



The Effect of COVID-19 Outbreak on Anxiety and Sleep Quality of the Surgical Nurses COVID-19 Salgınının Cerrahi Hemşirelerinin Kaygı ve Uyku Kalitesi Üzerindeki Etkisi

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Abstract

We aimed to determine sleep quality and anxiety levels of surgical nurses fighting the COVID-19 outbreak. This study was carried out as a cross-sectional and descriptive study. The data were collected by using a sociodemographic data form, Pittsburgh Sleep Quality Inventory (PSQI), and Beck Anxiety Inventory (BAI). A total of 302 healthcare workers participated in this study. The mean age of the participants was 31.95 ± 7.82 , and 73.2% of the participants were female, 58.9% of the participants were married and 31.5% of them working in the surgical intensive care and operating room services. Of all participants, 73.5% had poor sleep quality and mean PSQI was 8.18 ± 3.69 . The BAI score of surgical nurses was 16.61 ± 12.12 and 22.5% of them experienced severe anxiety. The means of PSQI and BAI were higher in women, working in surgical intensive care and operating room services, working over 40 hours a week ($p < 0.05$). BAI score was responsible for 45.6% of the change on PSQI score ($p < 0.001$). The COVID-19 outbreak dramatically increased the level of anxiety and negatively affected sleep quality. The mental health of the surgical nurses should be monitored closely. It is recommended to provide psychological support to the healthcare workers.

Keywords: Anxiety, COVID 19, Surgical Nurses, Outbreak, Sleep quality.

Özet

Bu çalışmada COVID-19 salgını ile mücadele eden cerrahi hemşirelerinin uyku kalitesinin ve anksiyete düzeylerinin belirlenmesi amaçlanmıştır. Çalışma kesitsel ve tanımlayıcı olarak yapılmıştır. Veriler sosyodemografik veri formu, Pittsburgh Uyku Kalitesi İndeksi (PUKİ) ve Beck Anksiyete Envanteri (BAE) kullanılarak toplanmıştır. Çalışmaya toplam 302 cerrahi hemşiresi katılmıştır. Hemşirelerin yaş ortalaması 31.95 ± 7.82 olup, %73.2'si kadındır. Bireylerin %58.9'u evli, %31.5'i cerrahi yoğun bakım ve ameliyathanelerde çalışmaktadır. Bireylerin PUKİ ortalaması 8.18 ± 3.69 'dir ve % 73.5'inin kötü uyku kalitesine sahip olduğu belirlenmiştir. Hemşirelerin BAE puanı 16.61 ± 12.12 'dir ve %22.5'inin şiddetli anksiyete yaşadığı bulunmuştur. Kadınlarda, cerrahi yoğun bakım ve ameliyathanelerde, haftada 40 saatin üzerinde çalışanlarda PUKİ ve BAE ortalamalarının daha yüksek olduğu bulunmuştur ($p < 0.05$). PUKİ puanındaki değişimin %45.6'sından BAE puanı sorumludur ($p < 0.001$). COVID-19 salgınının anksiyete düzeyini önemli ölçüde arttırdığı ve uyku kalitesini olumsuz etkilediği belirlenmiştir. Cerrahi hemşirelerinin ruh sağlığının yakından izlenmesi ve psikolojik destek verilmesi önerilmektedir.

Anahtar Kelimeler: Anksiyete, COVID 19, Cerrahi Hemşiresi, Salgın, Uyku kalitesi.

Introduction

The coronavirus disease 19 (COVID-19) was first seen in China in early December of 2019 [1]. On 11 March, The World Health Organization (WHO) evaluated the situation and declared a pandemic [2,3]. The first COVID-19 case in Turkey was detected on March 11, 2020 [3].

The infectious outbreak did not specify any gender, race, or socioeconomic status which caused the spread of fear among people. Although the disease impacted everyone globally, the patients and nurses have been the most vulnerable group to the emotional impact of the coronavirus [4]. The COVID-19 outbreak has forced the nurses to make tough decisions and to work under pressure by putting them in an unprecedented and tough situation globally. These difficult decisions include how to allocate insufficient resources to patients equally, and how to meet their own physical and mental healthcare needs [5]. In addition, the increase of the diagnosed and suspicious cases, the intensity of workload, the lack or depletion of personal protective equipment, having few treatment options, and having inadequate emotional support are other factors which have been increasing the psychological burden of the surgical nurses [6]. These situations may cause psychological health problems such as insomnia and anxiety among the nurses.

Nurses are at the forefront of outbreak management in this society [7]. The psychological symptoms that are experienced by the nurses impact the provision of health services. For this reason, in order to perform preventive interventions, it is necessary to define the psychological symptoms of the surgical nurses such as anxiety, stress, and insomnia and to meet their psychological needs.

While a large epidemiological literature on pandemic diseases, [8] there is little information available regarding the sleep quality and anxiety levels of surgical nurses during the COVID-19 pandemic in Turkey. For this reason, it was aimed to determine the sleep quality and anxiety levels of the surgical nurses fighting with the COVID-19 outbreak in Turkey.

Material and Method

This is a descriptive, cross-sectional, and self-reported study. This study was carried out with 302 nurses.

At first, the study consisted of 350 nurses working in the city, public, private and university hospitals in two provinces (Kayseri and Yozgat). Eventually, the response rate was 86.3% and the sample of the study consisted of 302 nurses who met the inclusion criteria and volunteered to participate in the study. This study was conducted online between April 15th, 2020-July 15th, 2020. The adequacy of the sample size was decided based on post hoc power analysis. The effect size was obtained as 0.82 by using the correlation coefficient between the Pittsburgh Sleep Quality Inventory (PSQI) and the Beck Anxiety Inventory (BAI). When the type I error was taken as 5% and the sample size as 302, the posterior power of the study was calculated as 99%.

Including and excluding criteria

Nurses who work in the surgical services and having required electronic equipment to respond to the survey were included in the study. Nurses who did not want to participate in the study, having sleep disorders and taking medication for sleep and having a mental illness were excluded from this study.

Data collection

An online questionnaire was applied by using Google forms, with a consent form appended to it. The link of the questionnaire was sent through e-mails, WhatsApp, and other social media to the contacts of the investigators. The data collection period lasted for 10-15 minutes.

Data Collection Tool

The data were collected using the sociodemographic characteristics form, the Pittsburgh Sleep Quality Inventory, and the Beck Anxiety Inventory.

Sociodemographic Characteristics Form: It was created by the researchers by the literature search [6,9,10] and the form consisted of 10 questions including introductory information such as age, gender, marital status, working institution, and working unit.

Pittsburgh Sleep Quality Inventory (PSQI): It was developed by Buysse et al. in 1989 consisting of a total of 24 questions [11]. Turkish reliability was made by Ağargün et al. in 1996 and its coefficient was found to 0.80 [12]. In our study, the coefficient was found to be 0.72. The Pittsburgh Sleep Quality Inventory has seven components and each component is evaluated between zero and three points. A total score higher than five indicates "poor sleep quality". Components of the Pittsburgh Sleep Quality Inventory are listed as sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, sleep medication, and daytime dysfunction [13].

Beck Anxiety Inventory (BAI): The inventory developed by Beck et al. in 1988 is used to determine the frequency of anxiety symptoms [14]. The validity and reliability study of the scale in our country was conducted in 1998 by Ulusoy et al. Cronbach's alpha coefficient of the scale was reported to 0.92 [15]. Cronbach's alpha coefficient of the scale was found to be 0.94 in our study. The highest score that can be obtained from the scale is 63. The high total score indicates that the anxiety level or severity is high. The anxiety levels of the patients according to the scores from the Beck Anxiety Inventory are: 0-15 points show mild, 16-25 points show moderate, and 26-63 points show severe anxiety symptoms [16].

Ethical Statements

This study was conducted in accordance with the Declaration of Helsinki. The approval of a university ethical council (2020:95799348-050.01.04-E.9946) was obtained before the study. Informed consent was obtained online from individuals who participated in the study. In addition, a study permission on COVID-19 was obtained from the Ministry of Health.

Statistical analysis

The data were analyzed by SPSS 24.0 (IBM Corp., Armonk, United States of America). The data were expressed either as frequencies or mean \pm standard deviation. Shapiro-Wilk test and Q-Q graphs were used to determine whether the numerical data were suitable for normal

distribution. The data with normal distribution were evaluated with one-way analysis of variance, student t-test to compare two or more groups. Post-hoc Tukey Honestly Significant Difference (HSD) analysis was used. Pearson correlation and Simple Linear Regression analysis were used. In all results, $p < 0.05$ was considered statistically significant, and all tests were 2-tailed.

Results

The mean age of surgical nurses was 31.95 ± 7.82 , and 73.2% of them were female. 58.9% were married and 53.6% had at least one child, 41.4% of them work in university hospitals, 31.5% of them work in surgical intensive care and operating room services (Table 1).

In the current study, 73.5% of surgical nurses were found to have poor sleep quality and the mean of the PSQI was 8.18 ± 3.69 . In addition, it was determined that means of BAI of the surgical nurses was 16.61 ± 12.12 , and 22.5% of them experienced severe anxiety (Table 2).

This study shows that the mean of the PSQI and BAI was higher in women and those working over 40 hours per week compared to other groups ($p < 0.05$). In addition, the quality of sleep ($p < 0.05$) of those working in the surgical intensive care and operating room services was found to be worse and the anxiety level was higher, although it was not statistically significant ($p > 0.05$) (Table 3).

A statistically significant, moderate positive correlation was found between PSQI and BAI mean scores ($r = 0.67$; $p < 0.001$) (Table 4). The results of the analysis of variance of the nurses' anxiety and sleep quality levels show that the regression model is statistically significant ($F = 251.597$; $p < 0.001$).

The t-test results regarding the significance of the regression coefficients show that the anxiety levels of surgical nurses are a significant variable on sleep quality (Table 5). As surgical nurses' anxiety level increases, PSQI score increases, and their sleep quality decreases. Anxiety score is responsible for 45.6% of the change on PSQI score (Table 5).

Table 1. Descriptive characteristics of the surgical nurses (n:302).

Descriptive characteristics	n	%
Age (years)		
18-25	84	27.8
26-40	167	55.3
≥ 41	51	16.9
Mean age	31.95±7.82	
Gender		
Female	221	73.2
Male	81	26.8
Marital status		
Married	178	58.9
Unmarried	124	41.1
The state of having children		
Yes	162	53.6
No	140	46.4
Number of children (n: 162)		
1	55	34.0
2	82	50.6
≥ 3	25	15.4
Working institution		
City hospital	87	28.8
Public hospital	90	29.8
University hospital	125	41.4
Working unit		
Surgical intensive care and operating room services	95	31.5
Other surgical services	207	68.5
Working year		
0-5 years	135	44.7
6-10 years	60	19.9
11-15 years	41	13.6
≥ 16 years	66	21.9
Weekly working hours		
Less than 40 hours	33	10.9
40 hours	143	47.4
More than 40 hours	126	41.7

Table 2. Surgical Nurses' PSQI and BAI total score averages (n: 302)

PSQI	n	%
Good sleep quality (0-5 points)	80	26.5
Poor sleep quality (≥ 6 points)	222	73.5
PSQI mean	8.18±3.69	
BAI		
Mild anxiety (0-15 points)	166	55.0
Moderate anxiety (16-25 points)	68	22.5
Severe anxiety (≥ 26 points)	68	22.5
BAI mean	16.61±12.12	

Table 3. Sleep quality and anxiety levels according to the descriptive characteristics of the surgical nurses

Descriptive characteristics (n: 302)	PSQI; mean ± SD	BAI; mean ± SD
Gender		
Female	8.52±3.63	18.77±12.12
Male	7.25±3.71	10.72±10.02
Statistical analysis*	p=0.008 / t*=2.666	p<0.001 / t*=5.340
Marital Status		
Married	7.91±3.79	16.14±12.40
Unmarried	8.57±3.51	17.30±11.72
Statistical analysis*	p=0.129 / t*=1.524	p=0.412 / t*=0.822
Working unit		
Surgical intensive care and operating room services	9.09±3.38	17.65±12.11
Other surgical services	7.76±3.75	16.14±12.12
Statistical analysis	p=0.005 / F*=3.752	p=0.316 / F*=0.216
Weekly working hours		
Less than 40 hours	6.60±3.46 ^a	11.51±12.06 ^a
40 hours	7.54±3.59 ^a	15.32±11.22 ^a
More than 40 hours	9.32±3.55 ^b	19.42±12.53 ^b
Statistical analysis**	p<0.001 / F**=11.988	p=0.001 / F**=7.402

PSQI = Pittsburgh Sleep Quality Inventory; BAI = Beck Anxiety Inventory; SD = standard deviation.
a, b, c = Significantly different groups will have different letters, while same groups will have the same letters.
*Student T test was performed.
** One-way analysis of variance, post-hoc Tukey analysis were performed.

Table 4. Relationship between surgical nurses' Beck Anxiety and Pittsburgh Sleep Quality Scale Scores

Variable	PSQI	
	R*	p
BAI	0.675**	0.000

*Pearson Correlation. ** Moderate correlation

Table 5. Effect of BAI scores of surgical nurses on PSQI scores: Linear regression analysis

Independent Variable	B	SE	β	t	p	95% CI	R: 0.675 R ² : 0.456 F: 251.597 Model p=.000*
(Constant)	4.764	0.267		17.879	0.000*	4.242-5.291	
BAI	0.206	0.013	0.675	15.862	0.000*	0.180-0.231	

*p<0.001. R: Correlation. Dependent variable: PSQI.
BAI; Beck Anxiety Inventory. PSQI; Pittsburgh Sleep Quality Inventory.

Discussion

In our study, 73.5% of surgical nurses were found to have poor sleep quality (PSQI >5), and the mean of PSQI was 8.18±3.69. At the same time, 22.5% of them experienced severe anxiety (BAI scores ≥24). Similar to our study, a study investigating the psychological effect of the coronavirus outbreak of healthcare workers in Wuhan found that more than half of them (59%) were under severe stress and had widespread sleep disorders. It has been reported that 13% of

healthcare workers have anxiety scores greater than 8 (BAI ≥8) [17]. In another study in Wuhan, 38% of the pediatric healthcare workers experienced poor sleep quality (PSQI >7) [8]. In Spain, a study reported that 64% of them experienced poor sleep quality (PSQI >6) [18]. The results of our study are significantly higher than those of the two studies mentioned above. The reason for this difference is likely because we took PSQI> 5 as the cut-off point. These results are expected, as other studies have shown poor

sleep quality among nurses who were in touch with the patients with COVID-19 positive [19,20]. In a study in China, insomnia and depression were found in healthcare workers after the severe acute respiratory syndrome (SARS) outbreak. In the same study, the effect of the outbreak was examined a year later, and it was found that the outbreak caused post-traumatic syndrome in healthcare workers [21]. In addition to the acute effects of the epidemic, it is necessary to take measures by addressing psychological problems that may occur in a long-term period. Therefore, psychological support should be offered for a long period of time to nurses [22]. It is considered that identifying psychological symptoms of surgical nurses such as anxiety, stress and insomnia and providing psychological support is important for the continuation of the healthcare in the pandemic.

In our study, women's sleep quality was lower and anxiety level was higher. In line with our study, depression and anxiety were found to be more common in women in a study conducted in Wuhan [17]. This may be because women are more vulnerable and emotional than men and are more affected by the crisis than men.

In this study, surgical nurses working in the surgical intensive care and operating room services where the treatment of patients who underwent emergency surgery and is unclear whether they have COVID-19 positive, showed a higher incidence of anxiety ($p>0.05$) and poor sleep quality ($p<0.05$) when compared to working in the other surgical services. Similar results were found in the other studies [8,18,23]. In a study in China, it was stated that the incidence of anxiety and depression is higher in operating room nurses who are more likely to team up with COVID-19 positive patients [23]. The fact that they are in frequent contact with the patients who might be COVID-19 positive but not tested may be the reason for these results.

One of the factors that negatively affect sleep quality and increase anxiety is excessive working hours. According to the results of our study, it was found that those who were working more than 40 hours a week had poor sleep quality and higher anxiety scores ($p<0.05$). In our country, in order to ease the burden of nurses, more nurses were

assigned to respond to pandemics [24]. Many governments have taken different measures to reduce the workload of the healthcare workers and to maintain their psychological well-being. The Wuhan government has increased the number of healthcare workers in the country with support from foreign countries [25].

In the studies which were conducted among the healthcare workers and nurses, it was stated that healthcare workers and nurses, with high levels of stress and anxiety experienced insomnia, and insomnia negatively affects their mental health status [19,26]. The healthcare workers may experience difficulties in managing care, evaluating treatment options, and coping with the outbreak due to a high level of anxiety and accompanying insomnia. For this reason, sleep and psychological well-being are important for healthcare workers to make the right decision, provide effective care and treatment, and protect the health of their own and the community [26]. In our study, it was found that as the anxiety level of surgical nurses increased, their sleep quality decreased and anxiety affected sleep at a rate of 45.6%. Similar to our study, in a study conducted in Wuhan, lack of sleep was associated with perceived stress level [17]. In addition, similar results were obtained in the study conducted in Hong Kong during the severe acute respiratory syndrome (SARS) outbreak [27]. Therefore, it is thought that it is important to manage anxiety and stress effectively.

The limitations of this study have descriptive design and self-reported measures since our sample group consists of surgical nurses from two provinces. Thus, it cannot be generalized, and further evidence through a large sample-size study is required.

Conclusion

The COVID-19 outbreak dramatically increased the anxiety level of the surgical nurses in our country and negatively affected the quality of sleep. The number of the nurses should be increased and the psychological support line which is established for surgical nurses should be actively used. Video conference support should be provided for coping with the outbreak consequences. The mental health of the nurses should be monitored closely.

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References

1. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020; 323(13): 1239-42. [[Crossref](#)]
2. Stannard D. COVID-19: Impact on perianesthesia nursing areas. *J Perianesth Nurs* 2020; 35(3): 237-8. [[Crossref](#)]
3. Güner Ö, Buzgan T. The First Three Months of the COVID-19 Pandemic: The World Health Organization's Response. *J Mol Virol Immunol* 2021; 2(3): 86-101. [[Crossref](#)]
4. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ* 2020; 368: m1211. [[Crossref](#)]
5. Lima CKT, Carvalho PMM, Lima IAAS, Nunes JVAO, Saraiva JS, Souza RI, et al. The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). *Psychiatry Res* 2020; 287: 112915. [[Crossref](#)]
6. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among healthcare workers exposed to coronavirus disease 2019. *JAMA Netw Open* 2020; 3(3): e203976. [[Crossref](#)]
7. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, 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. [[Crossref](#)]
8. Wang S, Xie L, Xu Y, Xiang, D. Sleep disturbances among medical workers during the outbreak of COVID-2019. *Occup Med (Lond)* 2020; 70(5): 364-9. [[Crossref](#)]
9. Günaydın N. The quality of sleep and effects on general mental health of nurses who works in a state hospital. *Journal of Psychiatric Nursing* 2014; 5(1): 33-40. [[Crossref](#)]
10. Saygın M, Yaşar S, Çetinkaya G, Kayan M, Özgüner M, Korucu C. Depression and anxiety levels of radiology workers. *SDU Journal of Health Sciences* 2011; 2(3): 139-44.
11. Buysse DJ, Reynolds CF 3rd, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 1989; 28(2): 193-213. [[Crossref](#)]
12. Ağargün MY, Kara H, Anlar O. Validity and Reliability of Pittsburgh Sleep Quality Index. *Turk Psychiatry Journal* 1996; 7(2): 107-15.
13. Bumin G, Tatlı İY, Cemali M, Kara S, Akyürek G. The comparison of the quality of sleep, stress, well-being and reaction time among healthcare professionals with shift and day workers. *Journal of Hacettepe University Faculty of Nursing* 2019; 6(3): 170-6. [[Crossref](#)]
14. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol* 1988; 56(6): 893-7. [[Crossref](#)]
15. Ulusoy M, Sahin NH, Erkmén H. The Beck anxiety inventory: Psychometric properties. *Journal of Cognitive Psychotherapy* 1998; 12(2): 163-72.
16. Gürel G, Saçmacı H. Evaluation of the effect of anxiety and depression on cognitive functions in patients with severe acne vulgaris. *Turk J Dermatol* 2019; 13(1): 25-9. [[Crossref](#)]
17. Du J, Dong L, Wang T, Yuan C, Fu R, Zhang L, et al. Psychological symptoms among frontline healthcare workers during COVID-19 outbreak in Wuhan. *Gen Hosp Psychiatry* 2020; 67: 144-5. [[Crossref](#)]
18. San Martín AH, Parra Serrano J, Cambriles T, Arias EMA, Méndez JM, del Yerro Álvarez MJ, et al. Sleep characteristics in health workers exposed to the COVID-19 pandemic. *Sleep Med* 2020; 75: 388-94. [[Crossref](#)]
19. Simonetti V, Durante A, Ambrosca R, Arcadi P, Graziano G, Pucciarelli G, et al. Anxiety, sleep disorders and self-efficacy among nurses during COVID-19 pandemic: A large cross-sectional study. *J Clin Nurs* 2021; 30(9-10): 1360-71. [[Crossref](#)]
20. Bilgiç Ş, Çelikkalp Ü, Mısırlı C. Stress level and sleep quality of nurses during the COVID-19 pandemic. *Work* 2021; 70(4): 1021-9. [[Crossref](#)]
21. McAlonan GM, Lee AM, Cheung V, Cheung C, Tsang KW, Sham PC, et al. Immediate and sustained psychological impact of an emerging infectious disease outbreak on healthcare workers. *Can J Psychiatry* 2007; 52(4): 241-7. [[Crossref](#)]
22. Maunder R, Hunter J, Vincent L, Bennett J, Peladeau N, Leszcz M, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ* 2003; 168(10): 1245-51. [[PubMed](#)]
23. Li XY, Wang J, Zhang RX, Chen L, He CK, Wang CY, et al. Psychological Status Among Anesthesiologists and Operating Room Nurses During the Outbreak Period of COVID-19 in Wuhan, China. *Front Psychiatry* 2020; 11: 574143. [[Crossref](#)]
24. Republic of Türkiye Ministry of Health, General Directorate of Management Services, Ankara, Türkiye. Announcements. Available at: <https://yhg.m.saglik.gov.tr/TR,10084/duyurular.html> [Accessed September 01, 2021].

- 25.** Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry* 2020; 7(3): e14. [[Crossref](#)]
- 26.** Selvi Y, Özdemir PG, Özdemir O, Aydın A, Beşiroğlu L. Influence of night shift work on psychologic state and quality of life in health workers. *Düşünen Adam The*

- Journal of Psychiatry and Neurological Sciences* 2010; 23(4): 238-43.
- 27.** Chua SE, Cheung V, Cheung C, McAlonan GM, Wong JW, Cheung EP, et al. Psychological effects of the SARS outbreak in Hong Kong on high-risk health care workers. *Can J Psychiatry* 2004; 49(6): 391-3. [[Crossref](#)]