

Evaluation of Sleep Quality, Work Stress and Related Factors in Hospital Office Workers

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ABSTRACT

Background: Occupational factors, working conditions, age, gender, exercise, acquired habits, and stress affect a person's sleep quality. The aim of this study was to investigate sleep quality, work stress, and related factors among office workers in a hospital. **Methods:** This cross-sectional study was conducted with office workers actively working in a hospital. A questionnaire consisting of a sociodemographic data form, the Pittsburgh Sleep Quality Index (PSQI), and Swedish Demand-Control-Support Scale were used to assess the participants. **Results:** The mean of PSQI score was 4.32 ± 2.40 and 27.2% of the participants had poor sleep quality. In the multivariate backward stepwise logistic regression analysis, it was found that shift workers were 1.73 times (95% CI: 1.02–2.91) more likely to have poor sleep quality, and a one-unit increase in work stress score increased the risk of having poor sleep quality by 2.59 times (95% CI: 1.37–4.87). An increase in age was found to decrease the risk of poor sleep quality in workers (OR=0.95; 95% CI: 0.93–0.98). **Conclusion:** This study suggests that reducing workload and increasing work control as well as enhancing social support will be effective in preventing sleep disturbances. It is important, however, in terms of providing guidance for hospital employees in planning future measures to improve working conditions.

1. INTRODUCTION

Occupational factors, working conditions, age, gender, exercise, acquired habits, and stress could affect a person's sleep quality. Although many factors, such as sociodemographic and occupational characteristics, could affect the prevalence of sleep disorders, very common among healthcare workers [1]. Sleep disorders can lead to decreased immunity, adaptability, anxiety, depression, and other physical and mental disorders [2]. It has also been found that

sleep disorders are associated with diseases, occupational accidents, and long-term health problems; It has been shown to affect both qualities of life and productivity [3]. Shift work patterns are becoming an increasingly common concept in many occupations in modern society. One-fifth of the working population is estimated to perform a job at different working hours or night [4]. Shift work can be performed in three shifts of 8 hours each and in two shifts beginning in the morning and ending at midnight. According to the International Labour

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Organization's (ILO) Night Work Convention, which came into force in 1995, the night shift is defined as "work performed during a period of not less than 7 hours, including from midnight to 5 a.m." [5]. Shift work is mandatory for 24-hour health care service, and night shifts are more common than in other sectors [6]. Sleep disturbance is a common problem among night shift workers. As a result of the disruption of circadian rhythms caused by shift work, the quality, and quantity of sleep decrease [7]. It has been determined that the night shift can affect not only their personal health but also the quality of their work, their psychological health, and the treatment of their patients and may cause related accidents.

Due to many factors in the working environment, workers are exposed to stress and experience physical, mental, and social changes due to their stress. Organizational factors such as work schedules and shift systems are among the causes of stress in the workplace. While continuous daytime work is the least stressful, shift workers are the most stressed. Failure to participate in regular activities due to shift work, inability to engage in regular social and community activities, and decreased job satisfaction can lead to stress [8]. The shift work system has been reported to cause stress and decrease workers' ability to cope [9]. There is a bidirectional relationship between poor sleep quality and stress. Stressful work environments lead to sleep problems [10]. Researchers have found that nurses from various medical departments are more likely to experience poor sleep quality due to work stress. Work stress has been found to affect job satisfaction and sleep quality among employees. Chronic work stress can lead to weakness, anxiety, depression, and other psychological problems that affect sleep quality [11, 12]. Most of the studies investigating sleep quality in hospital employees were conducted on nurses and doctors, and poor sleep quality was found [13-15]. When we think of shift work in health sector, the first groups that come to mind are healthcare workers, such as nurses and physicians, and office workers also work in shifts. The number of studies that have been conducted on office workers in hospitals is insufficient. In developing countries such as Turkey, hospital office workers do not come to mind

among the priority groups among healthcare workers. For this reason, the employee health practices of hospital office workers are ignored. The aim of this study was to investigate sleep quality, work stress, and related factors among office workers in hospitals.

2. METHODS

2.1. Study Settings and Population

This cross-sectional study was conducted between August 2022 and October 2022 with 512 office workers working at the Cerrahpaşa School of Medicine Hospital. The participants included the medical secretary, data entry, and administrative staff. The study questionnaire was administered to face-to-face hospital employees who attended a periodic health examination. No sample selection was made, and it aimed to reach the entire population. Of the 512 office workers working at the hospital, about 368 people attended the periodic health examination and agreed to participate in the study. Thus, 71.8% of the individuals in the study population could be reached. Written informed consent was obtained from each individual participant in the study. Inclusion criteria included registered office workers with more than one year of work experience. The study had no exclusion criteria. The night shift group included those who worked for at least five hours after midnight. On the other hand, the day shift group included those who worked for at least eight hours between 8 a.m. and 11 p.m. Working in night shift office workers, the group works in rotation. Those working in shifts of at least 1 year were included.

2.2. Research Instruments

A questionnaire consisting of a sociodemographic data form, the Swedish Demand-Control-Support Scale (DCSQ), and the Pittsburgh Sleep Quality Index (PSQI) were used to obtain information in the study. The sociodemographic data form included questions on individual characteristics, lifestyle, and occupational data in the first section. In the second section, DCSQ is used to evaluate the work stress of

the participants. The DCSQ, conducted in Turkish by Yücel et al., is a widely used scale to evaluate psychological demands, decision-making freedom, and social support in the workplace. The scale consists of three main subsections. It includes five questions for workload, six for work control (skill utilization and freedom of decision), and six for social support. Response options for the subdivisions of workload, skill utilization, and freedom of decision consist of “frequently, sometimes, rarely, and never” responses. For social support, options include “totally agree, partially agree, partially disagree, and completely disagree”. In the scale evaluation, the answers were coded between 1-4 Likert, and the total score of the relevant subsection is obtained by summing the scores of each subsection with higher values indicating higher psychological demands (range 5-20), higher decision latitude (range 6-24), and higher social support at work (range 6-24). All scale scores were calculated by summing up the respective unweighted item scores after appropriate reverse scoring of item 4 (overtime work) and item 9 (variety of work). High scores indicate a high workload, work control, and social support. Work stress was evaluated as the ratio of workload to work control [16]. In the third section, PSQI is used to evaluate sleep quality. The PSQI is a measure of subjective sleep quality. The PSQI was developed by Buysse et al. in 1989 [17]. The validity and reliability studies for the Turkish version were carried out by Ağargün et al. Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, hypnotic drugs, and daytime function, seven factors were rated on a 4-point Likert scale from 0 (no difficulties) to 3 (very difficult). The cumulative score of each factor was the total score of the PSQI, with the total score ranging from 0 to 21. The higher the score, the worse the sleep quality. Scores greater than five indicated poor sleep quality [18].

2.3. Data Analysis

The data were analyzed by using SPSS v24.0 (SPSS Inc., Chicago, IL, USA). In descriptive analyses, number and percentage values for categorical variables and mean and standard deviation values are presented for continuous variables. Continuous

variables are expressed as the mean \pm standard deviation, and categorical variables are expressed as the frequency and percentage. In comparing two groups of continuous variables, Student's t-test and Mann-Whitney U test were used in independent groups. Categorical data were compared by the chi-square test. As a result of these two-variable analyses, the independent variables found to be related to sleep quality were included in the backward stepwise logistic regression analysis model, and multivariate analysis was performed. The relationship of the variables determined to be related to sleep quality in the backward stepwise logistic regression analysis with the subcomponents of sleep quality was evaluated with the Pearson correlation test and Student's t-test. The results were considered significant at $p < 0.05$.

2.4. Ethical Considerations

The study was approved by the Cerrahpaşa School of Medicine Hospital Ethics Committee at Istanbul University-Cerrahpaşa (Date: 04.05.2021 No: 94540).

3. RESULTS

The study included 368 hospital office workers, mostly men (70.9%, $n=261$). The mean age of the participants was 37.27 ± 4.2 years. The mean body mass index (BMI) was 26.74 ± 8.8 . Of the participants, 68.8% ($n=253$) were married. Regarding occupational characteristics, 63% ($n=232$) had ten or more years of working experience. When participants were compared by sleep quality, female gender, singles, and shift workers had a significantly higher frequency of poor sleep quality. In contrast, the mean age and total working time was significantly lower among workers with poor sleep quality (Table 1).

When comparing participants' mean work stress scores as a function of their sleep quality, the mean work stress scores of employees with poor sleep quality were significantly higher than those with good sleep quality, while the social support score was significantly lower ($p < 0.001$, $p = 0.001$, and $p = 0.014$, respectively) (Table 2).

Table 1. Individual, lifestyle, and occupational characteristics and sleep quality of hospital office workers.

		Total (n=368, 100%)	PSQI≤5 (n=268, 72.8%)	PSQI>5 (n=100, 27.2%)	p
Age (mean±SD)		37.27 (±4.2)	38.41 (±8.10)	34.22 (±9.89)	<0.001
Gender (n, %)	Female	107 (29.1)	70 (65.4)	37 (34.6)	0.041
	Male	261 (70.9)	198 (75.9)	63 (24.1)	
Marital status, n (%)	Married	253 (68.8)	200 (79.1)	53 (20.9)	<0.001
	Single	115 (31.3)	68 (59.1)	47 (40.9)	
Education (n, %)	Primary School	75 (20.4)	58 (77.3)	17 (22.7)	0.541
	High School	184 (50.0)	130 (70.7)	54 (29.3)	
	University	109 (29.6)	80 (73.4)	29 (26.6)	
Shift work (n, %)	Yes	180 (48.9)	122 (67.8)	58 (32.2)	0.033
	No	188 (51.1)	146 (77.7)	42 (22.3)	
Total working time, y (mean±SD)		11.85 (±6.7)	12.53 (±6.43)	10.03 (±7.09)	0.002
Weekly working time, h (mean±SD)		44.47 (±1.5)	44.46 (±1.56)	44.50 (±1.51)	0.821
BMI (mean±SD)		26.74 (±8.8)	26.82 (±3.90)	26.52 (±4.85)	0.540

BMI: Body mass index.

Table 2. Relationship between DCSQ scores and sleep quality among hospital office workers.

	Total (n=368) (mean±SD)	PSQI≤5 (n=268, 72.8%) (mean±SD)	PSQI>5 (n=100, 27.2%) (mean±SD)	p
Workload	12.88(±3.06)	12.54(±3.14)	13.8(±2.67)	<0.001*
Work control	15.42(±3.69)	15.59(±3.68)	14.97(±3.69)	0.153*
Social support	19.60(±4.02)	19.91(±3.95)	18.76(±4.12)	0.014*
Work stress	0.89(±0.36)	0.86(±0.34)	0.99(±0.38)	0.001°

*Student's *t*-test, °Mann-Whitney *U* test.

When we compared the mean scores of PSQI sub-parameters according to shift work status, the mean scores of sleep duration, effective sleep habits, and total PSQI score were found to be statistically significantly higher in shift workers ($p=0.010$, $p=0.006$, $p=0.014$, respectively) (Table 3).

The final model obtained from the multivariate backward stepwise logistic regression analysis created with the variables determined to be associated with sleep quality in the binary analyzes is presented in the table. Accordingly, age, gender, marital status, shift work, total working time and stress score were included in the first step of the analysis. In the second step, the total working time; in the third and last step, it was exited from the marital status regression model. In the final model, it was found that

shift workers were 1.73 times (95% CI: 1.02-2.91) more likely to have poor sleep quality, and a one-unit increase in work stress score increased the risk of having poor sleep quality by 2.59 times (95% CI: 1.37-4.87). An increase in age was found to decrease the risk of poor sleep quality in workers (OR =0.95; 95% CI: 0.93-0.98) (Table 4).

A weak positive correlation was found between workload and subjective sleep quality, sleep duration, sleep disturbance, daytime functions, and total sleep quality score. On the other hand, a weak negative correlation was found between the social support score and subjective sleep quality and daytime functions. In addition to that, a weak positive correlation was found between the total stress score and daytime functions and total sleep quality score (Table 5).

Table 3. Pittsburgh Sleep Quality Index (PSQI) score for hospital office workers.

	Total (n=368) (mean±SD)	Shift worker (n=180, 49%) (mean±SD)	Daytime worker (n=188, 51%) (mean±SD)	P*
Subjective sleep quality	0.93(±0.63)	0.97(±0.70)	0.88(±0.55)	0.177
Sleep latency	0.98(±0.88)	1.10(±0.92)	0.86(±0.83)	0.010
Sleep duration	0.73(±0.66)	0.71(±0.72)	0.76(±0.59)	0.523
Habitual sleep efficiency	0.17(±0.49)	0.24(±0.59)	0.10(±0.36)	0.006
Sleep disturbance	1.04(±0.61)	10.5(±0.60)	10.4(±0.63)	0.843
Use of sleep medications	0.06(±0.37)	0.09(±0.48)	0.03(±0.22)	0.115
Daytime dysfunction	0.40(±0.66)	0.47(±0.75)	0.35(±0.55)	0.082
Global PSQI	4.32(±2.40)	4.63(±2.79)	4.01(±1.91)	0.014

*Student's *t*-test.

Table 4. Multivariate analysis with a backward stepwise regression model of factors associated with sleep quality.

	Step 1		Step 2		Step 3' (Final model)		
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	
Age	0.97 (0.93-1.01)	0.103	0.96 (0.93-0.99)	0.020	0.95 (0.93-0.98)	0.001	
Gender							
	<i>Female</i>	1.66 (0.94-2.93)	0.079	1.66 (0.94-2.92)	0.079	1.71 (0.98-3.01)	0.061
	<i>Male (ref)</i>						
Marital status							
	<i>Single</i>	1.61 (0.91-2.86)	0.105	1.61 (0.91-2.86)	0.101	-	-
	<i>Married (ref)</i>						
Shift work							
	<i>Yes</i>	1.63 (0.96-2.77)	0.073	1.63 (0.96-2.76)	0.069	1.73 (1.02-2.91)	0.041
	<i>None (ref)</i>						
Total working time (years)	1.00 (0.95-1.05)	0.912	-	-	-	-	
Stress total score	2.51 (1.33-4.75)	0.005	2.51 (1.33-4.74)	0.005	2.59 (1.37-4.87)	0.003	

* $R^2 = 0.084$ (Cox&Snell), 0.124 (Nagelkerke).

4. DISCUSSION

This study evaluated sleep quality, work stress, and related factors in hospital office workers. The results of this study showed that all participants had a mean PSQI score of 4.32 ± 2.40 , and 27.2% had poor sleep quality. Besides, it revealed that poor sleep quality was more common in females, singles, and shift workers, while participants with poor sleep quality had a lower mean age and total working time. In studies conducted with nurses, the PSQI score was 6.80 ± 3.39 in Spain, 6.0 ± 2.130 in Japan, and 9.10 ± 2.78 in China [19-21]. Studies in the literature report that the quality of sleep is poor in studies conducted on healthcare workers [22-26]. In a study conducted in Saudi Arabia, 42.3% of

healthcare workers were found to have poor sleep quality [26]. In this study, it was found that the frequency of those who had PSQI scores and poor sleep quality was lower, and it is suggested that the possible reason for this is the different occupational groups of the participants in this study.

In this study, married participants were found to have better sleep quality than single participants. Consistent with our study, in the study conducted by Bingöl, single nurses had poorer sleep quality than married nurses [27]. Furthermore, other studies on this subject have also shown that the sleep quality of married healthcare workers is better than that of single healthcare workers [22, 28]. In the study conducted by Üstün et al., it was seen that the reason for the good sleep quality of the nurses was

Table 5. The relationship between PSQI and the subdimensions of the DCSQ_{scores}.

		Workload	Work control	Social support	Work stress
Subjective sleep quality	r	0.216	0.032	-0.126	0.084
	p	<0.001	0.542	0.016	0.106
Sleep latency	r	0.094	-0.010	0.002	0.045
	p	0.071	0.853	0.975	0.389
Sleep duration	r	0.138	0.052	0.029	0.074
	p	0.008	0.322	0.582	0.158
Habitual sleep efficiency	r	0.054	0.006	0.002	-0.034
	p	0.302	0.902	0.962	0.519
Sleep disturbance	r	0.125	0.066	-0.016	0.028
	p	0.016	0.205	0.759	0.593
Use of sleep medications	r	0.021	0.066	0.027	0.081
	p	0.694	0.205	0.602	0.119
Daytime dysfunctions	r	0.217	-0.090	-0.203	0.207
	p	<0.001	0.085	<0.001	<0.001
Global PSQI	r	0.213	0.002	0.082	0.129
	p	<0.001	0.967	0.116	0.013

(Pearson correlation test), r →correlation coefficient.

that the majority (61.9%) were single and that those who were married had children aged four years and older (with low care burden) [28]. These findings suggest that the level of sleep quality should not be evaluated only with marital status; they should be evaluated together with factors such as having children, the number of night shift workers, and the department where they work.

Although the effects of gender on sleep quality in healthy adults are controversial in the literature, it has been stated that women may have more sleep problems, albeit partially. Some studies have found that men have better sleep quality [29, 31]. It is supposed that the reason for lower sleep quality in women is that they have other social obligations besides the workplace factor and that factors such as housework and children increase sleep problems.

Studies have shown that sleep quality is poor in workers younger than 35 and improves with age [27]. In addition, nurses' ability to cope with sleep problems has increased with age [32]. It is thought that the improvement of sleep quality with the advancement of age is because young nurses work in more intensive departments, work

night shifts more frequently, and want more time to rest as they age.

Consistent with the literature, this study found that sleep quality increased over working year [27]. It has been concluded that this situation negatively affects the quality of sleep because those who are new in their professional life are usually employed in night shift work and busy healthcare facilities, and their coping skills are insufficient. In this study, 'age' may have been a confounding factor in the poorer sleep quality of participants with fewer total working years. In this study, it was found that the sleep quality of younger participants was worse. The fact that a low number of total working years was removed from the model in the regression analysis, but age remained, supports this.

Sleep disturbance is a common problem among night shift workers. Consistently with the literature, we found that night shifts are more likely to have poor sleep quality than day shifts [33, 34]. Nurses working night shifts had low sleep efficiency, sleep disorders, daytime dysfunction, and longer sleep latency [35]. In addition, the sleep-wake cycle is negatively impacted by shift work. As such, sleep is

more likely to be disrupted in the daytime, which may result in shorter sleep periods. This was in line with previous studies indicating that specific characteristics of night shift work can lead to poor sleep quality. Consistent with these results, shift workers had a long time to fall asleep and a lower score for effective sleep habits in this study. Furthermore, in the retrospective stepwise regression model, the risk of poor sleep quality was 1.73 times higher in shift workers than in day workers.

In particular, the health sector includes many factors that cause stress, such as the difficulty of serving patients who experience intense stress and the frequent occurrence of stressful events in the daily work of those working in this sector. While work stress increases sleep disturbance, sleep disturbance also causes employees to perceive work stress more with mechanisms such as concentration problems [36]. In this study, it was found that the mean workload and work stress score of the participants with poor sleep quality was higher, the social support score was lower, and a 1-unit increase in the work stress score in the backward stepwise regression model increased the risk of poor sleep quality by 2.59 times (95% CI: 1.37-4.87). Similarly, in the study by Elevainio et al., sleep problems were significantly more severe in the group with a high mean work stress score [37]. A cohort study with a two-year follow-up stated that there was a correlation between occupational characteristics such as workload, control, social support, and sleep disorders.

Other studies have reported that sleep problems occur when the workload is high, but work control is not solely related to sleep [38, 39]. This finding is consistent with the view that the sense of motivation and mastery increases, and the tension-generating effect of a high workload decreases when both workload and work control are high compared to the workload-control model. In the Karasek model, social support is a variable that reduces the effect of work stress. In this study, as in other studies, low social support was associated with sleep problems [39].

The study has a few limitations. As the first main limitation, a causal relationship between sleep quality and related factors could not be established since this study was descriptive and cross-sectional. Secondly, only self-reported subjective measures

were used in this study, and all data were collected using self-report questionnaires, which may affect the results. Thirdly, non-occupational determinants of sleep quality, such as caffeine intake and drug use, were not asked. Fourthly, this study was conducted in a university hospital in Turkey, and hospital office workers working in this hospital were included. Because of this reason, the generalization cannot be made. However, apart from these limitations, this study is the first to investigate sleep quality, work stress, and related factors among hospital office workers in Turkey.

5. CONCLUSIONS

In this study, it was found that 27.2% of hospital office workers had poor sleep quality; poor sleep quality was more common in single and shift workers as well as in female gender, and the mean age and total working time were lower in participants with poor sleep quality. In addition, it was found that the increase in shift work and work stress score increased the risk of poor sleep quality, whereas increasing age decreased the risk. Determining the relationship between potential risk factors in the work environment and sleep disorders is necessary for worker health. The results of this study suggest that reducing workload and increasing work control as well as enhancing social support will be effective in preventing sleep disturbances. It is important, however, in terms of providing guidance for hospital employees in planning future measures to improve working conditions.

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