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Comparison of Sleep Disorders, Sleepiness, Depression, Anxiety and Fear in Frontline and Non-frontline Nurses of COVID-19

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Abstract

Aims: The COVID-19 pandemic has created many challenges for health services. Little is known about the impact of the pandemic on frontline and non-frontline nurses working with COVID-19 patients. The aim of this study was to compare mental disorders (sleep disorders, sleepiness, depression, anxiety, and fear) of frontline nurses of COVID-19 with non-frontline nurses.

Instruments & Methods: This comparative correlational study was conducted on 240 frontline and non-frontline nurses of COVID-19 who were selected by simple random sampling method in 2020 in hospitals affiliated to Khoy University of Medical Sciences. Data collection tools included demographic information questionnaire, Pittsburgh Sleep Disorders Index, Epworth Sleepiness Scale, Goldberg Questionnaire, Corona Disease Anxiety Scale, and Numerical Rating Scale. The results were analyzed using SPSS 20 software.

Findings: Mean scores of sleep disorder, sleepiness, depression, anxiety, and fear in frontline nurses were 10.27±2.34, 18.85±3.90, 30.11±7.05, 25.40±8.90, 6.07±2.17, respectively, and in non-frontline nurses was 7.20±1.65, 15.35±3.80, 24.34±3.56, 21.60±7.23,4.90±1.62. The mean scores in both groups were moderate, but the difference between the mean scores of the frontline nurses was significantly greater than that of non-frontline nurses ($p<0.05$). There was a direct and significant correlation between the studied variables with age, gender, marital status, number of children and years of work and an inverse and significant correlation with shift work ($p<0.05$).

Conclusion: The Mean scores of sleep disorder, sleepiness, depression, anxiety and fear in frontline nurses and in non-frontline nurses are moderate, but these mental disorders are more common in frontline nurses than in non-frontline nurses.

Keywords
Nurses [https://www.ncbi.nlm.nih.gov/mesh/68009726];
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Introduction

As one of the biggest health problems of the 21st century, the term emerging diseases refers to diseases that occur due to new unknown infectious agents or due to known infectious agents that are spreading geographically [1]. In the meantime, the COVID-19 pandemic, as the most pervasive emerging disease of this century [2], was a public reminder that emerging infectious diseases have always been a constant threat and potential challenge to human health [3]. The COVID-19 pandemic occurred at a time when the global health system and health care systems in most countries were unprepared to deal with it, and despite astonishing advances in science and technology, the pandemic of this disease posed a great and profound challenge to the world and caused the home settlement of billions of people, the severe disruption in the functioning and communication system of countries and the death of tens of thousands of people, and its end is still not clear [4]. In particular, the disease has the greatest impact on the health care sector and causes problems such as increasing the need for health workers, increasing the costs of prevention and personal protective equipment, diagnostic, laboratory, and treatment costs, increasing the need for beds and ventilators, and death [5].

Every year, the World Health Organization (WHO) celebrates World Patient Safety Day. The motto of World Patient Safety Day 2020 has been set by the WHO as "Health worker safety: a priority for patient safety", and enhancing the safety of healthcare providers is the fifth step in the WHO roadmap for patient safety. The COVID-19 pandemic makes it even more important to talk about the safety of healthcare providers, especially nurses. As a result, maintaining the health and safety of nursing staff is a key principle in promoting patient safety [6].

Nurses, as the largest member of the health care system, have the most contact with patients and play a major role in the prevention and treatment of diseases [7]. In times of crisis, close relatives and even the patient's family stay away from him/her, but nurses take care of patients even though their health is at risk [8] and they cannot refuse care under the pretext that the disease is dangerous [9]. On the other hand, high spread rate, concern about infection and transmission of disease to family members and relatives, lack of definitive treatment, intensive shifts and high workload, heavy protective cover, lack of equipment, insufficient support for nurses and nursing staff mortality have all increased psychological stress [10].

It is estimated that the rate of virus transmission within hospitals, from patients to health care personnel, is about %29 [11]. According to the Executive Director of the International Council of Nurses (ICN), the number of nurses who died during the COVID-19 pandemic was similar to the number killed in World War I [12]. In Iran, according to the Deputy Minister of Nursing of the Ministry of Health, out of more than 200,000 nurses on the front line of COVID-19, more than 60,000 nurses have been diagnosed with COVID-19 [13]. All this has caused front-line nurses to experience not only the risk of death, but also many mental disorders [14], while the results of some other studies in this field show that the rate of psychological damage among non-front-line nurses is higher than that of front-line nurses [15].

It seems that these factors can be stressful for nurses; Sleep disorders, stress and mental disorders in a vicious cycle can reduce the level of concentration, behavioral disorders, metabolic disorders and immune system. These factors can lead to infection in nurses of the COVID-19 ward, especially nurses who already have a background and susceptibility to mental disorders and sleep problems, which is more worrying. In addition, these problems can indirectly reduce the quality of nursing care [16], and consequently patient satisfaction.

Given the importance of this issue and the research priority of all universities by the Research Center of the Ministry of Health about COVID-19, this study was conducted in order to compare sleep disorders, depression, anxiety and fear in frontline nurses of COVID-19 with non-frontline nurses working in hospitals affiliated to Khoy University of Medical Sciences.

Instrument and Methods

This study is a comparative correlational study that was conducted in 2020 with the participation of nurses working in hospitals affiliated to Khoy University of Medical Sciences, Khoy, West Azerbaijan Province, Iran. Convenience sampling was performed for selection of front line nurses in the wards of Ayatollah Khoei Hospital (center of COVID-19). Non-front line nurses of COVID-19 randomly selected from the wards of Qamar bani Hashem, Ayatollah Khomeini, and Madani hospitals. Inclusion criteria included at least one year of work experience and at least one month of direct care experience in COVID-19 centers. The exclusion criteria included non-clinical nurses, patients with any chronic physical, mental, sleep disorders known or treated with psychotropic drugs before starting work, and not experiencing critical situations in the past year. Nurses who themselves or a family member were infected with COVID-19 were also included in this study. Participants with a history of caring for patients with COVID-19 were excluded from the second group. The sample size was determined 128 people using Morgan's table, and considering the possibility of removing the sample and increasing the validity of the research, the

required sample size was estimated to be 140 people in each group.

Due to the limitations of the Center of the wards, sampling was done by two nurses of the COVID-19 Hospital Center, and the time and place of sampling was done based on the opinion of the participants. After explaining the aims of the study, informed consent was obtained and participants were informed that their clinical data would be used for clinical or research purposes, while all their personal information would be kept confidential. The ethical principles of the Declaration of Helsinki were adhered to during collection, handling, and storage of data, and all care was taken to protect patient confidentiality. While gathering information, the researcher performed safety measures such as washing and disinfecting the hands, wearing N95 mask, gloves, gown, hat, and shoe cover. Sampling lasted about two months, from April 15 to May 15, 2021.

The study instrument consisted of 5 parts:

1. Demographic information questionnaire: This questionnaire included personal and social information of nurses such as age, sex, marital status, education level, living status, work experience, employment status, shift work, number of children and care challenges.

2. Pittsburgh Sleep Disorders Index (PSQI): The PSQI, developed in 1989 by DJ Buysse, has 9 terms and 19 items on a 4-point Likert scale from 0 to 3 and has 7 subscales. The total scores of 7 subscales will be between 0 and 21 [17]. The validity and reliability of this tool was estimated at 0.86 and 0.89 in the Iranian version [18] and 0.79 in the present study.

3. Epworth Sleepiness Scale (ESS): ESS, which is an eight-item questionnaire that is scored from 0 to 3 and has a maximum score of 24, assesses the likelihood of drowsiness during various activities. The validity and reliability of this scale was confirmed in previous studies [19] and it was estimated at 0.82 in the present study.

4. Corona Disease Anxiety Scale (CADS): The CADS was used to measure coronary anxiety. This scale has 18 items and 2 components on a 4-point Likert scale and its total score is between 0-54. The validity and reliability of this tool was confirmed in previous studies [20] and its reliability was calculated as 0.89 in this study.

5. The Goldberg Depression Questionnaire: The Goldberg questionnaire was used to assess participants' depression, which has 18 questions with a 5-point Likert scale and a score range of 0-90 [21]. The validity and reliability of this questionnaire has been confirmed in several studies [22] and in this study it was calculated as 0.86.

Numeric Rating Scale (NRS): Finally, the Numerical Rating Scale (NRS) was used to measure the participants' fear of the COVID-19 disease. The NRS is a 10 cm instrument that, in addition to measuring the intensity of pain and shortness of breath, is also used to measure the intensity of fatigue as well as the intensity of fear [23].

This study was conducted in accordance with the Helsinki Declaration and approved by the ethics committee of Khoy University of Medical Sciences (IR.KHOY.REC.1399.016). After expressing the purpose of the study, informed consent was obtained from the participants. The privacy and confidentiality of the participants in this study was also completely preserved. Participants were informed that their names were not written in the questionnaire and they had the right to leave the study whenever they wished.

Data were analyzed by SPSS 20 software. After examining the normality of the data with the Kolmogorov-Smirnov test, Pearson and Spearman's tests were used to investigate the correlation between the variables, and independent t-test was used to compare the mean scores.

Findings

240 nurses in two groups participated in the study. The mean age of the participants was 30.34±7.32 years. The mean work experience of nurses was 9.70±6.65 years. Also, the mean history of caring for a COVID-19 patient was 5.0±2.25 months. Most of the participants were female, married and had a bachelor's degree. Only 3 (2.10%) of the nurses had been screened for psychiatric counseling and 24 (17.10%) had participated in the training courses for the care of the COVID-19 patient (Table 1).

Most of the participants had selected more than one option as challenges that cause anxiety in caring for patients with COVID-19, which included fear of contracting the disease and the possibility of transmission to family members, the nursing shortage and intensive shifts, heavy protective coverings, eating, drinking and rest, mismanagement, lack of psychological support, and lack of equipment (Table 1).

Mean scores of sleep disorder, sleepiness, depression, anxiety, and fear in frontline nurses were 10.27±2.34, 18.85±3.90, 30.11±7.05, 25.40±8.90, 6.07±2.17, respectively, and in non-frontline nurses was 7.20±1.65, 15.35±3.80, 24.34±3.56, 21.60±7.23,4.90±1.62. The mean scores in both groups were moderate, but the difference between the mean scores of the frontline nurses was significantly greater than that of non-frontline nurses ($p<0.05$; Diagram 1).

There was a direct and statistically significant correlation between sleep disorders, sleepiness, depression, anxiety, and fear with age, marital status, number of children, and working years ($p<0.05$), so that with increasing age, years of works, and the number of children, these disorders increase. Also there was an inverse and significant correlation between studied variables with shift

work (p<0.05), but no significant correlation was found between the studied factors and the type of employment (p>0.05). Finally, there was a mean difference between the studied factors in both sexes, and these disorders were more common in women than in men (p<0.05; Table 2).

Table 1) Frequency of demographic characteristics of participants in hospitals affiliated to Khoy University of Medical Sciences

Demographic characteristics	No. (%)
Gender	
Female	104 (74.3)
Male	36 (25.7)
Marital status	
Married	101 (72.1)
Single	34 (24.3)
Divorced	5 (3.6)
Employment status	
Formal	44 (31.4)
With commitment informal	24 (17.1)
With contract	60 (42.9)
etc.	12 (8.5)
Education level	
bachelor	122 (87.1)
Master	18 (12.9)
Shift work	
Shift rotation	94 (67.1)
Fixed shift	46 (32.8)
Living condition	
With family	134 (95.7)
Singly	6 (4.3)
Number of children	
0	48 (34.3)
1	39 (27.8)
>1	53 (37.9)
Psychological and counseling screening	
Yes	3 (2.1)
No	137 (97.9)
Participating in training courses on the care of patients with COVID-19	
Yes	24 (17.1)
No	116 (82.9)
History of COVID-19	
Yes	51 (36.4)
No	89 (63.6)
Family history of COVID-19	
Yes	29 (20.7)
No	111 (79.3)
Anxiety-inducing challenges in caring for patients with COVID-19	
Fear of contracting the disease and the possibility of transmitting it to family members	96 (68.57)
Lack of nurses and intensive shifts	76 (54.28)
Heavy protective covers, eat, drink and rest	63 (45.00)
Mismanagement, lack of psychological support	34 (24.28)
Lack of equipment	29 (20.71)

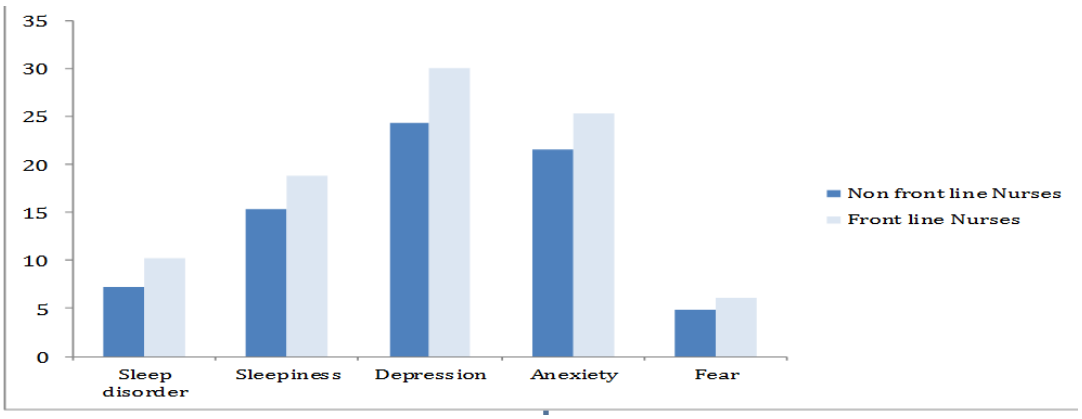

Diagram 1. Comparison of studied variables between frontline nurses of COVID-19 and non-frontline nurses

Table 2) Investigating the relationship and correlation between mental disorders with demographic variables of frontline nurses

Variables	Sleep disorders	Sleepiness	Fear	Depression	Anxiety
Age*	P=0.006 r=0.23	P=0.003 r=0.26	P=0.038 r=0.18	P=0.007 r=0.23	P=0.009 r=0.22
Marital status**	P=0.001 r=0.32	P=0.002 r=0.26	P=0.030 r=0.18	P=0.001 r=0.37	P=0.001 r=0.35
Number of children*	P=0.001 r=0.50	P=0.001 r=0.42	P=0.009 r=0.22	P=0.001 r=0.43	P=0.0001 r=0.50
Employment status**	P=0.39	P=0.620	P=0.840	P=0.224	P=0.910
Work experience*	P=0.002 r=0.26	P=0.001 r=0.31	P=0.006 r=0.27	P=0.012 r=0.21	P=0.003 r=0.18
Shift work**	P=0.028 r=-0.19	P=0.013 r=-0.21	P=0.009 r=-0.22	P=0.001 r=-0.27	P=0.005 r=-0.234
Gender***	t=-1.69 P=0.012	t=-1.23 P=0.009	t=-3.70 P=0.001	t=-2.80 P=0.006	t=-2.34 P=0.021

*Pearson correlation test; **Spearman correlation test; ***Independent t-test

Discussion

The aim of this study was to compare sleep disorders, depression, anxiety and fear in frontline nurses of COVID-19 with non-frontline nurses working in hospitals affiliated to Khoy University of Medical Sciences.

According to the findings of this study, the mean scores of all variables in both groups were moderate, but the difference in the mean scores of frontline nurses was more than that of non-frontline nurses.

In a study by Lai *et al*., on health care workers who were involved in providing care to COVID-19 patients in China, 50.4% of them had symptoms of depression, 44.6% of them had symptoms of anxiety, 34% of them had insomnia, and most of them (71.5%) had distress [14]. Studies performed in the three years following the SARS outbreak in 2003 reported higher levels of burnout, psychological distress, post-traumatic stress disorder, and fear of potential infectious diseases in the future among health care workers [24]. Also, the findings of a study by Mohammad *et al*, on survivors of Ebola showed that being a health worker is a protective factor for mental disorders, especially depression [25].

The studies conducted in other parts of the world indicate that the prevalence of anxiety is about 11.3 to 50% [14, 26, 27]. A study by Gupta *et al*. in Nepal indicated that 38% of healthcare workers involved in caring for COVID-19 patients suffered from anxiety or depression [28]. But a meta-analysis showed that the low prevalence of anxiety and depression in healthcare workers caring for COVID-19 patients was 23.2% and 22.8%, respectively [29]. The current finding is slightly higher than this range. The high prevalence of anxiety in Iranian nurses could be attributed 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 [26, 28]. It is possible that in the research environment of the study, the selection of nurses to care for patients with COVID-19 was voluntary and was selected after psychological screening and with complete mental preparation, while in this study, only 3 nurses were screened and offered psychological counseling.

The results of this study showed that although the mean scores of sleep disorders and sleepiness scale are moderate between both groups, the mean scores of frontline nurses are higher than those of non-frontline nurses, which is consistent with Tu *et al.* and Zhan *et al*.'s study [30, 31]. Li *et al*. reported more severe depression, anxiety, insomnia, and distress symptoms among nurses and frontline workers [15]. Nurses' workload, night shifts, and more contact with COVID-19 patients are risk factors for insomnia [32]. Sleep disorders and sleepiness in the present study may be due to the high prevalence of mental disorders among study participants, because mental disorders such as anxiety, fear, and depression are the factors affecting sleep disorders. In addition, problems related to physiological needs such as eating, defecating, resting, and heavy protective clothing are other factors that participants in this study cited as care challenges.

Also, frontline nurses showed high symptoms of depression, anxiety and fear compared to non-frontline nurses. The findings of Ying *et al*.'s studies showed that nurses in wards related to COVID-19 are exposed to psychological disorders due to the nature of work, Personal Protective Equipment (PPE), use of 95-N mask, risk of infection and infecting others [10]. Rajkumar also believes that anxiety, depression, and health worries are common psychological reactions caused by anxiety COVID-19 disease [33]. In other studies, many nurses stated that they needed more rest and personal protective equipment and suggested that they needed psychological skills training to cope with anxiety and other emotional problems [34, 35]. These results are consistent with the results of our study, it seems to be mostly due to the unknown and creating ambiguity in people about this virus. Fear of the unknown reduces the perception of immunity in humans, which has always been a concern for humans.

Other findings of the current research showed that the levels of studied disorders are higher among frontline female nurses who are married, have children, shift work and have a long work experience. The results of Qi and Huang showed that mental disorders were more common among married women nurses who had children and cared for patients with COVID-19, and this fear and anxiety was probably due to the fear of contracting the disease and transmitting it to the family and especially children [36, 37]. Of course, it should be noted that in this study, the number of female nurses was more than male nurses, and it is not possible to make a reliable judgment about it. In addition, Jarrar *et al*.'s studies showed that nurses increased levels of mental stress during long shifts [38]. However, the results of some studies showed that mental disorders are more common among frontline nurses who have less work experience [14]. It seems that in Iranian nurses, long working hours with COVID-19 patients during a week and lack of emotional support is one of the factors affecting nurses' stress and anxiety.

Finally, the results of the present study indicated that mental disorders are more common in frontline nurses than in non-frontline nurses. These cases can reduce the quality of nursing care, increase the duration of hospitalization, increase patient dissatisfaction and have negative consequences for patients. Of course, the nursing, due to its professional nature, is in the top 12 stressful professions and is probably among the top stressful

jobs among health professions. Meanwhile, the health of nurses in the departments related to COVID-19 is at risk due to the nature of the work, which can lead to many psychological disorders [39]. Therefore, paying attention to mental health, counseling and screening, and psychological support for nurses with the priority of nurses on the front line of COVID -19 can reduce the severity of these disorders to some extent.

This study has some limitations. First of all, this study was carried out in Khoy, West Azerbaijan Province, Iran; therefore, the results cannot be generalized to all nurses in Iran. Secondly, we evaluated the research variables at the time of the study because it was a cross-sectional study and it was not possible to observe the participants over a longer period of time like a longitudinal study. Therefore, it is suggested to conduct more studies with longitudinal design in other centers of Iran.

The present study highlighted the sleep disorders, depression, anxiety and fear in nurses during the COVID-19 epidemic in Iran, especially among frontline nurses of COVID-19. More strategies should be urgently introduced to alleviate the mental and psychological distress of nurses. Mental health professionals should be deployed on medical teams to provide psychological support.

Furthermore, financial and material support, including life and medical equipment, as well as spiritual support from colleagues, team leaders, family, and friends are crucial for confronting with psychological symptoms. This study demonstrated that frontline and non-frontline nurses experienced mental health problems. Since the physical and mental health of nurses is directly related to the quality of their performance in patient care, increasing satisfaction and interest in work, and increasing their work efficiency, therefore, in this current high-risk situation, nurses prone to mental disorders should be identified in order to improve their health. This shows the necessity of planning nursing and hospital managers in centers related to COVID -19. In this way, the mental health of nurses can be maintained and improved with appropriate psychological solutions and techniques. On the other hand, the necessary platform for the management, care and protection programs of the treatment team should be provided in a more informed and precise manner.

Conclusion

The Mean scores of sleep disorder, sleepiness, depression, anxiety and fear in frontline nurses and in non-frontline nurses are moderate, but these mental disorders are more common in frontline nurses than in non-frontline nurses.

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