nurses during the COVID-19 pandemic. **Methods:** This cross-sectional descriptive-analytical study was conducted in June–September 2020. Participants were 146 FL nurses and 206 SL nurses who were in direct contact with COVID-19 patients in two hospitals in Sirjan, Iran. They were recruited to the study through a census. Data were collected using a demographic questionnaire and the 21-item Depression Anxiety Stress Scale. Data analysis was done through the Shapiro-Wilk, Chi-square, Mann-Whitney *U*, and independent-sample *t* tests. **Results:** The mean scores of depression, anxiety, and stress were, respectively, 15.87 ± 4.32, 8.35 ± 4.74, and 13.4 ± 4.39 among FL nurses and 9.91 ± 5.96, 6.91 ± 5.48, and 7.38 ± 3.95 among SL nurses. The between-group differences regarding these mean scores were statistically significant ($P < 0.001$). **Conclusion:** Depression, anxiety, and stress are highly prevalent among both FL and SL nurses who provide care to patients with COVID-19. Psychological support and education about stress management strategies for nurses can help them manage their depression, anxiety, and stress.

KEYWORDS: *Anxiety, COVID-19, Depression, Nurses, Stress*

Address for correspondence: Dr. Hamid Jafari,
Department of Medical Emergencies,
Sirjan School of Medical Sciences,
Ebnsina Street, Sirjan, Iran.
E-mail: hjafari68@gmail.com

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Introduction

Coronavirus disease 2019 (COVID-19) was first diagnosed in Wuhan, China, in December 2019, and rapidly changed into a pandemic and a major health issue in all countries, including Iran. The first cases of COVID-19 in Iran were reported on February 19, 2020, in Qom. After that, the disease rapidly spread throughout the country[1] and turned into a serious health and social issue.[2,3]

As key members of healthcare delivery teams, nurses are at the frontline (FL) of diagnosing COVID-19 and providing treatment and care services to afflicted patients. Therefore, they experience high levels of depression, anxiety, and stress because of the great risk of transmission of the disease, heavy workload, shortage of personal protective equipment, shortage of medications for afflicted patients, death of colleagues, and limited support.[4-9] Previous studies reported that during the COVID-19 pandemic, healthcare providers experience different psychological problems, such as stress, fear, and anxiety.[8,10-12] For example, a study showed that 37.8% of nurses suffered from anxiety and concluded that COVID-19 might cause high levels of anxiety among nurses who are in the FL of care delivery. Another study found that 7.4% of nurses had weekly absences from work due to stress-induced burnout and disability. This rate is 80% more than the rate among other occupational groups.[9] A study in China also showed that many nurses suffered from high levels of anxiety during the COVID-19 pandemic.[6] Changes in healthcare settings during the COVID-19 pandemic to maintain their dynamicity and efficiency may also cause varying levels of depression, anxiety, and stress for healthcare providers, particularly nurses. These problems can, in turn, affect the quality of their services.[7,9]

A key step to the management of depression, anxiety, and stress among nurses during the COVID-19 pandemic is to collect reliable comparative data about the prevalence of these disorders among nurses who are in the FL and the second line (SL) of care delivery to afflicted patients in healthcare settings. To the best of our knowledge, there are limited comparative data in this area in Iran. Therefore, this study was conducted to narrow this gap.

Objectives

This study aimed at evaluating the prevalence of depression, anxiety, and stress among FL and SL nurses during the COVID-19 pandemic.

Methods

Design and participants

This cross-sectional descriptive-analytical study was conducted in June–September 2020. Participants were all nurses of Gharazi and Imam Reza hospitals, Sirjan, Iran, who were involved in direct care delivery to patients with COVID-19. Nurses were recruited to the study through a census. Based on their affiliated ward, participants were grouped as 146 FL nurses (129 women and 17 men) and 206 SL nurses (188 women and 18 men). FL nurses worked in hospital wards with the highest probability of contact with COVID-19 patients, i.e., emergency room, intensive care unit (ICU), COVID-19 care unit, and internal medicine wards. SL nurses were those who worked in hospital wards with a lower probability of contact with COVID-19 patients, namely surgical, gynecology, psychiatric, dialysis, and pediatric wards. Inclusion criteria were an associate degree or higher in nursing, a work experience of more than six months, consent for participation, no affliction by psychiatric disorders, no continuous use of anxiolytic medications, and no experience of significant life events during the past six months (such as the death or hospitalization of close relatives or their own hospitalization).

The sample size was calculated using the results of a former study, which reported that the prevalence of anxiety among nurses was 33%.[12] Therefore, with a Z of 1.96 and a d of 0.05, the sample size was determined to be 344. As the calculated sample size was almost equal to the size of the total population of nurses in the study setting, all eligible nurses in the setting were recruited to the study through a census.

Data collection Instruments

Data were collected using a demographic questionnaire and the 21-item Depression Anxiety Stress Scale (DASS-21). DASS-21 was developed by Lovibond and Lovibond in 1995 as a self-report scale for measuring depression, anxiety, and stress.[13] It has 21 items in three seven-item subscales that are scored on a four-point Likert scale from 0 ("Does not apply to me" or "Never") to 3 ("Applies to me very much" or "Almost always"). Therefore, the possible total score of each subscale is 0–21. As DASS-21 is the short form of DASS-42, its total subscales scores are multiplied by two and are categorized into five categories and interpreted as shown in Table 1.[13,14] A former study reported that

Table 1: Categorization and interpretation of the scores of the depression, anxiety, and stress subscales

Subscales	Categories				
	Extremely severe	Severe	Moderate	Mild	Normal
Depression	≥28	21–27	14–20	10–13	0–9
Anxiety	≥20	15–19	10–14	8–9	0–7
Stress	≥34	26–33	19–25	15–18	0–14

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Table 2: Between-group comparisons regarding participants' socio-demographic characteristics

Comparison	Group[a]			*P*-value
	FL (*n*=146)	SL (*n*=206)	Total (*n*=352)	
Age(Years)	36.51±8.72	37.59±8.68	37.008±8.69	0.32[b]
Work Experiences (Years)	13.66±8.33	14.72±8.50	14.28±8.43	0.18[b]
Gender				0.37[c]
Male	17 (11.6)	18 (8.7)	35 (9.9)	
Female	129 (88.4)	188 (91.3)	317 (90.1)	
Educational level				0.81[c]
Undergraduate	135 (92.5)	189 (91.7)	324 (92.0)	
Postgraduate	11 (7.5)	17 (8.3)	28 (8.0)	
Marital Status				0.36[c]
Married	99 (67.8)	149 (27.7)	248 (70.5)	
Single/Divorced	47 (32.2)	57 (72.3)	104 (29.5)	
Overtime work (Hours)				< 0.001[c]
< 50	90 (61.6)	164 (79.6)	254 (72.2)	
> 50	56 (38.4)	42 (20.4)	98 (27.8)	

[a] Data presented as Mean ± SD or N (%);

[b] The results of the Mann-Whitney U test;

[c] The results of the Chi-square test

Cronbach's alpha values of the depression, anxiety, and stress subscales of the scale were 0.97, 0.92, and 0.95, respectively.[15] Two former studies in Iran also used this scale and reported its acceptable validity and reliability.[16,17] Cronbach's alpha values of the DASS-21 subscales in this study were 0.83, 0.85, and 0.81, respectively.

Data collection was performed using the WhatsApp application in order to minimize the risk of COVID-19 transmission. Study instruments were provided to participants by the nursing managers of the study setting. Questionnaires were excluded if there were three or more unanswered items.

Data analysis

Data were analyzed using the SPSS software v.16 (SPSS Inc., Chicago, IL, USA). Mean and standard deviation (mean ± SD) were calculated for numerical variables, whereas absolute and relative frequencies were calculated for categorical variables. Normality was tested using the Shapiro-Wilk test. Moreover, the Chi-square, the Mann-Whitney *U*, and the independent-sample *t* tests were conducted for analyzing relationships and performing between-group comparisons. A *P* value less than 0.05 was considered statistically significant in all tests.

Ethical considerations

The Institutional Review Board and the Ethics Committee of Sirjan School of Medical Sciences, Sirjan, Iran, approved this study (ethical approval code: IR.SIRUMS.REC.1399.001). The study was also registered in Pajoohan (code: 98000036). Participants received clear explanations about the study aim and methods, the voluntariness of participation in the study, and the confidentiality of their data. Finally, they signed the informed consent form of the study.

Table 3: Between-group comparisons regarding the mean scores of participants' depression, anxiety, and stress

Variables	Group[a]		*P*-value[b]
	FL (*n* = 146)	SL (*n* = 206)	
Stress	15.87±4.32	9.91±5.96	< 0.001
Anxiety	8.35±4.74	6.91±5.48	< 0.001
Depression	13.4±4.39	7.38±3.95	< 0.001

[a] Data presented as Mean ± SD;

[b] The results of the Mann-Whitney U test

Results

Among 374 nurses in the study setting, 352 nurses completely answered the study instruments (response rate: 94%). Most participants were SL nurses (58.52%), were female (91%), and held an undergraduate degree (92%). The means of their age and work experience were 37.008 ± 8.69 and 14.28 ± 8.43 years, respectively. Table 2 shows their characteristics. There were no significant differences between FL and SL nurses regarding their gender, age, educational level, marital status, and work experience ($P > 0.05$). However, the number of FL nurses who worked overtime for more than 50 hours per month was significantly greater than SL nurses ($P = 0.001$) [Table 2].

The mean scores of depression, anxiety, and stress were, respectively, 15.87 ± 4.32, 8.35 ± 4.74, and 13.4 ± 4.39 among FL nurses and 9.91 ± 5.96, 6.91 ± 5.48, and 7.38 ± 3.95 among SL nurses. The results of the

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Table 4: The mean scores of depression, anxiety, and stress among FL and SL nurses according to their sociodemographic characteristics

Characteristics	Variables[a]					
	Stress		Anxiety		Depression	
	FL	SL	FL	SL	FL	SL
Gender						
Male	11.17 ± 5.6	10.5 ± 3.6	8.13 ± 4.2	9.1 ± 6.2	12.5 ± 4.7	9.9 ± 4.0
Female	16.49 ± 3.7	9.85 ± 6.1	8.5 ± 5.2	6.9 ± 5.6	13.5 ± 4.3	7.14 ± 3.9
P value	<0.001[b]	0.61[c]	0.48[c]	0.54[c]	0.57[c]	0.01[c]
Age (years)						
<40	16.1 ± 4.0	11.9 ± 5.2	8.1 ± 4.2	7.05 ± 4.2	13.1 ± 3.8	8.7 ± 3.2
≥40	15.6 ± 4.6	7.8 ± 5.9	8.5 ± 5.2	4.7 ± 3.6	13.6 ± 4.8	6.11 ± 4.2
P value	0.34[c]	<0.001[b]	0.02[c]	<0.001[b]	0.65[c]	<0.001[b]
Educational level						
Undergraduate	16.05 ± 4.1	9.9 ± 6.0	8.5 ± 4.8	6.7 ± 5.4	13.3 ± 4.3	7.2 ± 3.9
Postgraduate	13.6 ± 6.1	9.8 ± 5.1	6.5 ± 3.4	8.5 ± 5.6	13.8 ± 4.6	8.7 ± 3.8
P value	0.16[c]	0.87[c]	0.16[c]	0.13[c]	0.63[c]	0.22[c]
Marital status						
Married	16.2 ± 3.2	10.4 ± 5.9	8.3 ± 3.7	7.07 ± 5.1	13.5 ± 4.2	7.3 ± 3.9
Single/divorced	15.1 ± 6.0	8.4 ± 5.7	8.3 ± 6.4	6.4 ± 6.2	13.1 ± 4.6	7.6 ± 3.9
P value	0.1[c]	0.01[c]	0.28[c]	0.09[c]	0.66[c]	0.75[c]
Work experience (years)						
≤15	15.3 ± 4.6	10.3 ± 6.4	7.3 ± 5.3	6.7 ± 5.6	12.8 ± 4.5	6.1 ± 4.0
>15	16.6 ± 3.7	9.3 ± 5.2	9.9 ± 3.0	7.1 ± 5.1	14.2 ± 4.0	9.06 ± 3.1
P value	0.03[c]	0.2[c]	<0.001[b]	0.28[c]	0.03[c]	<0.001[b]
Overtime work (h)						
<50	15.7 ± 4.8	8.3 ± 5.2	8.7 ± 5.2	5.8 ± 4.3	13.1 ± 4.3	7.2 ± 4.1
≥50	16.1 ± 3.4	15.8 ± 4.6	10.6 ± 3.8	9.2 ± 7.2	13.7 ± 4.5	7.8 ± 2.9
P value	0.38[c]	<0.001[b]	0.32[c]	<0.001[b]	0.52[c]	0.04[c]

[a]All data presented as mean ± SD

[b]The results of the Mann-Whitney U test

[c]The results of the *t* test

Mann-Whitney *U* test showed that the mean scores of depression, anxiety, and stress among FL nurses were significantly greater than SL nurses ($P < 0.001$) [Table 3].

Around 70% of FL nurses and 33% of SL nurses had mild to severe depression, 56% of FL nurses and 41% of SL nurses had mild to severe anxiety, and 62% of FL nurses and 20% of SL nurses had mild to severe stress. Among FL nurses the mean depression was significantly different between those with work experiences less and more than 15 years. Also, the mean anxiety scores were significantly different in FL nurses with different work experience and age groups. Moreover, the mean stress scores were significantly different in FL nurses with different gender and work experiences. Among SL nurses the mean depression scores were significantly different among those with different ages, work experiences, and overtime working. Also, the mean anxiety scores were significantly different between nurses with different ages and overtime. Moreover, the mean stress scores were different between nurses with different ages, marital status, and overtime ($P < 0.05$) [Table 4].

Discussion

The results of this study revealed that compared with SL nurses, FL nurses had significantly higher levels of depression, anxiety, and stress. The higher level of stress among FL nurses in this study is in line with the findings of several earlier studies that showed a high level of stress among healthcare providers during epidemics.[9,10,12,18-21] Another study also showed that the prevalence rates of depression, anxiety, stress, and posttraumatic stress disorder among 470 healthcare providers in Singapore were 8.9%, 14.5%, 6.6%, and 7.7%, respectively.[22] These findings are attributable to the heavy workload, shortage of staff and necessary equipment for care delivery to patients with COVID-19, death of patients, lack of support from other organizations, direct contact with COVID-19 patients, and concerns over affliction by COVID-19 or its transmission to others. A cross-sectional study on 180 healthcare providers providing care to patients with COVID-19 in China showed that anxiety and stress significantly affected the quality of their sleep and services.[23] In order to reduce the stress of COVID-19 transmission to others among FL nurses, healthcare

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authorities need to provide them with adequate overnight accommodations and facilities to help them keep themselves isolated from others, particularly their family members.

Study findings also showed that the prevalence of anxiety among all nurses was 40%, and the prevalence of anxiety among FL nurses was significantly higher than SL nurses. In agreement with this finding, several earlier studies reported that FL nurses were more likely to report severe or extremely severe anxiety and stress than other healthcare providers during the COVID-19 pandemic.[9,10,20,21]

Study findings also showed that the level of anxiety among FL nurses had a significant direct relationship with age and work experience. In other words, nurses with older age and greater work experience had higher levels of anxiety. Two former studies also reported the same finding.[5,18] Another study revealed that nurses' work experience had a significant relationship with their depression, anxiety, and stress.[24] This finding is probably due to the fact that nurses with greater work experience are more likely to be assigned with care delivery to critically ill patients, which, in turn, exposes them to higher levels of anxiety.

We also found that participants' gender had a significant relationship with their stress among FL nurses so that the level of stress among female nurses was significantly greater than male nurses. A former study also reported the same finding.[25] The higher level of stress among female nurses may be due to their greater occupational problems and concerns and their greater fear of transmitting infectious diseases to their children during epidemics. Unlike our findings, a study found no significant relationship between gender and stress.[4]

Another finding of this study was the significant relationship of overtime work hours with depression, anxiety, and stress. Similarly, two former studies reported that heavy workload can significantly affect employees' depression, anxiety, and stress.[26,27] The significant increase in the number of patients who need nursing care during epidemics significantly increases nurses' workload. Meanwhile, some nurses may go on medical leave during epidemics due to their affliction by infectious diseases, resulting in nursing staff shortage. These conditions require nurses to work more hours, which, in turn, significantly increases their workload and leads to anxiety and stress for them. Moreover, the necessity of working overtime can increase the likelihood of family–work conflicts, leading to greater stress for nurses.

This study has some limitations. First, the reasons for psychological disorders among study participants remained unknown because this was a cross-sectional study. Second, there were no data about participants' mental status before the COVID-19 pandemic, and it was difficult to know whether their mental background affected their mental status during the COVID-19 pandemic. Third, as data were collected using a self-report questionnaire, some participants might not have provided honest answers to some items. These limitations reduce the generalizability of the findings to other settings.

Conclusion

This study shows the high prevalence of depression, anxiety, and stress among nurses, particularly FL nurses, who provide care to patients with COVID-19. The most important reasons for the high prevalence of psychological disorders among nurses during the COVID-19 pandemic are probably their care-related emotional strains, difficult working conditions, and heavy workload. Healthcare managers and policymakers need to provide nurses, particularly FL nurses, with adequate social support, education about stress and anxiety management, and a supportive workplace environment in order to reduce their emotional problems during and after the COVID-19 pandemic and, thereby, empower them for quality care delivery.

A national study is recommended to assess psychological problems among nurses in different healthcare settings during the COVID-19 pandemic. Qualitative studies are also recommended to explore in detail the factors contributing to psychological problems among healthcare providers. Moreover, studies are needed to assess manifestations of depression, anxiety, and stress among nurses after the pandemic.

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Conflict of interest

There are no conflicts of interest.

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