BIBLIOGRAPHIC INFORMATION SYSTEM

Journal Full Title: Journal of Biomedical Research & Environmental Sciences

Journal NLM Abbreviation: J Biomed Res Environ Sci

Journal Website Link: https://www.jelsciences.com

Journal ISSN: 2766-2276

Category: Multidisciplinary

Subject Areas: Medicine Group, Biology Group, General, Environmental Sciences

Topics Summation: 128

Issue Regularity: Monthly

Review Process type: Double Blind

Time to Publication: 7-14 Days

Indexing catalog: Visit here

Publication fee catalog: Visit here

DOI: 10.37871 (CrossRef)

Plagiarism detection software: iThenticate

Managing entity: USA

Language: English

Research work collecting capability: Worldwide

Organized by: SciRes Literature LLC

Manuscript should be submitted in Word Document (.doc or .docx) through **Online Submission** form or can be mailed to support@jelsciences.com

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JOURNAL OF BIOMEDICAL RESEARCH & ENVIRONMENTAL SCIENCES
issn: 2766-2276
SUBJECT AREA(S): SLEEP DISORDERS | PULMONOLOGY
DOI: 10.37871

RESEARCH ARTICLE

Sleep Characteristics of Healthcare Professionals in the COVID-19 Pandemic

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ABSTRACT

Introduction: Sleep disturbances and anxiety are the first physical reflections observed in healthcare professionals. The aim was to reveal the sleep characteristics and moods of healthcare professionals during the pandemic for making improvements and provide support.

Methods: This study is observational and cross-sectional study and was carried out in a Training and Research Hospital in Kirsehir, Turkey. A total of 48 nurses, 25 doctors, 37 allied health personnels, 12 security guards, and 25 medical secretaries were included, of which 147 were healthcare professionals and 50 were not healthcare professionals (control group). Three questionnaires were used; two to measure sleep, one to measure stress. The volunteer participants were administered face-to-face Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale, and Beck Stress Scale (BSS) simultaneously and scored individually. These scores were evaluated separately for demographic characteristics and their association with occupational groups.

Results: A total of 197 people were included in the study, of which 147 were healthcare professionals, and 50 were not healthcare professionals (control group). The average age of the participants was 34.15 ± 9.18 years. The participants' average PSQI (6.25 ± 3.24), ESS (7.46 ± 3.16), and BSS (11.26 ± 4.65) were calculated. The difference between the BSS ($p < 0.01$) and PSQI ($p < 0.05$) values of women and men was statistically significant. BSS and PSQI values were low in security guards. However, these values were high in nurses. The occupational experience of the participants in all three scales was not statistically significant. It was higher in the control group than the healthcare professional group. However, these differences between the groups were not statistically significant.

Discussion and Conclusion: In the COVID-19 pandemic, there was no difference in sleep and anxiety characteristics between health workers and non-health workers and the most common group of healthcare professionals with anxiety, sleep disorders was nurses. Based on the results, women and nurses between the ages of 31-35 should be given priority in support of healthcare professionals.

INTRODUCTION

The 2020 pandemic owed to Coronavirus Disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). In the pandemic, the first case of COVID-19 was diagnosed on March 10, 2020 in Turkey. The first death because of the virus was reported on March 15, 2020. On April 1, 2020, it was announced that coronavirus had spread all over Turkey [1].

Healthcare professionals were at the highest risk of transmission during the pandemic. This group had a high risk of transmitting the disease to family members. Thus, several reasons such as developing anxiety, anxiety, and fear, the number of unknown cases related to the virus, busy schedule, possible inadequacy in medical equipment, the necessity of choosing patients in medical approach, and

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DOI: 10.37871/jbres1285

Submitted: 17 July 2021

Accepted: 25 July 2021

Published: 26 July 2021

Keywords

- COVID-19
- Healthcare workers
- Sleep
- Pandemic
- Anxiety

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How to cite this article: Zorlu D, Akca V. Sleep Characteristics of Healthcare Professionals in the COVID-19 Pandemic. J Biomed Res Environ Sci. 2021 July 26; 2(7): 604-609. doi: 10.37871/jbres1285, Article ID: JBRES1285, Available at: https://www.jelsciences.com/articles/jbres1285.pdf

witnessing the death of their colleagues negatively affect healthcare professionals in several ways. Thus, anxiety and sleep disorders were the first physical reflections observed in healthcare professionals [2-5].

In the management of the pandemic, several evaluations and plans for healthcare professionals were prepared in March at the beginning of the pandemic in China for the health sector to survive, and recommendations were determined [6].

We aimed to evaluate whether there is a difference in sleep and anxiety characteristics of healthcare workers and non-health workers during the pandemic period, and to evaluate the sleep characteristics of healthcare professionals working in our unit during the pandemic period. Our aim was to identify the health workers who need support in this regard, to provide psychiatric and psychological medical support to our health workers, and to make improvements by revealing the sleep characteristics and moods of the health workers during the pandemic process.

MATERIALS AND METHODS

The study was approved by the Ahi Evran University Clinical Ethics Committee with decision number 2020-08/57.

Both verbal and written information was provided to the participants about the study, and written consent was obtained from each volunteer participant. This study is observational and cross-sectional study.

Study population

In this study, a total of 197 participants were included, of which 147 were healthcare professionals, and 50 were not healthcare professionals (control group). The control group was randomly selected from volunteers participating in the study, who applied to the hospital but did not have any active disease and health care workers. Inclusion criteria of the study; being an active COVID-19 healthcare worker during the pandemic period and volunteering to participate in the study. Active health workers who did not volunteer and health workers who were not active COVID-19 workers were excluded from the study. 2 nurses, 5 assistant health personnel, 12 security guards, and 5 medical secretaries did not volunteer to participate in the study. Healthcare professionals were classified as follows: 48 nurses, 25 doctors, 37 assistant health personnel, 12 security guards, and 25 medical secretaries. The average age of the participants was 34.15 ± 9.18 years.

The volunteer participants were administered face-to-face, validated Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), and Beck Stress Scale (BSS), which were scored individually and simultaneously [7,8]. Scores were evaluated separately for demographic characteristics and their association with occupational groups.

Scales used

Pittsburgh Sleep Quality Index (PSQI): It was developed by Buysse, et al. [7]. It quantitatively measures sleep quality to define good and bad sleep. It includes a total of 24 questions; 19 of which are self-assessment questions. Five are answered by the individual's spouse or a roommate. When calculating the score of the index, questions answered by the individual's spouse or roommate were not included in the calculation. Self-assessment questions contain different items related to sleep quality. These questions determine sleep duration, sleep latency (delay), and the frequency and severity of specific sleep problems. The 18 scored items were grouped into seven components. Some of the components consist of a single substance, whereas others included a group of several substances. Each item is scored between 0 and 3.

Scoring: A total score of "5" or greater is indicative of poor sleep quality. If it scored a "5" or more, it is recommended that discuss sleep habits with a healthcare provider.

Component 1	#9 Score	C1 –
Component 2	#2 Score (<15 min (0), 16-30 min (1), 31-60 min (2), >60 min (3))	
	+ #5a Score (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3)	C2 –
Component 3	#4 Score (>7(0), 6-7 (1), 5-6 (2), <5 (3)	C3 –
Component 4	(total # of hours asleep) / (total # of hours in bed) x 100	
	>85%=0, 75%-84%=!, 65%-74%=2, <65%=3	C4 –
Component 5	# sum of scores 5b to 5j (0=0; 1-9=1; 10-18=2; 19-27=3)	C5 –
Component 6	#6 Score	C6 –
Component 7	#7 Score + #8 score (0=0; 1-2=1; 3-4=2; 5-6=3)	C7 –

Epworth Sleepiness Scale (ESS): was developed in 1990 to measure sleepiness and sleep state during the day. It is a short survey designed by Murray Johns. In this questionnaire, people are asked about their likelihood of falling asleep during activities they do during the day but not every day. Accordingly, they are asked to score between 0 and 3. The questionnaire consists of eight items in total. Although 0-9 points are evaluated as normal, a score between 10 and 24 indicates the need to consult an expert. Scores between 11 and 15 indicate mild-moderate sleep apnea, whereas 16 points and above indicate severe sleep apnea or narcolepsy [8].

Beck Stress Scale (BSS): is a perceived stress scale. It consists of 21 questions. For each question, "None option" is 0 point, "mild clinical findings" is 1 point, "moderate clinical findings" is 2 points, and "serious clinical findings" is 3 points. At the end of the test, the scores are added. They are categorized into mild anxiety symptoms if points were

between 8 and 15, moderate anxiety symptoms if between 16 and 25, and severe anxiety symptoms if between 26 and 63. People with severe symptoms of anxiety were advised to see a doctor.

Statistical analysis

Statistical analysis of the study was performed using Statistical Package for Social Sciences version 21.0 software for Windows (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp., USA). Normality was tested using Kolmogorov-Smirnov and Shapiro-Wilk tests. The homogeneity of variances was tested using Levene's test. Descriptive statistics of the variables were given as mean ± standard deviation and frequency n (%). Two groups of health workers and non-health workers were formed. Sleep and anxiety characteristics were evaluated in these two groups. Since there is normality and stillness, the parametric test was provided and tested. Since there is normality and stillness, the parametric test was provided and tested. Two groups were compared using independent t-test, and more than two groups were compared using Analysis of Variance (ANOVA). Duncan's multiple comparison test was used to determine the group that showed significant results in the ANOVA. The number of subjects to be used in the study was calculated by power analysis. In the Power analysis, when effect size is d = 0.5, Power (1-β) = 0.85, Allocation ratio N2/N1 = 0.35, it was calculated that the total sample size should be at least 190 subjects, with a minimum of 49 in the control group and a minimum of 141 in the experimental group. Power analysis was performed using G*Power 3.1.9.6. The p-value of less than 0.05 was interpreted as statistically significant in all statistical analyses.

RESULTS

A total of 197 people were included in the study, of which 147 were healthcare professionals, and 50 were not healthcare professionals (control group). The average age of the participants was 34.15 ± 9.18 years. Descriptive statistics and comparisons of variables between groups belonging to healthcare professionals are given in table 1. The participants' average PSQI (6.25 ± 3.24), ESS (7.46 ± 3.16), and BSS (11.26 ± 4.65) were calculated (Table 2).

The effect of sex on PSQI was statistically significant. PSQI of female participants was higher than that of men ($p < 0.05$). The effect of sex on ESS values was statistically insignificant ($p > 0.05$). The difference in BSS values between women and men was statistically significant ($p < 0.01$). Female participants were higher than men. The difference in b PSQI between different age groups was statistically significant ($p < 0.05$). The average PSQI value of the 26-30 age group was lower than the other groups. The 31-35 age group had the highest average PSQI value.

The difference between age groups in terms of ESS values was statistically significant ($p < 0.05$). ESS values of the group above the age of 46 years were significantly lower than the other groups. The difference in BSS values between the age groups was not statistically significant.

The effect of the participants' occupation on PSQI was statistically significant ($p < 0.05$). The PSQI values of the security guards were lower than the other occupation. The effect of occupation on BSS values was statistically significant ($p < 0.01$).

Table 2 shows the comparison results of the control group and healthcare professionals in terms of scores obtained from the scales. According to table 2, average values in all three scales were higher in the control group than the healthcare professionals group. However, these differences between the groups were not statistically significant.

DISCUSSION AND CONCLUSION

In this study, similarly, in previous outbreaks, no significant difference was observed in the scale values between the control group and healthcare workers, which may be because of the social effects of the pandemic without discrimination. In the COVID-19 pandemic, the most common group of healthcare professionals with sleep disorders was nurses. In this period, the sleep quality of security guards was the least affected. And the finding was that these three scales were not related to professional experience.

Moreover, sleep and anxiety disorders were more common in nurses. Female participants had high PSQI. A higher PSQI total score indicates poor sleep quality. The index does not indicate the presence of a sleep disorder or the prevalence of sleep disorders. PSQI determines the frequency and severity of sleep duration, sleep latency (delay), and specific sleep problems. In addition, a significant result was obtained among healthcare professional groups. Moreover, the highest score was observed in nurses. In this study, nurses had the lowest sleep quality among healthcare professionals, which was expected, as nurses were at high risk to be in contact with patients diagnosed with COVID among the healthcare personnel during the follow-up and treatment of such patients. In addition, they ranked first in the high-risk group of workers because of the long exposure time due to the dense working hours. Therefore, our results were consistent with that of a larger population study on this subject [9].

In this period, the sleep quality of security guards was the least affected.

The 31-35 age group had the highest average PSQI. As the disease was reported to be more severe in older ages, sleep

Table 1: Explanatory statistics of variables and group comparisons.

		N(%)	PSQI	EPW	BECK
TOTAL		147(100)	6.25 ± 3.24	7.46 ± 3.16	11.26 ± 4.65
Sex	Female	111(75.5)	7.93 ± 4.15	6.60 ± 3.96	12.76 ± 4.18
	Male	36(24.5)	6.02 ± 3.91	5.19 ± 2.57	6.63 ± 2.63
	P[1]		0.016	0.083	0.006
Age, (Year)	18-25	34(23.13)	7.82 ± 4.07^{ab}	5.82 ± 3.05^{ab}	10.79 ± 3.73
	26-30	37(25.17)	6.48 ± 4.03^{a}	5.62 ± 3.23^{ab}	10.29 ± 3.46
	31-35	21(14.29)	9.66 ± 3.86^{b}	8.85 ± 5.19^{c}	13.66 ± 4.54
	36-40	24(16.33)	6.62 ± 3.79^{a}	6.08 ± 3.13^{ab}	10.16 ± 4.08
	41-45	15(10.20)	8.40 ± 4.99^{ab}	7.40 ± 3.29^{bc}	14.26 ± 5.76
	46+	16(10.88)	6.50 ± 3.96^{a}	4.43 ± 1.16^{a}	10.18 ± 4.36
	P[2]		0.034	0.020	0.775
Job	Personel	37(25.2)	6.81 ± 3.87^{ab}	5.83 ± 3.29	9.13 ± 1.48^{ab}
	Doctor	25(17.0)	7.36 ± 3.78^{b}	6.24 ± 3.70	9.88 ± 2.06^{ab}
	Security guard	12(8.2)	4.75 ± 2.91^{a}	5.41 ± 2.53	3.41 ± 1.03^{a}
	Nurse	73(49.7)	8.28 ± 4.30^{b}	6.61 ± 4.62	14.10 ± 1.55^{b}
	p		0.030	0.720	0.009
Professional Experience, (Year)	1-5	69(46.94)	7.33 ± 4.10	5.91 ± 3.83	10.02 ± 4.97
	6-10	28(19.05)	8.64 ± 4.17	7.92 ± 4.88	13.10 ± 5.05
	11-15	10(6.80)	5.40 ± 2.45	6.40 ± 3.37	11.00 ± 4.52
	16-20	20(13.61)	7.55 ± 4.76	6.40 ± 4.91	11.40 ± 4.56
	20+	20(13.61)	7.25 ± 4.31	4.90 ± 3.79	12.95 ± 4.89
	p		0.309	0.141	0.759

Normality was tested using Kolmogorov-Smirnov and Shapiro-Wilk tests. The homogeneity of variances was tested using Levene's test. Explanatory statistics of the variables were given as ± standard deviation and frequency n (%). Two groups were compared using independent t-test, and more than two groups were compared using analysis of variance (ANOVA). 1: Independent t test, 2: ANOVA and DUNCAN multiple comparison test.

Table 2: Relationship between control and experimental group scales.

Scales	Control (*n* = 50)	Group (*n* = 147)	*p*
PSQI	7.94 ± 3.91	7.46 ± 4.16	0.485
EPW	6.46 ± 3.98	6.25 ± 4.24	0.769
BECK	11.56 ± 8.00	11.26 ± 11.65	0.868

Explanatory statistics of the variables were given as ± standard deviation and frequency n (%). Two groups were compared using independent t-test, and more than two groups were compared using analysis of variance (ANOVA). Duncan's multiple comparison test was used to determine the group that showed significant results in the ANOVA. The *p*-value of less than 0.05 was interpreted as statistically significant in all statistical analyses. 1: Independent t test.

disturbances were also found to be in the older age group. However, the reason for high sleep disorders in the 31-35 age group may be the risk of infecting family members at home and care concerns for their children.

Moreover, female participants had higher BSS scores than men, indicating that anxiety levels of female health workers were higher than that of men. In addition, the differences between professional groups were striking. Again, nurses had the highest BSS score. These results were also same with that of previous studies [10].

The ESS was significantly low, particularly in people above the age of 46 years. In other words, scale scoring results were close to normal, which was expected, as the scale evaluates not feeling tired but drowsiness or falling asleep and is mostly used in the diagnosis of sleep-related respiratory failure. This scale was included to rule out organic-induced sleep disorders [11].

Another remarkable finding was that these three scales were not related to professional experience. This shows that the exposure to SARS-CoV-2 for the first time for all healthcare workers, regardless of professional experience, during the first pandemic period had the same effect on each employee regardless of experience [12].

Similarly, in previous outbreaks, no significant difference was observed in the scale values between the control group and healthcare workers, which may be because of the social effects of the pandemic without discrimination. During this period, social anxiety and sleep disorders increased [11,12].

In addition, several comments on this matter, insecurity in comments, and difficulty in taking pandemic measures increased social anxiety and fear [13].

A literature review showed that, during the outbreak of COVID-19, healthcare workers on the front line developed more sleep disturbances than non-healthcare professionals, and they had worse quality of sleep. Special attention should be paid to shift workers. Concrete protection and prevention measures for particularly exposed population should be considered in pandemic situations [14]. Another one showed that, that, during the outbreak of COVID-19, sleep disturbance was highly prevalent among pediatric healthcare workers, and sleep disturbance was independently associated with being an only child, exposure to COVID-19 patients and depression. Therefore, more mental health services are needed for frontline pediatric healthcare workers in Wuhan [15]. Study from China, showed that medical staff who were treating patients with COVID-19 infection had levels of anxiety, stress, and self-efficacy that were dependent on sleep quality and social support [16].

Giving priority to the nurses working in our unit, training meetings were held for all healthcare personnel under the chairmanship of the infection control committee on prevention and precautions during the pandemic. Psychiatrists and psychologists working in our unit were interviewed by giving priority to healthcare professionals who demanded. Medical equipment support was completely provided. Working times were set for shorter periods (4-6 h), and personnel transformation was achieved. Clear job descriptions of the units were reported both in writing and verbally. Training support was provided to healthcare professionals in our unit through face-to-face training, meetings, and interviews. These regulations reduced fear and anxiety by reducing uncertainty in process management.

Therefore, approaches aiming to reach wider masses of healthcare professionals by preparing a digital support package on "psychological well-being for healthcare professionals" were also used [17]. Similarly, "psychological first aid" approach was initiated in Ireland, and psychosocial support was provided to healthcare workers. Various online training programs were provided in patient approaches [18]. In our unit, a staff COVID outpatient clinic was organized. Thus, the infected personnel were treated and followed up in different outpatient clinics than the normal COVID outpatient clinic.

In addition, the "COVID WhatsApp" group consisting of chest diseases, infectious diseases, and radiology physicians and both pandemic outpatient clinics and inpatients were followed up with our common views. With this approach, workload was reduced and uncertainties in diagnosis and treatment were eliminated by making a joint decision. This reduced anxiety and fear in doctors who actively work with COVID patients. In addition, COVID intensive care and service nurse groups were formed. Patient follow-up and nurse needs were immediately expressed and resolved from the group.

The limitation of this study was the insufficient number of participants, as healthcare professionals worked for short periods to reduce viral load. In addition, healthcare personnel were infected, and the number of employees was decreasing.

Sleep and anxiety were less common in physicians than nurses because of physician solidarity. With the onset of the pandemic, case discussion and radiological evaluation groups were established on doctor social network platforms. In these groups, counseling on approaching the patients was provided to the experienced lecturers. In addition, professional group associations made approaches and updates regarding their field. Regular webinars were held to update approaches and developments. COVID-19 guides and books have been published. Concerns were shared on physician social platforms. These regulations reduced the incidence of anxiety and sleep disorders in physicians [19-21].

In fact, the responsibilities and risks of all healthcare professionals in the pandemic were similar. The main reasons for this were the long working hours of healthcare personnel and disruptions in payments, which can be listed as violence against healthcare workers even in this period. To reduce the sleep and anxiety disorders of healthcare workers and prevent them from getting deeper, it is deemed necessary to improve working conditions, increase their income to a level they deserve, and organize psychiatric/psychological support programs [22-26].

In conclusion, in the COVID-19 pandemic, there was no difference in sleep and anxiety characteristics between health workers and non-health workers. And the most common group of healthcare professionals with anxiety, sleep disorders was nurses. Based on the results, women and nurses between the ages of 31-35 should be given priority in support of healthcare professionals.

Therefore, to protect and improve public health, particularly in the COVID-19 pandemic, it is necessary to be sensitive to the needs and expectations of healthcare professionals to maintain the increasing need, continuity, and quality of healthcare services. The main necessary recommendations for this purpose can be listed as follows: regulating working hours, solving the payment problem, planning psychiatric and/or psychological support programs, applying deterrent sanctions for violence against healthcare workers, and providing care and education services to the children of healthcare professionaLS.

ACKNOWLEDGMENT

We thank all healthcare professionals and are proud of our colleagues. We dedicate this study to health workers who work devotedly and with all their might despite all the risks during the pandemic.

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How to cite this article: Zorlu D, Akca V. Sleep Characteristics of Healthcare Professionals in the COVID-19 Pandemic. J Biomed Res Environ Sci. 2021 July 26; 2(7): 604-609. doi: 10.37871/jbres1285, Article ID: JBRES1285, Available at: https://www.jelsciences.com/articles/jbres1285.pdf