Sleep Quality among Nurses during the First Year of Coronavirus Disease 2019

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Abstract

BACKGROUND: Nurses represent the largest section of the health-care workforce, and lack of sleep has an adverse influence on them, particularly during pandemics such as coronavirus disease 2019 (COVID-19). It causes not only health problem but also poor work results and an increased risk of medical errors.

AIM: The goal of the study was to determine the prevalence of poor sleep quality among nurses during COVID-19 outbreaks.

MATERIALS AND METHODS: A cross-sectional analysis was conducted among a group of nurses in the Al-Madinah region of Saudi Arabia at the National Guard Health Affairs in 2020 (1st year of the COVID-19 crisis). Data were collected using a validated questionnaire with two sections: Sociodemographic data such as age, nationality, family status, gender, and the Pittsburgh Sleep Quality Index.

RESULTS: There were 238 nurses in the report. 37.8% of them were found to be between the ages of 31 and 35, while 24.4% were under the age of 30. The nurses were mostly female (84%). Sleep latency, sleep disruption, overall subjective sleep quality, and sleep length were the most widely identified sleep problems. Sixty-six percent of the nurses said they had a poor night's sleep. None of the demographic variables analyzed had a significant relationship with overall sleep quality.

CONCLUSION: Majority of nurses working at the National Guard Health Affairs and primary health-care centers in Al-Medina, Saudi Arabia, experience poor sleep quality, during the 1st year of COVID-19 crisis regardless of their demographic characteristics.

Introduction

The global pandemic coronavirus disease 2019 (COVID-19) is the most challenging condition humanity has encountered in the twenty-first century [1], [2]. This pandemic has an impact on every sector of our life, particularly due to a lack of knowledge about the virus's route of transmission and how to treat and prevent it [2], [3]. Every society was negatively affected by the pandemic's psycho-emotional consequences. Although a considerable portion of the population can demonstrate strength and courage in the face of stress, anxiety, or loss caused by the pandemic, the virus can damage the psychological health of a smaller portion of the population, increasing stress-related problems [4].

Sleep is a physiological processing of body renewal [5]. It has two dimensions: Duration (quantity) and depth (quality) [6]. Sleep is one of basic Maslow's hierarchy needs for human beings [7]. Poor sleep quality has an impact on not only thinking abilities but also emotions, performance, and health [8].

Nurses represent the largest sector of health-care professionals, so they have a significant role in the health-care system, which is adversely affected by poor sleep quality as it results in not only health problems, but also it is linked to weak employee performance and increase in the likelihood of making medical mistakes that endanger the patient's life [9].

The nurses' work is characterized by various day and night shifts and irregular activity [10]. Sleep disturbances in the form of irregular sleep-wake patterns have been reported in up to 57% of shift-working nurses, resulting in decreased sleep time and daily dysfunction [11].

National researchers in Taif, 2018 [12], looked into the relationship between sleep quality and medical students' grades. Researchers at King Abdulaziz University in Jeddah found that 70.4% of medical students had low sleep quality in 2017 [13] and found no important associations between them. In Najran, a 2017 [14] sleep quality analysis among health-care staff found that a majority of them were nurses, and 42.3% of the workers were bad sleepers.

Clinicians attempted to measure sleep quality and nurse productivity in Taiwan, 2013 [15], the UK,

2017 [16], Nigeria, 2017 [17], and South Korea, 2018 [18], and all results revealed that sleep quality disturbance is a common problem among nurses.

In addition, the Saudi transformation plan for 2020 concentrates on human practice quality and scientific skills. Furthermore, the Saudi vision 2030 aims to increase the quality of employee performance by enhancing soft skills, which are one of the most significant parts of a qualitative human investment. As a result, nurses play an important part in the development of health care.

COVID-19 time effects on sleep quality and performance among nurses in Al-Madinah city, Saudi Arabia, have never been studied. As a result, the aim of the present study was to determine the prevalence of poor sleep quality among nurses in the National Guard Health Affairs in Al-Medina district, Saudi Arabia, in 2020 (the 1st year of the COVID-19 crisis), and to assess any correlation between demographic characteristics and sleep quality.

Materials and Methods

Study area

The research was carried out in Saudi Arabia's Al-Madinah city's National Guard Health Affairs. Saudi Arabia is the Arab world's second-largest nation. Madinah is a city in Saudi Arabia's northwestern region. Medina covers an area of (589) square kilometers. It is about 150 miles north of Mecca and 400 miles south of the Red Sea.

Al-Madinah's Prince Mohammed Bin Abdulaziz Hospital (PMBAH), "the fifth National Guard Health Facility in the Kingdom," is a completely serviced facility with a 215-bed ability, located on Prince Naif Road at the foot of Mount Uhud. The National Guard employees and their dependents, as well as other deserving patients, are served by the Prince Mohammad Bin Abdulaziz Hospital. It covers three departments' inpatient, outpatient, and emergency. Nurses from various countries work in all departments.

Study design and population

Nurses from the National Guard Hospital and the primary health-care centers (PHCCs) in Al-Madinah city participated in a cross-sectional descriptive analysis.

Inclusion criteria

Nurses at the National Guard Hospital and the PHCC in Al-Madinah by 2020.

Exclusion criteria

- Administrative nurses working in the National Madinah's Guard Hospital in 2020
- Nurses on leave at the National Guard Hospital, Al-Madinah, in 2020 during data collection.

Sample size and sampling technique

Raosoft's sample calculator was used to measure the represented study population size. The total number of nurses is 620, with a margin error of 5 and 95 confidence level; a sample size of 238 was suggested. The hospital is divided into 12 departments, with 19 nurses randomly selected from each department due to the fact that all department shifts are scheduled at the same time. The study sample was conveniently expanded to include ten nurses from a primary health-care center in the same study region.

Study tool

A previously validated questionnaire was used to collect data for the study. It is divided into two sections: The first contains sociodemographic information such as age, nationality, marital status, and gender. The Pittsburgh Sleep Quality Index (PSQI) was used in the second portion.

The PSQI is a useful tool for assessing the quality and patterns of adult sleep. Sleep quality disturbances, latency, length, habitual quality, use of drugs, and daytime dysfunction over the previous month are used to distinguish "poor" from "good" sleep quality.

Data entry and analysis

IBM SPSS version 24 was used to analyze the data in this report (IBM Corp., Armonk, N.Y., USA). The characteristics of the study variables were described using a simple descriptive statistic in the form of counts and percentages for categorical and nominal variables and mean and standard deviations for continuous variables. The key research variable was measured using the (PSQI) scoring system.

The Chi-square test was used in this analysis to create a relationship between demographics and the key study variable. Finally, the null hypothesis was refused if the $p < 0.05$.

Results

In this study, the sleep quality of 238 nurses in the National Guard Health Affairs in Al-Medina city,

Saudi Arabia, was evaluated. The demographic profile of the studied population showed that nearly 40% of the participants were found to fall between 31 and 35 years old (37.8%), followed by around one-fourth whose aged 30 years old and below (24.4%). Almost half of them (46.6%) were Malaysian and roughly one-third (34.0%) were of Filipino nationality. Majority of the studied nurses were female (84.0%). About three-fourth of them were married at least once (72.6%). Furthermore, most of them were non-smokers (94.5%) and working in the hospital (96.2%) (Table 1).

Table 1: Participants' demographic profile characteristics (n=238)

Demographics	Count	%
Age		
30 years old and below	58	24.4
31–35 years old	90	37.8
36–40 years old	52	21.8
Above 40 years old	38	16.0
Nationality		
Saudi	11	4.6
Malaysian	111	46.6
Filipino	81	34.0
Sudanese	3	1.3
Jordanian	18	7.6
Egyptian	10	4.2
British	2	0.8
Australian	1	0.4
Pakistani	1	0.4
Gender		
Male	38	16.0
Female	200	84.0
Marital status		
Single	65	27.4
Married at least once	173	72.6
Marital status		
Single	65	27.4
Married	165	69.3
Widowed	6	2.5
Separated	2	0.8
Smoking		
Non-smoker	225	94.5
Smoker	13	5.5

Table 2 shows the sleep routine characteristics of the participants. Around 40% (39.9%) of them have usually gone to bed between 10:01 PM and 12:00 midnight, while nearly one-third between 8:00 PM and 10:00 PM (28.6%). Furthermore, 50.8% of them took 30 min and less to fall asleep each night. 68.9% woke up in the morning between 4:01 AM and 6:00 AM, 61.8% had an actual 6–8 h of sleep at night, and 57.4% stayed in bed for 6–8 h.

Table 2: Sleeping pattern of the participants

Variables		Count	%
When do you normally go to bed? (24-h format)	20:00–22:00	68	28.6
	22:01–00:00	95	39.9
	Pass 00:00	29	12.1
	After work/duty	46	19.3
How long does it take you to fall asleep each night (in minutes)?	30 min and less	121	50.8
	31–60 min	65	27.4
	61–120 min	29	12.2
	More than 120 min	16	6.7
	Not sure	7	2.9
How early do you normally get up in the morning?	02:00–04:00	40	16.8
	04:01–06:00	164	68.9
	Pass 06:00	22	9.3
	Before work/duty	12	5.0
How many hours did you get off real sleep at night?	5 h or less	79	33.2
	6–8 h	147	61.8
	More than 8 h	11	4.6
	Not sure	2	0.4
How many hours were you in bed?	5 h or less	53	23.0
	6–8 h	132	57.4
	More than 8 h	34	14.8
	Not sure	11	4.8

In terms of sleep-related trouble encounters, around 40% and one-fourth of the studied population were unable to fall asleep in <30 min three or more times a week (39.6%) and once or twice a week (26.0%). On the other hand, nearly half of them reported waking up in the middle of the night or early in the morning three or more times a week (48.1%). About one-third of the nurses surveyed (32.6%) had to get up to use the bathroom once or twice a week, and three or more times a week (33.9%). Furthermore, almost half of them reported feeling overheated (48.9%), had bad dreams (49.6%) cannot breathe comfortably (74.8%), coughed or snore loudly (72.6%), felt too cold (56.4%), experienced pain (53.8%), and other reasons (48.9%) not during the past month. Other reasons include too much thinking (15%), post night shift (20%), and pain and sickness (22.5%) at more than 15% rate.

The recent month-related experiences of the participants were also determined. The majority of them (75.5%) have taken medication to help them fall asleep, and 60.9% have had difficulty staying awake while driving, eating, or engaging in social activity in the previous month. Nearly half of the respondents, on the other hand, did not find it difficult to maintain their enthusiasm for getting things done over the past month (49.3%). Almost half rated their sleep quality as good overall (49.8%). After accounting for the causes of trouble in sleeping of the participants, the average quality sleep score of the participants was found to be 25.26 ± 7.1 (min = 5, max = 39).

From Table 3, it is shown that the most commonly reported sleep problems were sleep latency, sleep disturbance, overall subjective sleep quality, and duration of sleep. Overall poor sleep quality was reported among 65.6% of the nurses, based on PSQI results.

Table 3: Objective sleep measures of the subjects

Scoring	Sleep Quality Index	Min	Max	Mean	SD
Duration of sleep		0	3	1.11	1.0
Sleep disturbance		0	3	1.43	0.6
Sleep latency		0	3	1.86	1.0
Day dysfunction due to sleepiness		0	3	0.86	0.9
Sleep efficiency		0	3	0.34	0.8
Overall sleep quality		0	3	1.22	0.8
Need meds to sleep		0	3	0.38	0.8
Pittsburgh sleep quality index		0	18	6.98	3.4
		Count		%	
Pittsburgh sleep quality index	Good sleep quality	82		34.4	
	Poor sleep quality	156		65.6	

The correlation of the quality of sleep score of the studied nurses toward demographic factors was also investigated, as shown in Table 4. Results revealed no significant differences (p > 0.05) in their quality sleep score when compared against factors such as age, gender, family status, smoking characteristics, and place of work.

Discussion

COVID-19 crisis revealed the importance of the nursing profession in these circumstances. As a

Table 4: Association between demographic characteristics of the participants and overall sleep quality

Demographics	Pittsburgh Sleep Quality Index		p-value
	Good sleep quality	Poor sleep quality	
Age			
30 years old and below	(30.6)	(69.4)	0.899
31–35 years old	(37.3)	(62.7)	
36–40 years old	(34.3)	(65.7)	
Above 40 years old	(31.0)	(69.0)	
Gender			
Male	(50.0)	(50.0)	0.097
Female	(31.9)	(68.1)	
Marital status			
Single	(27.5)	(72.5)	0.290
Married at least once	(36.7)	(63.3)	
Smoking			
Non-smoker	(34.2)	(65.8)	0.638
Smoker	(42.9)	(57.1)	

result of the shortage of the nursing staff, health-care settings allow nurses to work longer shifts and many shifts per week, which result in sleep deprivation, which has been reported to affect adversely the nurses' performance and cause errors and accidents during work [19]. The current study has been carried out to assess the sleep quality among nurses in the National Guard Health Affairs in Al-Medina city, Saudi Arabia, during 2020 (the 1st year of COVID-19 pandemic) and set recommendations to reduce the burden of the problem among the nurses.

Malik *et al*., 2018 [20], and many other researchers in Saudi Arabia used and assessed the construct validity of the PSQI index among different health-care workers in Jeddah, Riyadh, and Jazan and showed satisfactory results and similar findings as other developed countries who validate the PSQI index in many clinical and subclinical settings [21], [22].

In the current study, the mean PSQI score was 6.98 ± 3.9, which is lower than that reported in Shandong, China, among nurses working in the emergency department in public hospitals (8.2 ± 3.9), secondary hospitals (9.5 ± 3.9), and tertiary hospitals (11.8 ± 4.3). However, it was comparable to that reported in primary hospital (7.4 ± 3.5) [23]. Furthermore, the current study revealed an overall prevalence of bad quality of sleep (PSQI >5) of 65.6% compared to 76.3% and 63.9% among emergency nurses and registered nurses, respectively, in China [23], [24], 78.5% among hospital staff nurses in Taiwan [15], and 57% among nurses in another study carried out in Taiwan [11]. In Nigeria, 61% of the nurses had poor sleep quality and the mean PSQI score was 5.7 ± 2.7 [17], and in another study, 58.3% of nurses had poor sleep quality [25]. In Newcastle (UK), the prevalence of poor sleep quality was 59% in none work-shifting nurses and 78% in work-shifting nurses [16]. In Tehran (Iran), poor quality of sleep was reported among 41% of health-care workers [26]. Finally, in another Saudi study carried out in Najran, 48.6% of nurses reported poor sleep quality [14].

According to Sher, 2020 [27], a comparison of the current study's findings with those of previous recent research released during the COVID era revealed that the pandemic is linked to increasing rates of anxiety, sleep difficulties, and even suicide [28], [29]. Others attributed the pandemic's impact on immune systems to the pandemic. Others have linked the pandemic's influence on immune systems not only for medical personnel and nurses but also for the general public [30].

In the present study, 50.8% of the nurses fell into sleep within 30 min or less whereas 27.4% took between 31 and 60 min and overall sleep latency was the most commonly reported sleep problem among them. In Nigeria, the average time taken by nurses to fall into sleep was 21.7 ± 15.8 min [17]. Furthermore, in Iran, sleep latency was the most important problem of the nurses [31].

In the current survey, the duration of sleep range between 6 and 8 h among 61.8% of the nurses while 33.2% sleep 5 h or less. In Nigeria, the duration of sleep ranged between 1 and 10 h, with a mean of 6.2 ± 1.5 [17]. It has been recently documented that shorter sleep duration has a negative impact on the nursing work performance [32].

The present study revealed no significant difference in the rate of poor sleep quality between nurses working in hospitals and those working in primary health-care settings. The inclusion of a very small sample size from primary healthcare centers compared to those recruited from hospitals is most likely the reason for this result. In a similar study carried out in China, the prevalence of bad quality of sleep among emergency nurses was related significantly to the hospital level [23].

Numerous studies found an association between decreased quality of sleep and working in shifts as well as increase in the workload [15], [33], [34], [35], [36], [37]. In the present study, we classified our population into two categories: Those working in hospitals with a shift schedule and excessive workload and those working in primary health-care centers with only a morning shift and relatively low workload. We did not observe a significant difference between the two groups as regards the prevalence of poor sleep quality. Some other studies did not reveal an association between work shifts and quality of sleep [38]. Other studies suggested that hospital nurses were highly stressed and more prone to sleep problems [39], [40].

In the present study, almost one-quarter of nurses (24.5%) reported taking medications to help them to sleep in the past month. High figure has been reported by Bagheri *et al*. in Iran (35.5%) [38]. In another study carried out by Sepehrmanesh *et al*. also in Iran [41], 19.5% of nurses used sleep medication to fall asleep. In the United States, 27% of nurses used medications to help them sleep, while 13% reported using medications to stay awake [42]. Sleep

medications have adverse impacts on the quality of life because they may lead to some unpleasant symptoms including headache, dizziness, concentration problems, vomiting, sleepiness, insomnia and also it could affect memory [43], [44], [45], [46].

It has been documented in the literature that the factors that had considered as risk factors for bad sleep among nurses collectively include shift work, personal lifestyle and characteristics, work-related characteristics, family structure, and chronic symptoms such as headaches, abdominal pain, head and back pain, and fatigue [47]. In the present study, we investigated only demographic characteristics of nurses in addition to place of work (hospital versus primary health-care center) and found no association with poor sleep quality. Similar to ours, some other studies found no association between demographic characteristics of nurses and poor sleep quality [15], [48]. Contrary to that, Chan [49] observed that older age, gastrointestinal symptoms, and higher level of stress were determinants of poor sleep among nurses. Kageyama *et al*. reported that nurses under the age of 27 who worked three night shifts a month were more likely than others to have sleep problems [50].

The current research has some limitations. It was only performed at one hospital, restricting the applicability of the results to other settings. The cross-sectional design of the study and collection of data by a self-report tool and none using objective tests were considered limitations of the study. Despite those limitations, this study has public health importance in exploring the problem of sleeping disturbance among nurses during pandemic times that could impact the quality of care delivered to patients in our community.

Conclusions

Sleep problems during the 1st year of COVID-19 crisis are very common among nurses working at the National Guard Health Affairs and primary health-care centers in Al-Medina city, Saudi Arabia, as it affected almost two-thirds of them, with no difference based on their demographic characteristics. Sleep latency, sleep disturbance, subjective overall sleep quality, and sleeping time were the most commonly observed sleep problems among nurses.

Recommendations

During pandemics such as COVID-19, adjunctive interventions are required to increase sleep efficiency among nursing personnel, specifically the frequency and duration of night shifts.

Ethical Considerations

This study was conducted according to the principles of the World Medical Declaration of Helsinki and approved by the King Abdullah International Medical Research Center (IRBC/1076/20). Each nurse had to sign a written consent form. The privacy and confidentiality of participants were protected; no identifiers were obtained and all data, hard and soft copies, were maintained on the hospital premises and only the research team had access to it.

Authors' Contributions

WA was in charge of the study's conception and design, as well as conducting analysis, providing research materials, and collecting and organizing data. Data were analyzed and interpreted by AM and SAE. WA and ABA contributed to the initial and final revisions of the paper, as well as material support. The manuscript's content and similarity index are the responsibility of all authors, who have critically revised and accepted the final document.

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