Work 70 (2021) 1021–1029
DOI:10.3233/WOR-210538
IOS Press

Stress level and sleep quality of nurses during the COVID-19 pandemic

Şebnem Bilgiç[a,*], Ülfiye Çelikkalp[b] and Cem Mısırlı[c]
[a]*Faculty of Health Sciences, Fundamentals of Nursing Department, Trakya University, Edirne, Turkey*
[b]*Department of Public Health, School of Medicine, Trakya University, Edirne, Turkey*
[c]*Health Center for Medical Research and Practice, Trakya University, Edirne, Turkey*

Received 10 April 2021
Accepted 28 July 2021

Abstract.
BACKGROUND: COVID-19 infection is transmitted easily and quickly, and nurses constitute the riskiest group of healthcare workers. Therefore, they may experience high levels of stress and sleep problems.
OBJECTIVE: This study was conducted in order to evaluate the stress levels and sleep quality of nurses working during the COVID-19 pandemic.
METHODS: The cross-sectional study was conducted with 316 nurses working in a pandemic hospital in a city center. A descriptive form, the Pittsburgh Sleep Quality Index (PSQI), and the Perceived Stress Scale (PSS) were used to collect data.
RESULTS: A positive, moderately significant correlation was found between the average PSQI score of nurses and the average perceived stress score ($p \leq 0.001$). Multiple regressions determined that shift work, stress level, a coworker having COVID-19, being out of home due to the risk of transmission, and having a person older than 65 in the home were effective predictors of sleep quality ($R^2 = 33.5$, $p \leq 0.001$). Age, years worked, fear of infecting the family with COVID-19, receiving COVID-19 education, regular nutrition, and sleep quality were effective predictors of stress level ($R^2 = 32.2$, $p \leq 0.001$).
CONCLUSION: It was determined that nurses have low sleep quality and high stress levels during the pandemic process.

Keywords: Healthcare workers, outbreak, psychological factors, Turkey

1. Introduction

The COVID-19 pandemic that started in December 2019 in Wuhan, in the Hubei province of the People's Republic of China, has completed its first year. In the past year, coronavirus cases and death rates have increased significantly all over the world. In the report published by the World Health Organization (WHO) on February 27, 2021, it is reported that the number of COVID-19 cases is 114,247,878, while 2,533,864 people have died because of the pandemic [1]. Although the WHO states that the temporary case mortality rate is around 2%, the results of some studies suggest that this rate varies between 0.3% and 6% [2].

In the Occupational Safety and Health Administration's (OSHA) classification according to professions, it is accepted that healthcare workers are the occupational group with the highest risk in terms of SARS-CoV-2 exposure [3]. Since healthcare professionals are at the forefront of pandemics affecting the whole world and work under the most difficult conditions, infection and death rates are higher in this group [4]. In pandemics that affect the whole of society socioeconomically and psychologically,

*Address for correspondence: Şebnem Bilgiç, Faculty of Health Sciences, Fundamentals of Nursing Department, Trakya University, Edirne 22030, Turkey. E-mail: sebnembilgic@trakya.edu.tr.

the mental health of healthcare workers is negatively affected in terms of severe working conditions and health consequences [5]. In the study by Kang et al., it was reported that 36.9% of medical and nursing staff working in Wuhan had mental health below the threshold, 34.4% had mild mental problems, 22.4% had moderate mental problems, and 17.5% of participants applied for psychological counseling services [6].

COVID-19 spreads very rapidly, transmitted from person to person through droplets, respiratory secretions, and direct contact [7]. In the literature, it is reported that nurses who are on the frontline caring for patients experience the highest occupational stress and associated high anxiety compared to other occupational groups in previous outbreaks that had rapid transmission characteristics [8, 9]. During the COVID-19 pandemic, nurses who come into direct contact with a potentially deadly virus have a high level of concern for their own health and that of their families [4]. The ethical obligation to provide care to patients increases this concern. Nurses face the challenge of balancing these stressful situations that they experience [10, 11]. Other stress factors that have emerged since the outbreak began include concerns about a lack of staff and personal protective equipment, unknown processes, a lack of organizational support, and worsening working conditions [5–12]. This high-risk condition and increased anxiety in the work environment cause chronic stress and various psychological health problems in medical personnel [4, 12, 14]. An increased level of stress and anxiety is known to negatively affect sleep quality and lead to psychological problems, as people who experience stress have difficulty falling asleep and often wake up during sleep. It has been shown in the literature that there is a strong relationship between nurses' stress levels and sleep quality [15, 16].

This study aimed to determine the sleep quality and perceived stress levels of nurses working in a pandemic hospital during the COVID-19 pandemic, and to evaluate the relationship between sleep quality and stress level.

2. Materials and methods

This is a descriptive cross-sectional study covering all nurses working in a pandemic hospital during the COVID-19 outbreak in Turkey. The first COVID-19 case in Turkey was reported by the health ministry on 11 March 2020. Study data were collected between June and August 2020. The nurses who participated in the study worked actively during the pandemic for a period of approximately 4–7 months. All the nurses ($n = 722$) working in a pandemic hospital in Turkey formed the population of this study. The study was conducted with 338 nurses (46.8% of the population) who agreed to participate in the study.

2.1. Data collection tools and data collection

A questionnaire developed by the researchers, the Perceived Stress Scale (PSS), and the Pittsburgh Sleep Quality Index (PSQI) were used to collect the data. After obtaining the necessary permissions for the study, an online survey was created using the Google Forms web application. Information about the research was shared with the nurses through WhatsApp and email. Study questions were sent to participants' smartphones via WhatsApp. The nurses who agreed to participate in the study answered the questionnaire and gave feedback.

The questionnaire consists of two parts with 24 questions. The first part includes questions about the nurses' sociodemographic characteristics (age, gender, education, marital status, etc.). The second part is about the experiences of the nurses during the COVID-19 pandemic.

2.1.1. Perceived Stress Scale (PSS)

The scale developed by Cohen et al. was adapted into Turkish by Eskin et al. The PSS is used to measure the degree to which certain situations in a person's life are perceived as stressful [17]. The scale consists of a total of 14 items answered on a 5-point Likert scale, ranging from "Never (0)" to "Very often (4)." Seven items (4, 5, 6, 7, 9, 10, 13) containing positive statements are scored backwards. The scores obtained from the PSS vary between 0 and 56, with a high score indicating that the person is highly stressed. In this study, the Cronbach's alpha coefficient of the scale was calculated as 0.84.

2.1.2. The Pittsburgh Sleep Quality Index (PSQI)

The validity and reliability of the scale developed by Buysse et al. in Turkish was determined by Ağargün et al. and the internal consistency coefficient was reported as 0.80 [18]. PSQI is a 19-item self-report scale that assesses sleep quality and disorder over the past month. Each item on the scale is scored between 0 and 3. The scale consists of 7 subscales that evaluate subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency,

sleep disturbances, use of sleeping pills, and daytime functionality loss. The total PSQI score, which ranges from 0–21, is obtained by adding up the scores for the subscales. A total PSQI score greater than 5 indicates that the individual's sleep quality is insufficient and indicates severe impairment in at least two areas or moderate deterioration in three areas. In this study, the internal consistency coefficient of the scale was calculated as 0.82.

2.2. Data analysis

The data were analyzed with the SPSS (Statistical Package for Social Sciences) 21.0 program. Descriptive statistical methods such as frequency, percentage, mean, standard deviation (SD), and the Kolmogorov-Smirnov distribution test were used to analyze the data. *T*-tests and one-way analysis of variance were used to compare variables with normal distribution between groups, and Pearson correlation analysis was used to determine the relationships between numerical variables. Sleep quality, which is one of the dependent variables in the study, was associated with some independent variables (shift work, stress level, COVID-19 infection of a colleague, staying away from home due to the risk of contamination, and having an individual older than 65 at home). Perceived stress was also associated with some independent variables (age, years worked, fear of infecting the family with COVID-19, receiving COVID-19 education, regular nutrition, and sleep quality). Multiple regression analysis was therefore performed. The results were evaluated at a 95% confidence interval and $p < 0.05$ significance level.

2.3. Ethical considerations

Before starting the study, a permit was obtained from the Ministry of Health and ethics committee approval was obtained from Trakya University Faculty of Medicine Non-Invasive Clinical Research Ethics Committee (date 05.06.2020, file number TÜTF-BAEK/2020/227). All nurses provided informed consent in line with the voluntary participation principle.

3. Results

The average age of the nurses in this study was 32.24 ± 8.41 years (min: 19; max: 56) and the average years worked was 10.31 ± 9.08 years. 84.9% of the nurses were female, 50.0% were married, and 74.9% had a bachelor's degree. In addition, 66.6% of the nurses worked in shifts, 10.9% had been infected with COVID-19. The vast majority of the nurses (81.4%) reported that their co-workers had been infected with COVID-19, and more than half (%55.3) reported having difficulty accessing personal protective material. When nurses were asked if there were people over the age of 65 living in the same house with them, 17.5% answered yes and 92.6% said that they were afraid of infecting people in the house. 26.9% reported that they had to stay in another place (hotel, dorm, hostel) outside the home in order to avoid infecting their family. When nurses were asked if they could eat regularly during the pandemic, more than half (%52.4) said they could not, while 22.5% were found to have a chronic disease. 56.2% of the nurses had received adequate training on COVID-19 (Table 1).

It was found that the average PSQI score of the nurses was 7.36 ± 3.35 (min = 1, max = 20) and the average PSS score was 31.43 ± 7.85 (min:13, max:56). According to the results of the correlation analysis, a positively significant correlation was found between the average PSQI score of nurses and the PSS score. These findings suggest that nurses perceive high levels of stress and have poor sleep quality. In addition, as nurses' PSS score increases, the PSQI score also increases. In other words, the quality of sleep deteriorates as the stress level of nurses increases (Table 2).

According to the PSQI scale, those with total scores below 5 sleep well, while those who score 5 or more have poor sleep quality. Accordingly, the study found that the perceived stress level score of nurses with poor sleep quality was significantly higher than those with good sleep quality (Table 3).

Multiple regression analysis was performed by associating independent variables with PSQI and PSS aggregate scores, which are dependent variables in the study. Models describing the sleep quality ($R^2 = 0.332$, $p < 0.001$) and stress perception ($R^2 = 0.322$, $p < 0.001$) of nurses during the COVID-19 pandemic were found to be significant. In the model affecting sleep status, shift work ($\beta = -0.175$, $p < 0.001$), perceived stress level ($\beta = 0.455$, $p < 0.001$), a friend at work being infected with COVID-19 ($\beta = -0.115$, $p < 0.05$), staying in places outside the home to avoid infecting people at home ($\beta = -0.098$, $p < 0.05$), and having a person older than 65 at home ($\beta = -0.102$, $p < 0.05$) were identified as effective variables. This model accounts for 33.2% of the variance. In the model

Table 1
Demographic characteristics of the nurses ($n = 338$)

Characteristics	*N*	%
Gender		
Female	287	84.9
Male	51	15.1
Marial status		
Married	169	50.0
Single	169	50.0
Education level		
High school	35	10.4
Bachelor's degree	253	74.8
Postgraduate	50	14.8
Shift work		
Yes	225	66.6
No	113	33.4
Infected with COVID-19		
Yes	37	10.9
No	229	67.8
Contact / quarantine	18	5.3
Unknown	54	16.0
COVID-19 infection of a colleague		
Yes	275	81.4
No	63	18.6
Difficulty in accessing personal protective material		
Yes	187	55.3
No	151	44.7
Living with people over the age of 65		
Yes	59	17.5
No	279	82.5
Fear of infecting the family with COVID-19		
Yes	313	92.6
No	25	7.4
Staying away from home due to the risk of contamination with COVID-19		
Yes	91	26.9
No	247	73.1
Chronic illness		
Yes	76	22.5
No	262	77.5
Regular nutrition		
Yes	161	47.6
No	177	52.4
Receiving COVID-19 education		
Yes	190	56.2
No	148	43.8

Table 2
Relationships between nurses' PSQI and PSS scores ($n = 338$)

Variables	Mean ± SD	Median (min.–max.)	PSS
PSQI	7.36 ± 3.35	7 (1–20)	r = 0.516 $p = 0.000$
PSS	31.43 ± 7.85	30(13–56)	–

Note: r, correlation coefficient. Abbreviations: PSS = Perceived Stress Scale, PSQI = Pittsburgh Sleep Quality Index.

affecting stress level, age ($\beta = -0.351$, $p < 0.05$), years worked ($\beta = 0.387$, $p < 0.05$), fear of infecting a family member ($\beta = -0.093$, $p \leq 0.05$), receiving COVID-19 training in the workplace ($\beta = -0.092$, $p < 0.05$), regular nutrition ($\beta = -0.174$, $p < 0.001$), and PSQI score ($\beta = 0.431$, $p < 0.001$) were determined as effective variables. The arguments in this model have a determining rate of 32.2% for the stress level (Tables 4, 5).

Table 3
Comparison of nurses' sleep quality with perceived stress score

Inventory	PSQI		t	*p*
	Good sleep quality ($n = 77$)	Poor sleep quality ($n = 261$)		
PSS	26.14 ± 6.77	32.99 ± 7.46	–7.222	0.000

Abbreviations: PSS = Perceived Stress Scale, PSQI = Pittsburgh Sleep Quality Index.

4. Discussion

The COVID-19 pandemic has caused various physical and psychological disorders in many individuals in society. Particularly during such a pandemic, there is a special need to address the problems of health workers, who are known to be a more disadvantaged group compared to other professional groups. This study tried to reveal the stress levels and sleep quality of the nurses who were at the forefront during the pandemic and the factors affecting them.

The most important finding of the study was that the nurses had low sleep quality and high stress levels. Similar results were obtained in different studies that evaluated sleep quality and stress levels of health workers and nurses during the COVID-19 pandemic [19–23]. Studies have reported that nurses have low sleep quality [19, 20, 23] or have sleep problems [22] and stress level is high [14, 21]. In a meta-analysis study in which Magbadi et al. examined 40 stress-related and 18 sleep-related studies, signs of stress and sleep disorders were found in 43% of nurses [24]. In studies examining sleep disorders and stress in health workers during the COVID-19 pandemic, it has been reported that employees have poor sleep quality, suffer from severe insomnia, and experience stress [25, 26]. These findings are especially important for representing the high prevalence of stress and sleep problems among nurses working on the frontlines in the fight against COVID-19.

Nursing is a profession that entails intense stress due to working conditions, a heavy workload, and care difficulties. During the COVID-19 pandemic, nurses are working long hours with a high risk of infection and sometimes with a lack of medical

Table 4
Results for multiple regression analysis between nurses' PSQI scores and independent variables

Model	B	SE	Standard β	t	p
Constant	5.150	1.182	–	4.357	0.001
Shift work	–1.240	0.329	–0.175	–3.773	0.001
COVID-19 infection of a colleague	–0.987	0.388	–0.115	–2.542	0.011*
Staying away from home due to the risk of contamination	–0.740	0.353	–0.098	–2.098	0.037
Living with people over the age of 65	–0.902	0.401	–0.102	–2.247	0.025*
Chronic illness	–0.625	0.362	–0.078	–1.725	0.085
PSS	0.194	0.020	0.455	9.918	0.001

Note: Model $R = 0.586$; $R = 0.343$; Adjusted $R^2 = 0.332$; $F = 28.862$; * $p \leq 0.05$, ** $p \leq 0.001$. Dependent variable: PSQI, Independent variables: PSS score, Shift work (0:Yes, 1:No), COVID-19 infection of a colleague (0: Yes, 1: No), Living outside the home in the COVID-19 process (0: Yes (hostel, hotel), 1: No), Living with people over the age of 65 (0: Yes, 1: No), Chronic illness (0: Yes, 1: No). Abbreviations: PSS = Perceived Stress Scale, PSQI = Pittsburgh Sleep Quality Index.

Table 5
Results for multiple regression analysis between nurses' PSS scores and independent variables

Model	B	SE	Standard β	t	p
Constant	28.773	3.918		7.344	<0.001
Age	–0.327	0.149	–0.351	–2.195	0.029*
Gender	1.978	1.028	0.090	1.923	0.055*
Years worked	0.335	0.137	0.387	2.447	0.015*
Fear of infecting the family with COVID-19	–2.786	1.421	–0.093	–1.961	0.049*
Receiving COVID-19 education	–1.447	0.733	–0.092	–1.974	0.045*
Regular nutrition	–2.730	0.759	–0.174	–3.596	<0.001
PSQI	1.010	0.111	0.431	9.103	<0.001

Note: Model $R = 0.580$; $R = 0.329$; Adjusted $R^2 = 0.322$; $F = 23.880$; $^*p \leq 0.05$, $^{**}p \leq 0.001$. Dependent variable: PSQI, Independent variables: Age, working experience (year), PSQI, Fear of infecting the family with COVID-19 (0: Yes, 1: No), Gender (0:Female, 1: Male), Receiving COVID-19 education (0: Uneducated, No, 1: Educated), Regular nutrition (0: Irregular 1: Regularly), Abbreviations: PSQI = Pittsburgh Sleep Quality Index, PSS = Perceived Stress Scale.

supplies. This can cause them to experience anxiety and sleep disorders [27]. Sleep and stress are two factors that can negatively affect each other. Exposure to long-term and high amounts of stress can lead to insomnia. As a result of correlation and regression analysis conducted in our study, it was found that there was a relationship between the nurses' sleep quality and perceived stress scores. In addition, sleep quality and perceived stress scores were compared and it was determined that nurses with low stress scores had good sleep patterns, while nurses with high stress scores had poor sleep patterns. All of these results reveal the relationship between sleep and stress and show similarities to the literature. There are studies which have reported that stress levels increase as nurses' sleep quality deteriorates [21], and sleep quality deteriorates as work stress increases [28]. Sleep problems are common in health professions that experience high levels of work stress. In the literature, it has been stated that occupational stress factors of nurses are directly and significantly linked to the sleep problems they experience during the COVID-19 pandemic [29]. Poor sleep quality can lead to serious health problems in employees and negatively affect health workers' performance, patient care, and safety [23].

In the model developed to determine predictors that affect nurses' sleep quality within the study, variables such as shift work, stress, coworkers having COVID-19, having to stay out of the home due to the risk of transmission, and having a person older than 65 in the home were identified as effective predictors. These variables have been shown to negatively affect the sleep quality of nurses. In the study conducted by Tu et al. on nurses that provide care for COVID-19 patients, the authors determined that most of the nurses (62%) had low sleep quality. It was noted that reasons of this were low numbers of nurses, long working hours, high workload, fear of infecting the disease to colleagues and families, lack of information and separation from families [30]. In another study, it was determined that more than half of the nurses (52.8%) had sleep disorders and nurses working at night shift, nurses that had stress, nurses that had COVID-19 infection among family or friends experienced sleep disorders more than other nurses [22]. As a result of this study, it was established that health workers who lived with their families [23] or

who had older family members [2] experienced sleep disorders due to the fear of infecting them. In addition, it was noted that nurses that worked in night shifts during the pandemic period had higher risks of sleep disorders and as their work stress increased, their sleep quality decreased [28, 31]. It was also mentioned that due to COVID-related stress sleep disorders reached worrying levels [31]. Sufficient and quality sleep is seen as important for mental health. The fact that coronavirus infection is more common in healthcare workers negatively affects their mental health. According to a statement from the International Council of Nurses (ICN), the number of nurses who have died due to COVID-19 is more than the number of nurses who died in World War I, which lasted 4 years [32]. For this reason, colleagues being infected with COVID-19 is another factor that has a negative effect on the sleep quality of nurses.

In the literature, it is stated that nurses experience intense stress, especially during a pandemic [33]. In this study, it was determined that stress levels of nurses were related to age and year of service while having no significant relationship with sex. In literature there are studies that reported there is a difference between stress and sex [34] while there are some other studies that reported no significant difference [14]. The authors argue that absence of difference in stress experienced by nurses during the pandemic according to sex is significant for employee and patient safety.

Studies that were made during the pandemic reported that nurses and midwives over the age of 35 had higher depression scores [35], and as age of nurses increased, their stress scores increased accordingly [36, 37]. In the study it was reported that as age of nurses increased, their stress levels also increased and it was considered that this could be related with more serious consequences of COVID-19 virus emerging with progressing age. Study by Li et al. reported that as employment year of nurses increased, their stress levels decreased and nurses with a maximum of 5 years of work experience had the highest stress levels [37]. Similarly, study by Murat et al. determined significant relationship between employment duration of nurses and their perceived stress levels. It was determined that as employment duration increased, perceived stress scores of nurses decreased [38]. Studies demonstrated that as vocational professionalism of nurses increased, their clinical performances also improved, decreasing the levels of stress they experienced [14]. Improving vocational information and experience with increasing work experience which would decrease stress levels of nurses is an expected finding of the study and our results are in line with the literature.

Studies reported that employees experienced high levels of fear of infecting families [2, 38, 39] and in this process most of them had to live away from families in order to reduce in-house infection [36, 38]. Study by Sampaio et al. reported that nurses who experienced fear of getting infected or infecting somebody had high stress indicators [40]. Similar results were found in the current study, thus health workers fear infecting their family members in the pandemic process and prefer spending this process outside home.

The literature states that in the event of a pandemic, nurses are often given new roles (ethical dilemmas, decision-making) outside the usual nursing roles. In this context, it is seen that adequate education plays a key role in preparing for a disaster or pandemic situation and ensuring professional competence [41]. In the study by Lebragu et al. it was determined that participation in COVID-19 training is an important predictor of the fear of COVID-19; the fear and stress levels of the nurses participating in such training are lower [41]. In the current study, it was determined that receiving training on COVID-19 infection had a significant effect on stress levels of nurses. All nurses working in this framework, must receive in-service training on protection from COVID-19 infection, infection methods, and treatment. In this process new technological means must be assessed to organize advanced special training programs.

In this study, another finding is that a lack of regular nutrition, which is a physiological need, in work environments increases the stress of nurses. Stress and nutrition can affect each other: when an organism cannot get enough nutrients for itself, it increases the level of stress hormones, while an increase in stress leads individuals to consume ready-made food, snacks, and unhealthy foods that are high in calories [42, 43]. In the literature, it is reported that high levels of stress after natural disasters affect eating behaviors; there may be changes in individuals' diets, and especially a decrease in healthy eating behaviors [44]. Similarly, in this study, it was found that difficult working conditions during the pandemic disrupted the nutrition of nurses and, accordingly, their stress levels; nurses who stated that they could not eat regularly reported higher levels of stress.

In the case of outbreaks, using personal protective equipment is a highly important infection control precaution. In their meta-analysis study, Chou

et al. noted that using personal protective equipment decreased infection risk in health workers [45]. However, studies conducted during the pandemic also revealed problems with supply of personal protective equipment. Oladele et al. reported that 55.4% of health workers had problems with finding personal protective equipment [46] while Murat et al. reported that 36.1% of nurses had the same problem [38]. 55.3% of nurses in this study reported problems with accessing personal protective equipment which is in line with the literature. Having problems with accessing personal protective equipment by nurses that are under risk in the pandemic period for working at the front line increased their risk of getting infected. In the U.S.A. the Centers for Disease Control and Prevention (CDC) informed in their 2020 report that 19% of the cases infected with COVID-19 between February 12th and April 9th were health workers [47]. In the study by Ünver and Yenigün on surgical nurses, 15.8% of nurses [48] and in the study by Murat et al. 13.3% of nurses were found to be infected with COVID-19 [38]. Also the fact that more than half of the 2457 positive cases (%52.06) determined as a result of the test made on health workers in Wuhan city of China were nurses is important for demonstrating high risk of infection among nurses [49]. In this study 10.9% of nurses were determined to be infected with COVID-19. The fact that this study was conducted in 4–7 month-period from the beginning of the pandemic and that 10.9% of nurses informed they were infected with COVID-19 in this period is a significant result in terms of fast spread of the infection among nurses.

4.1. Limitations

Possible limitation of the study is the fact that it was conducted only on nurses and based on self-reporting. In addition, there might be other psychosocial factors next to the researched factors in this study that might negatively affect sleep qualities and stress levels of nurses working in the pandemic process. The fact that only the factors in this study are researched are among limitations of the study. In addition to limitations, the study was conducted in cooperation with occupational health and safety unit of the hospital and stress levels and sleep problems of nurses working at the hospital were determined. An important strength of the study is that the results would give direction to preventive applications planned towards employees in the future. Due to the COVID-19 pandemic many health workers were infected and lost their lives. Thus, the study would contribute to the literature with its assessment of stress and sleep problems experienced by nurses working at a pandemic hospital following the first wave of the COVID-19 pandemic.

5. Conclusion

As a result of this study, it was determined that nurses had poor sleep qualities and experienced high levels of stress. It was found that especially nurses with high stress levels had poor sleep qualities and based on work conditions in the pandemic process and infectiousness of the infection factor, many factors negatively affected sleep qualities and stress levels of nurses. During the COVID-19 pandemic nurses work actively in very busy work environment and under risk of infection. Thus, it is important to collect data regularly to assess causes of stress and health problems of nurses. In this process, in order to improve quality of medical care and ensure health and safety of nurses, employment of nurses in unprotected and insufficient physical work environments must be avoided. Thus, organizing coronavirus disease, infection control and prevention training programs might be effective in lowering stress. In addition, providing nurses with sufficient personal protective equipment and supporting training might be effective in reducing their fears of getting infected themselves or infecting their families. Considering uncertainty of the COVID-19 pandemic process, conducting proactive psychological support approaches to sustain wellness of nurses is essential-vital. The authors suggest that future studies would cover initiatives to prevent/decrease stress and insomnia next to revealing their causes and the subject would be more thoroughly assessed with studies covering all health workers.

Acknowledgments

The authors would like to thank all participants who participated in the study.

Conflict of interests

The authors declare that there are no conflict of interests.

References

[1] World Health Organisation. Novel Coronavirus (2019-nCoV) Situation Reports. WHO; 2021. https://www.who.int/publications/m/item/weekly-epidemiological-update—5-january-2021. (accessed Feb 27, 2021).

[2] Wang C, Pan R, Wan X, Tan Y, Xu L, Ho C, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int. J. Environ. Res. Public Health. 2020;17(5):1729.

[3] Occupational Safety and Health Administration (OSHA). Guidance on Preparing Workplaces for COVID-19. wwwoshagov› Publications› OSHA3990. 4-2020. Available from: https://www.osha.gov/Publications/OSHA3990.pdf. (accessed Feb 14, 2021).

[4] Afshari D. Nourollahi-darabad M, Chinisaz N. Demographic predictors of resilience among nurses during the COVID-19 pandemic. Work. 2021;68:297–303.

[5] Çevik Aktura S, Özden G. Psychologıcal effects of the epıdemıc: nurses of COVID-19. J. Int. Soc. Res. 2020; 13(73):1146-1151.

[6] Kang L, Ma S, Chen M, Yung J, Wang Y, Li R, et al. Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: a cross-sectional study. Brain Behav Immun. 2020;87:11–17.

[7] Guan W, Ni Z, Hu Y, Liang W, Ou C, He J, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med. 2020;382:1708–1720.

[8] Chew NW, Lee GK, Tan BY, Jing M, Goh Y, Ngiam NJ, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. Brain Behav Immun. 2020; 88:559-565.

[9] Maunder RG, Lancee WJ, Balderson KE, Bennett JP, Borgundvaag B, Evans S, et al. Longterm psychological and occupational effects of providing hospital healthcare during SARS outbreak. Emerg. Infect. Dis. 2006;12(12):1924-1932.

[10] Cai H, Tu B, Ma J, Chen L, Fu L, Jiang Y, et al. Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of coronavirus disease 2019 (COVID-19) in Hubei, China. Med Sci Monit. 2020;26:e924171-1. e924171.

[11] Khalid I, Khalid TJ, Qabajah MR, Barnard AG, Qushmaq IA. Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. Clin. Med. Res. 2016;14(1):7-14.

[12] Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. Lancet Psychiatry. 2020;7(4):e15-e16.

[13] Koç S, Özkul AS, Özdemir Ürkmez D, Özkul Özel H, Çelik Çevik L. Analysis of level and sources of stress in nurses working in a health organization. Med. J Okmeydanı Train Res. Hosp. 2017;33(2):68-75.

[14] Zandiana H, Sakhab MA, Nasiria E, Moghadama TZ. Nursing work intention, stress, and professionalism in response to the COVID-19 outbreak in Iran: A cross-sectional study. Work, 2021;68:969–979.

[15] Xiao H, Zhang Y, Kong D, Li S, Yang N. The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. Med Sci Monit. 2020;26: e923549-1.

[16] Qi J, Xu J, Li BZ, Huang JZ, Yang Y, Zhang ZT, et al. The evaluation of sleep disturbances for Chinese frontline medical workers under the outbreak of COVID-19. Sleep Med. 2020;72:1–4.

[17] Eskin M, Harlak H, Demirkıran F, Dereboy Ç. The adaptation of the perceived stress scale ınto Turkish: a reliability and validity analysis. In New Symposium Journal. 2013;51(3):132-140.

[18] Ağargün MY, Kara H. Anlar O. Validity and reliability of Pittsburgh sleep quality index. Turkish Journal of Psychiatry. 1996;7:107-111.

[19] Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. Psychiatry Res. 2020;288;112954.

[20] Korkmaz S, Kazgan A, Çekiç S, Tartar AS, Balcı HN, Atmaca M. The anxiety levels, quality of sleep and life and problem-solving skills in healthcare workers employed in COVID-19 services. J. Clin. Neurosci. 2020;80:131-136.

[21] Mo Y, Deng L., Zhang L, Lang Q, Liao C, Wang N, et al. Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. J Nurs Manag. 2020; 28(5):1002-1009.

[22] Zhan Y, Liu Y, Liu H, Li M, Shen Y, Gui L, et al. Factors associated with insomnia among Chinese front-line nurses fighting against COVID-19 in Wuhan: A cross-sectional survey. J Nurs Manag. 2020;28(7):1525-1535.

[23] Zhou Y, Yang Y, Shi T, Song Y, Zhou Y, Zhang Z, et al. Prevalence and demographic correlates of poor sleep quality among frontline health professionals in Liaoning Province, China during the COVID-19 outbreak. Front Psychiatry. 2020;11:520.

[24] Al Maqbali, Al Sinani M, Al Lenjawi B. Prevalence of stress, depression, anxiety and sleep disturbance among nurses during the COVID-19 pandemic: A systematic review and meta-analysis. J. Psychosom. Res. 2021;141:110343.

[25] Jahrami H, BaHamman A, AlGahtani H, Ebrahim A, Faris M, AlEid K, et al. The examination of sleep quality for frontline healthcare workers during the outbreak of COVID-19. Sleep Breath. 2020;26:1-9.

[26] Tselebis DA, Lekka C, Sikaras E, Tsomaka A, Tassopoulos I. Ilias D, et al. Sleep Disorders, Perceived Stress and Family Support Among Nursing Staff During the Pandemic Crisis, Res. Sq. 2020;8(4):434.

[27] Salari N, Khazaie H, Hosseinian-Far A, Ghasemi H, Mohammadi M, Shohaimi S, et al. The prevalence of sleep disturbances among physicians and nurses facing the COVID-19 patients: a systematic review and meta-analysis. Glob. Health. 2020:16(1):1-14.

[28] Deng X, Liu X, Fang R. Evaluation of the correlation between job stress and sleep quality in community nurses. Medicine. 2020;99(4):e18822.

[29] Zhang CQ, Zhang R, Lu Y, Liu H, Kong S, Baker JS, et al. Occupational stressors, mental health, and sleep difficulty among nurses during the COVID-19 pandemic: the mediating roles of cognitive fusion and cognitive reappraisal. J Contextual Behav Sci. 2021;19:64-71.

[30] Tu ZH, He JW, Zhou N. Sleep quality and mood symptoms in conscripted frontline nurse in Wuhan, China during COVID-19 outbreak: A cross-sectional study. Medicine, 2020;99(26):e20769.

[31] Majumdar P, Barman O, Chakraborty P, Sahu S. COVID-19 pandemic and rotational shift work: ımpact on physical and mental health of Indian nurses. Int. J. Res. 2020;6: 60-72

[32] International Council Nursing (ICN) 28 October 2020 https://www.icn.ch/news/icn-confirms-1500-nurses-have-died-COVID-19-44-countries-and-estimates-healthcare-worker-covid (accessed Nov, 30 2020).
[33] Krystal J. Responding to the hidden pandemic for healthcare workers: stress. Nat Med. 2020;26:639.
[34] Hasan AA, Elsayed S, Tumah H. Occupational stress, coping strategies, and psychological-related outcomes of nurses working in psychiatric hospitals. Perspect Psychiatr Care. 2018;54(4):514-522.
[35] Yörük S, Güler D. The relationship between psychological resilience, burnout, stress, and sociodemographic factors with depression in nurses and midwives during the COVID-19 pandemic: A cross-sectional study in Turkey. Perspect Psychiatr Care. 2021;57(1): 390-398.
[36] Leng M, Wei L, Shi X, Cao G, Wei Y, Xu H, et al. Mental distress and influencing factors in nurses caring for patients with Covid-19. Nurs Crit Care. 2021;26(2):94-101.
[37] Li R, Chen Y, Lv J, Liu L, Zong S, Li H, et al. Anxiety and related factors in frontline clinical nurses fighting COVID-19 in Wuhan. Medicine. 2020;99(30):e21413.
[38] Murat M, Köse S, Savaşer S. Determination of stress, depression and burnout levels of front-line nurses during the COVID-19 pandemic. Int. J. Ment. Health Nurs. 2021;30: 533-43.
[39] Dai Y, Hu, G, Xiong H, Qiu H, Yuan X. Psychological impact of the coronavirus disease 2019 (COVID-19) outbreak on healthcare workers in China. MedRxiv. 2020;6: 1-22.
[40] Sampaio F, Sequeira C, Teixeira L. Nurses' mental health during the COVID-19 outbreak: A cross-sectional study. J. Occup. Environ. Med. 2020;62(10):783-787.
[41] Labrague LJ, A. De Los Santos JA, Fear of COVID-19, psychological distress, work satisfaction and turnover intention among frontline nurses. J Nurs Manag. 2021;29(3):395-403.
[42] Eskici G. COVID-19 pandemia: nutrition recommendations for quarantine. Anatol Clin. 2020;25:124-129.
[43] Özcan Ç, Kızıl M. Evaluation of the effect of job stress level on employment conditions, diet quality and anthropometric measurement. Journal of Nutrıtıon And Dıetetıcs. 2020; 48(3):1-9.
[44] Serin Y, Şanlıer N. Emotional eating, factors affecting food intake and basic nursing approaches. J Psychiatric Nurs. 2018;9(2):135-146.
[45] Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Epidemiology of and risk factors for coronavirus infection in health care workers: a living rapid review. Ann. Intern. Med. 2020;173(2):120-136.
[46] Oladele DA, Idigbe IE, Musa AZ, Gbajabiamila T, Bamidele T, Ohihoin AG et al. Self-reported use of and access to personal protective equipment among healthcare workers during the COVID-19 outbreak in Nigeria. Heliyon. 2021; e07100.
[47] Jackson D, Anders R, Padula WV, Daly J, Davidson PM. Vulnerability of nurse and physicians with COVID-19: Monitoring and surveillance needed. J. Clin Nurs. 2020;29:3584-3587.
[48] Ünver S, Yenigün SC. COVID-19 fear level of surgical nurses working in pandemic and surgical units. J. Perianesth. Nurs. 2021.
[49] Zheng L, Wang X, Zhou C, Liu Q, Li S, Sun Q, et al. Analysis of the infection status of healthcare workers in wuhan during the COVID-19 outbreak: a cross-sectional study. Clin. Infect. Dis. 2020;71(16):2109-2113.