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Stress, anxiety, depression among nurses caring for COVID-19 patients in Babol, Iran: a logistic regression

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ABSTRACT

Background: Nurses who are involved in the caring of COVID-19 patients, are at risk of mental distress. The present study was conducted with the purpose of demonstrating the relationship between stress, anxiety, depression and characteristics of nurses who provide care to COVID-19 patients.

Methods: This descriptive cross-sectional study was conducted using the census method from May to June, 2020 on 224 clinical nurses who were working in hospitals affiliated with Babol University of Medical Sciences and were involved in caring for COVID-19 patients. The data collection instruments included the Depression, Anxiety and Stress Scale - 21 items (DASS-21) and the individual characteristic questionnaire. Bivariate and multivariate binary logistic regressions were computed to identify the associated factors.

Results: The mean and the standard deviation for stress, anxiety and depression scores were 9.47±7.30, 9.29±7.51 and 8.84±7.22 respectively. 17.4% had stress, 54% had anxiety and 43% had a degree of depression. There were significant relationships between the nurses' stress level and characteristics including age (OR =3.009, 95%CI 1.46–6.16, P=0.003), having children (OR=0.26, 95%CI 0.11-0.63, P=0.003), work experience (OR=4.50, 95% CI 2.17-9.96, P=0.000) and employment status (OR=0.39, 95% CI 0.16-0.95, P=0.04). Moreover, along with these characteristics, job satisfaction (OR =3.03, 95%CI 5.64– 1.63, P=0.000), level of physical activities (OR =0.26, 95%CI 0.08–0.82, P=0.02), exercising (OR =2.27, 95%CI 1.31-3.90, P=0.003) and violence in the workplace (OR =0.27, 95%CI 0.12– 0.56, P=0.001) also had significant relationships with the nurses' anxiety level. Furthermore, the relationships between the nurses' level of depression and characteristics including age (OR =2.07, 95%CI 1.15 – 3.72, P=0.014), work experience (OR =21.79, 95%CI 1.04 – 3.10, P=0.03), job satisfaction (OR=3.03, 95%CI 1.63–5.64, P=0.000), exercising (OR =1.76, 95%CI 1.02–3.04, P=0.04), having chronic diseases (OR =0.35, 95%CI 0.15–0.81, P=0.014), violence in the workplace (OR =0.39, 95%CI 0.20–0.75, P=0.005) and sleep (OR =1.77, 95%CI 1.00–3.16, P=0.050) were significant.

Conclusion: The authorities should consider a number of the individual characteristics of nurses including age, work experience, gender, marital status, having children, job satisfaction, sleep, violence in the workplace and history of chronic disease in their planning and provide psychological support for them. Psychological support services may be needed for nurses in order to protect and promote their mental health.

Keywords: Stress, Anxiety, Depression, COVID-19, Nursing care, Nurses.

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Introduction

The COVID-19 pandemic is a serious threat for public health (1). Nurses work at the frontline of the fight against this disease and risk their lives while performing their duties (2). They have always played a key role in preventing and controlling infection, care and public health (3). Early in the spread of COVID-19, more than 3000 medical staff in Wuhan, China, got infected (40% in hospitals and 60% in the society) (3).

In the face of this critical situation, the healthcare workers at the forefront, who are directly involved in the diagnosis, treatment and caring of COVID-19 patients, are at risk of mental distress and other mental health disorders. The increasing number of confirmed and suspected cases, the high level of work pressure, the lack of personal protective equipment, the extensive media coverage, the shortage of specific drugs and feeling that they are not being sufficiently supported may all affect the healthcare workers' stress (4). A whole new working condition, the job burn-out caused by the burden of heavy workload and the protective equipment, fear of getting infected and contaminating others, a feeling of inability to attend to clients and Maintaining proper communication in stressful situations are the challenges faced by the health care providers (5).

The emergency situations caused by COVID-19 put major pressures on nursing services. When nurses work in environments where job demands are high and resources are low, they are exposed to higher job stress and more physical and psychological symptoms, which might have negative effects on their health and well-being (6, 7). Maintaining the mental health of the nursing staff is necessary to control infectious diseases (8).

Evidence has shown that while nurses are caring for patients with emerging diseases such as MERS, Covid-19 and H1N1, they experience loneliness, anxiety, fear, fatigue, sleep disorders and other mental and physical problems (9,10,11). A review study showed that demographic variables including gender, occupation, age, workplace and department as well as psychological variables such as self-efficacy and poor social support were accompanied by increase in stress, anxiety, depression symptoms and insomnia in healthcare workers. Evidences indicated that COVID-19 can be an independent risk factor for stress in healthcare workers (12). In a research in 2020 in China on mental health of healthcare workers who were exposed to COVID-19, the findings showed that 50.4% of them reported depression symptoms, 44.5% anxiety, 34% sleep disorder and 71.5% symptoms of distress (13). The prevalence rates of moderate to severe depression, anxiety, and stress among Iranian nurses who provided care to patients with COVID-19 were 43.7%, 73%, and 24%, respectively (14).

The findings of another study showed that the mean self-reported stress and anxiety scores were 32.19±7.56 and 39.91±12.92 respectively and the multiple regression analysis showed that having a child in the family, working hours per week and anxiety were the main variables related to the nurses' stress (3).

Since COVID-19 is an emerging disease and the healthcare system and culture vary from region to region, more studies is needed on the psychological experience of frontline nurses coping with COVID-19 (15). Regular screening of healthcare workers involved in patient care as well as diagnosing and providing care for patients with COVID-19 to assess their stress, depression and anxiety seems necessary (12). The existing information about work stress among nurses is limited (3).

Considering the important role of nurses in improving and promoting healthcare services in the society, the researchers decided to investigate the relationship between stress, anxiety, depression and some of the individual characteristics of nurses involved in caring for COVID-19 patients in hospitals affiliated with Babol University of Medical Sciences.

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Methods

This descriptive cross-sectional study was conducted from May to July, 2020 using census method on all clinical nurses working in two hospitals affiliated with BUMS (Ayatollah Rouhani and Shahid Yahya Nejad) in northern Iran who were involved in direct care of COVID-19 patients. Among the 302 nurses who directly involved in the care of Covid-19 patients, 224 completed the questionnaire. The inclusion criteria were: having a bachelor's or master's degree in nursing, being directly involved in providing care for COVID-19 patients in one of the wards of the two aforementioned hospitals, at least one-year experience of working in the hospital and willingness to participate in the study. Participants who incompletely answered the study instruments were excluded. This study was approved by the university research ethics committee with the code of ethics of IR.MUBABOL.HRI.REC.1399.138.

Data Collection Tools

The research instruments used in this study included the individual characteristics questionnaire and the short form version of Depression Anxiety Stress Scales (DASS-21). The individual characteristics questionnaire had 18 items comprising age, gender, marital status, education level, work experience, type of work shift, job satisfaction, average amount of overtime, employment status, types of hospital, having children, level of physical activity, exercising, history of chronic diseases, workplace violence, sleep and history of depression in the family. DASS-21 is a self-report instrument that shows the recent mood swings and was first introduced by Lovibond in 1995(13). As the name suggests, it has 21 items which are scored on Likert scales. These 21 items contain: 7 questions related to stress including finding it hard to wind down, tendency to over-react to situations, using a lot of nervous energy, getting agitated, finding it difficult to relax, being intolerant of anything that keeps you from getting on with what you were doing, and feeling touchy; 7 questions related to anxiety including dryness of the mouth, breathing difficulty, trembling, being worried about situations in which you might panic and make a fool of yourself, feeling close to panic, action of the heart in the absence of physical exertion, and feeling scared without any good reason; and finally 7 questions related to depression including inability to experience any positive feeling at all, finding it difficult to work up the initiative to do things, feeling that you have nothing to look forward to, feeling down-hearted and blue, being unable to become enthusiastic about anything, feeling that you are not worth much as a person, and feeling that life is meaningless. The validity and reliability of this instrument have been reviewed and approved by Mehdipour and Najafi (16, 17). The internal consistency of the scale was determined in the study of Shamsaie et al. (2018) using Cronbach's alpha and the figures for each subscale were as follows: 85% for stress, 86% for anxiety and 83% for depression (18).

Data collection

After defining the purpose of the study and reassuring the participants that all information will remain confidential, the researcher distributed the questionnaires and gave explanation in case any of the items were unclear. The participants had to read each statement and rate the intensity of the symptom mentioned in it on a 4-point Likert scale as it had been experienced over the past week. In this regard, zero meant that the symptom had not been experienced at all, one meant it had been experienced to some extent, two meant it had been experienced rather much, and three meant it had been experienced very much. The total score of each subscale of this instrument is obtained by summing up the scores of the questions related to that subscale. Since DASS-21 is the short-form version of the main scale (42-item), the total score of each subscale must be doubled (18). Then, the intensity of the signs and symptoms can be determined according to table1.

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Table 1. Symptom severity of different parameters in the three groups

Score variables	stress	anxiety	depression
normal	0-14	0-7	0-9
mild	15-18	8-9	10-13
moderate	19-25	10-14	14-20
severe	26-33	15-19	21-27
Extremely severe	>34	>20	>28

Lovibond, S.H. & Lovibond, P.F. (1995). Manual for the Depression Anxiety & Stress Scales. (2nd Ed.) Sydney: Psychology Foundation.

Data Analysis

Data were analyzed using SPSS statistical software version 18. The correlations between independent and dependent variables were tested by binary logistic regression analysis. The variables which had a p-value less than 0.2 were entered into multivariate analysis. In the end, the model was finalized using backward elimination. Finally, a p-value of less than 0.05 was considered statistically significant association, and the adjusted odds ratio with 95% CI was calculated to determine the strength of association.

Regular monitoring of data collection was performed by the principal investigator. The completed questioners were cheeked manually first for completeness then the collected data were entered onto the computer. If a questionnaire is incomplete, it will be returned for completion, the questionnaire was excluded from the analysis if they did not wish to fill in the missing information. The executive stages of the study were approved by the Vice Chancellor for Research of Babol University of Medical Sciences. Informed consent for voluntary participation in this study was obtained from all participants.

Results

The study sample contained 224 nurses with an average age of 32.9±6.31. The demographic characteristics of the participants were as follows: 167 (74.6%) were female, 148 (68%) were younger than 50 years of age, 85% had bachelor's degree, 80% worked rotating shifts, 58% had 1 to 10 years of work experience, 67% were working under a formal contract, 80% were married, 59% had at least one child, 52% were working 50 to 100 hours of overtime per month, 67% said they were satisfied with their jobs, 90% had physical activities, 53% did not exercise regularly, 87% did not have any chronic diseases, 98% did not have any history of mental disorders, 90% had no history of depression in their families, 68% got 7 to 8 hours of sleep at least 3 to 4 days a week, and 78% did not experience workplace violence (Table 2).

Level of Stress, Anxiety and Depression

The mean (± standard deviation) stress score calculated by DASS-21 was 4.73 (±3.65), which was multiplied by two (to make it equal to the result of the main scale) and the result was 9.47 (±7.30). More than 82% of the nurses had normal stress levels. The mean (± standard deviation) anxiety score was 4.67 (±3.75) based on DASS-21 and 9.34 (±7.51) after multiplying it by two. More than half of the nurses (54%) had degrees of anxiety. The mean (± standard deviation) depression score was 4.42 (±3.61) as measured by DASS-21 and 8.84 (±7.22) after it was doubled. About 43% of the nurses experienced some degrees of depression (Table 3).

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Table 2. Frequency distribution of respondents by socio-demographic characteristics and selected variables

Demographic-social variables		Number (%)
Sex	male	57(25.4)
	female	167(76.4)
age	≤35	148(68)
	>35	68(32)
Shift type	morning	23(10.3)
	Evening or night	22(9.8)
	rotational	178(79.8)
Work Experience	≤10	129(57.6)
	>10	95(42.5)
Education level	bachelor of Nursing	191(85.3)
	Master of Nursing	33(14.7)
Marital status	single	43(19.2)
	married	181(80.8)
Having a child	Yes	132(59.5)
	no	90(40.5)
Employment status	Yes	149(67)
	no	71(33)
Overtime(h)	50<	38(17)
	50-100	116(51.8)
	100-150	60(26.8
	>150	10(4.5)
hospital	Rouhani Hospital	141(62.9)
	Yahya Nejad Hospital	83(37.1)
Job satisfaction	Yes	149(67.7)
	no	71(32.3)
Physical activity level	inactive	20(8.9)
	active	203(91.1)
exercise	yes	105(47.1)
	no	118(52.9)
Chronic disease	yes	28(12.50
	no	195(87.5)
Workplace violence	yes	48(21.6)
	no	174(78.4)
Maintain 7–8 h sleep 3–4 times a week	yes	151(68)
	no	71(32)
Psychiatric disorder	yes	5(2.2)
	no	218(97.8
Family history of depression	yes	22(9.9)
	no	200(90.1)

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Table 3. Frequency distribution of nurses' depression, anxiety and stress

Score variables	stress	anxiety	depression
	Number (%)	Number (%)	Number (%)
normal	181 (82)	100 (45.7)	127 (57.7)
mild	15 (6.7)	26 (11.9)	42 (19.1)
moderate	17 (7.6)	44 (20.1)	36 (16.4)
severe	4 (1.8)	27 (12.3)	12 (5.58)
Very severe	3 (1.3)	22 (10)	3 (1.4)

Multivariate Analyses

In the final model and in the presence of all variables, five variables including marital status, work experience, having children, job satisfaction and history of depression emerged as the significant stress-related factors. Among these factors, work experience was the strongest variable related to stress in nurses involved with COVID-19, in a way that the nurses who had more than 10 years of experience had a 4 times greater risk of experiencing stress than those nurses who had less than 10 years of experience (OR=4.5).

Moreover, in the final model and in the presence of all variables, three variables including work experience, job satisfaction and violence in the workplace emerged as the factors associated with anxiety in nurses involved with COVID-19. Among these factors, again work experience had the strongest relationship with anxiety in nurses, in a way that the nurses who had more than 10 years of experience were 3.87 times as likely to experience anxiety as the nurses who had less than 10 years of experience (aOR= 3.87 , 95% CI=2.09-7.18).

Finally, regarding the factors associated with depression, six variables including gender, history of depression, exercising, sleep pattern, history of chronic diseases and violence in the workplace emerged in the final model and in the presence of all variables. The nurses who did not have a history of depression had 0.27 times greater risk of depression than the nurses with a history of depression and the nurses who did not exercise were 2.04 times as likely to suffer from depression as the nurses who did exercise. Moreover, the nurses who got 7 to 8 hours of sleep less than 3 to 4 days a week were 2.28 times as likely to get depressed as the nurses who had a normal sleep pattern and the nurses who did not experience violence in their workplaces and had no history of chronic diseases had respectively 0.39 and 0.32 times greater risk of depression than the nurses who experienced workplace violence and had chronic diseases (Table 4).

Table 4: Multiple logistic regression model predicting stress, anxiety and depression in nurses involved with Covid-19

variables	groups	SE	P-Value	AOR	95% Conf. Interval
stress					
constant		20.27	0.37	8.42	0.07-942.42
Marital status	single	-	-	-	-
	married	0.15	0.03	0.21	0.04-0.90
Years of employment	<10	-	-	-	-
	≥11	1.98	0.001	4.50	1.89-10.69

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variables	groups	SE	P-Value	AOR	95% Conf. Interval
Having a child	yes	-	-	-	-
	no	0.11	0.009	0.16	0.04-0.63
Job satisfaction	yes	-	-	-	-
	no	1.08	0.01	2.66	1.19-5.90
Depression history	yes	-	-	-	-
	no	0.17	0.003	0.31	0.10-0.93
Anxiety					
constant		0.42	0.39	0.42	0.05-3.07
work experience	<10	-	-	-	-
	≥11	1.22	0.000	3.87	2.09-7.18
Job satisfaction	yes	-	-	-	-
	no	0.92	0.004	2.67	1.36-5.25
Workplace violence	yes	-	-	-	-
	no	0.12	0.003	0.30	0.13-0.67
Depression					
constant	-	193.08	0.005	114.02	4.10-3151.12
sex	male	-	-	-	-
	female	0.20	0.10	0.55	0.26-1.14
Depression history	yes	-	-	-	-
	no	0.13	0.01	0.27	0.10-0.73
exercise	yes	-	-	-	-
	no	0.65	0.02	2.04	1.08-3.83
Maintain 7–8 h sleep 3–4 times a week	yes	-	-	-	-
	no	0.73	0.01	2.28	1.22-4.27
Chronic disease	yes	-	-	-	-
	no	0.14	0.01	0.32	0.13-0.79
Workplace violence	yes	-	-	-	-
	no	0.13	0.009	0.39	0.19-0.78

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Discussion

The results showed that 17.4% of the nurses had stress, more than half (54%) experienced anxiety and about 43% had some degrees of depression. In the study of Lai et al. (2020) on the healthcare workers who were involved in providing care for COVID-19 patients in China, 50.4% of them had symptoms of depression, 44.5% anxiety, 34% sleep disorder, and 71.5% distress (4). The study of Gupta et al. (2020) in Nepal indicated that 38% of the healthcare workers involved in caring for COVID-19 patients suffered from anxiety or depression (19). A meta-analysis showed that the prevalence of anxiety and depression in healthcare workers who provide care for COVID-19 patients was 23.2% and 22.8% respectively (20). Other studies showed that the prevalence of anxiety is about 11.3 to 50% (4, 21, 22). The prevalence rates of moderate to severe depression, anxiety, and stress among Iranian nurses who provided care to patients with COVID-19 were 43.7%, 73%, and 24%, respectively (14). This is in line with the findings of several previous studies which reported that the prevalence of stress was 48% among nurses in Iran during the COVID-19 pandemic (23). The findings of the present study report that it is slightly higher. The high prevalence of anxiety in Iranian nurses could be related to the lack of protective equipment and fear of infection. Previous studies have also confirmed the high levels of anxiety in those who had direct clinical contact with COVID-19 patients (19, 22).

In this study, prevalence of depression was 43%, which is higher than what was reported in other studies in other region of the world. In this regard, we can refer to a study in Nepal that reported a prevalence of depression of 8% (18) and 28% in a study in China (22). Moreover, in a meta-analysis, the combined prevalence was reported to be 22.8% (20). The high prevalence of depression in Iranian nurses is probably related to risk factors such as the high transmission risk of COVID-19 and the social isolation of nurses due to concern about spreading the disease to relatives and friends.

In this study, 17.4% of the nurses experienced some degrees of stress, which is similar to the results of the study of Wu et al. (24) However, in the study of Mo et al. (2020) the mean stress score of Chinese nurses was reported to be 39.9%. The long work hours during a week as well as fear of getting infected by COVID-19 infection through the respiratory droplets and direct contact (3) increased the Chinese nurses' stress to a relatively higher level compared to Iranian nurses. Generally, stress in health care workers fighting COVID-19 is attributed to long shifts, unrealistic wages, lack of personal protective equipment, and concern about getting infected or infecting one's family (25, 26).

Work experience was the strongest variable associated with stress and anxiety among nurses who were involved with COVID-19 in a way that nurses who had more than 10 years of experience were at an increased risk of experiencing stress and anxiety compared to the nurses with less than 1o years of experience. Long work hours during a week is one of the factors affecting nurses' stress and anxiety (3). The Iranian nurses who were satisfied with their jobs reported less stress, anxiety and depression than those who were not interested in and satisfied with their jobs. In the study of Letavak et al. (2012) it was perceived that the nurses who have a lower level of job satisfaction get more depressed (27). There are other studies that show job satisfaction and professional commitment help to reduce stress and anxiety (28, 29). Moreover, a history of depression emerged as a factor associated with stress and depression. Many of the previous studies also showed that high stress levels in nurses lead to anxiety, frustration, depression and other mental and emotional disorders (30, 31).

Marital status and having a child in the family were among factors affecting the nurses' stress. Having children causes stress in nurses because the children need care and also because there is a risk of transmission of COVID-19 from the nurse parent to the child, which is in line with the study of Mo (3). Moreover, there was a significant relationship between marital status and nurses' stress, which is consistent with the study of Yildirim et al. (2020) (32).

The nurses who are older than 35 years are more likely to get stress and anxiety. Although in the study of Yildirim et al. (2020), it was shown that the young healthcare staff had higher anxiety scores compared to older ones (32). In addition, the nurses who are informally employed are less likely to

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experience stress and anxiety than the nurses who are formally employed. The type of employment is associated with workplace anxiety (33). It seems that informally employed nurses can quit their jobs more easily because they have no obligation to the organization. As a result, they have less stress and anxiety than formally employed nurses.

Violence in the workplace emerged as one of the factors associated with stress and anxiety in nurses involved with COVID-19. In the study of Tong et al. (2019), it was found that workplace violence was followed by symptoms of depression in nurses. Reducing the workplace violence and developing the psychological capital can be helpful in the fight against the symptoms of depression (34).

The nurses who exercise and have higher levels of physical activities are less likely to get depression than the nurses who do not exercise and have low levels of physical activities. Physical inactivity and sedentary behavior are significantly associated symptoms of depression and anxiety (35).

The risk of depression is higher in nurses who have a chronic disease or an abnormal sleep pattern. The study of Levatak et al. (2012) indicates that the nurses who have health problems are more likely to be depressed. In other words, there is a relationship between nurses' medical problems and their depression (27). The study of Wu showed that more than one third of the medical staff had symptoms of insomnia during the COVID-19 outbreak, which was associated to isolation and the psychological distress caused by the prevalence of the disease. Considering various psychological factors, it is necessary for the medical personnel to receive interventions in this regard (36). The distress caused by symptoms of anxiety affects the medical staff's sleep quality (37).

The nurses who fight against COVID-19 are generally under psychological pressure. The authorities should consider the nurses' individual characteristics (age, work experience, gender, marital status, having children and history of chronic diseases), improve their working conditions and provide opportunity for them to get enough sleep to help them modulate their stress, anxiety and depression. Moreover, the nurses should be taught appropriate sports and physical activities to do in their leisure time as well as relaxation techniques to maintain their mental health.

Conclusion

Prevalence of stress, anxiety and depression is high among nurses involved with caring for COVID-19 patients and it is associated with a number of their individual characteristics including age, work experience, gender, marital status, having children, job satisfaction, workplace violence, sleep, exercising and history of chronic diseases. Therefore, screening services and psychological supports (comprehensive interventions for the early diagnosis and management of the symptoms of depression, anxiety, and stress also education about stress management) should be provided for nurses and their working conditions should be improved to reduce their anxiety and distress.

Limitations

The present study has several limitations. This study examined only the nurses in the city of Babol in North of Iran. Therefore, it is difficult to generalize the results to all Iranian nurses. Since this was a cross-sectional study, it was not possible to observe the subjects in a longer period of time like a longitudinal study. Third, only one questionnaire was used in this study because of the time constraints.

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Competing Interests: The authors declare no conflicts of interest.

Data availability: The data that supports the findings of this study are available from the corresponding author upon reasonable request.

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