

# Evaluation of sleep quality and daytime sleepiness in nurses

Idris Kirhan<sup>1</sup>, Fatih Uzer<sup>2</sup>

<sup>1</sup>Harran University Hospital, Department of Internal Medicine, Sanliurfa, Turkey

<sup>2</sup>Kastamonu State Hospital, Department of Respiratory Medicine, Kastamonu, Turkey

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## Abstract

**Aim:** The aim of this study is to determine the daytime sleepiness of nurses and to determine the sleep quality and related factors.

**Material and Methods:** The research was conducted in Harran University Research and Training Hospital and Kastamonu State Hospital between July 2019 and August 2019. Nurses who accepted to participate in the study were included. The nurses who were on annual leave, sick leave and who refused to participate in the study were excluded from the sampling. In this study; Personal Information Form, Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleep Scale (ESS) were used to collect data. The Personal Information Form, which was developed based on the literature, consists of questions that include demographic characteristics and individual characteristics which are thought to affect sleep quality. Demographic characteristics (gender, age, weight, height, body mass index (BMI)) as well as other individual characteristics (working style, economic status, presence of a health problem etc.) were questioned.

**Results:** 115 (40.0%) male and 172 (59.9%) female nurses involved in the study, the mean age was  $28.3 \pm 6.3$ . The mean PSQI scores of the participants were  $6.5 \pm 3.1$ , the mean ESS scores were  $7.3 \pm 4.6$  and the mean BMI was  $23.9 \pm 4.3$ . It was found that 70.7% (203) of the nurses included in the study had poor sleep quality (PSQI  $\geq 5$ ) and 22.9% (66) had excessive daytime sleepiness (ESS  $\geq 10$ ). The majority of the participants (59.7%) had normal BMI, while 17.1% had a comorbid disease. When the participants with poor sleep quality (PSQI  $\geq 5$ ) were evaluated, it was found that nurses working as shifts had statistically significant worse sleep quality than those who work without shifts ( $p < 0.001$ ). No statistically significant difference was found between participants when daytime sleepiness levels were compared).

**Conclusion:** Our study showed that most of the nurses have poor sleep quality and one fifth of them have excessive daytime sleepiness; moreover, it was found that shift-type workers had poorer sleep quality than non-shift-type worker.

**Keywords:** Sleep quality; epworth sleep scale; nurse

## INTRODUCTION

A person should be mentally healthy as well as physically. The health of an individual depends on providing his basic needs (1). In addition to basic requirements such as eating, drinking and breathing, sleep is also an important need. Sleep prepares the individual for the new day by restoring the body and soul, while regulating and repairing brain functions. A change in sleep pattern and quality affects the person's daily activities.

Sleep affects cognitive functions such as productivity, memory functions, concentration, contributes to energy conservation, detoxification of the brain, and physical and psychological restoration of body, affects the individual's

quality of life and well-being. Good sleep quality is associated with a wide range of positive outcomes such as better physical and mental health, less daytime sleepiness and a greater well-being overall. Sleep quality includes quantitative aspects of sleep that can be measured objectively, such as sleep latency, length of sleep, and the number of wake-ups during nighttime; it also includes subjective aspects such as the deepness of sleep and feeling rested after sleep. Sleep quality is important as there are studies reported that 15-35% of adults suffer from sleep disorders. In addition, poor sleep quality can be a symptom of many different health disorders (1-2).

Nursing is one of the most important occupations with variable working hours throughout their working lives.

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**Corresponding Author:** Fatih Uzer, Harran University Hospital, Kastamonu State Hospital, Department of Respiratory Medicine, Kastamonu, Turkey Sanliurfa, Turkey

**E-mail:** uzerfatih@gmail.com

Shifts or irregular night shifts can deprive sleep quality. Irregular working hours negatively affect psychological and physical health. This puts the safety of nurses under danger, as well as patients (1-7). The aim of this study is to determine the daytime sleepiness level of nurses and to determine the sleep quality and related factors.

## MATERIAL and METHODS

This is a cross-sectional study designed to determine sleep quality and excessive daytime sleepiness of nurses. The research was conducted in Harran University Research and Training Hospital and Kastamonu State Hospital between July - August 2019. Nurses who accepted to participate were included in the study. Participants who has psychiatric disease related hypersomnia, narcolepsy, medication-related narcolepsy, patients with diseases which cause excessive daytime sleepiness (obstructive sleep apnea syndrome, insufficient sleep syndrome etc.) and patients with metabolic diseases which effects sleep quality (untreated hypo-hyperthyroidism, diabetes mellitus etc.) are excluded. Also; nurses who were on annual or sick leave and refused to participate the study were not included in the sampling. In the study; Personal Information Form, Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleep Scale (ESS) were used to collect data. The Personal Information Form, which was developed based on the literature, consists of questions that include demographic characteristics and individual characteristics that are thought to affect sleep quality. Demographic characteristics (gender, age, weight, height, body mass index) as well as other individual characteristics (working style, economic status, presence of a health problem etc.) were questioned. PSQI was developed by Buysse et al in 1938 to evaluate sleep quality. Ağargün et al. (8) conducted the Turkish validity and reliability study in 1996. This value shows that the internal consistency of the scale is high. PSQI contains 24 questions in total. Nineteen of these are self-report questions. The remaining five questions were answered by a spouse or roommate. These last five questions are used for clinical information only and are not included in the scoring. In the self-report questions, Question 19 is about the presence or absence of a roommate or partner and is not taken into account in the calculation of the component scores of the scale. The 18 PSQI questions included in the scoring were grouped into 7 component scores. While some of the components are a consisted of a single question's score, some are obtained by grouping several questions.

7 items are found in PSQI :

- Component 1: Sleep Quality
- Component 2: Sleep Latency
- Component 3: Sleep Duration
- Component 4: Sleep Efficiency
- Component 5: Sleep Disturbance
- Component 6: Sleep Medication
- Component 7: Daytime Sleep Dysfunction

Each component is has a score between zero and three. The

total score of 7 components gives the PSQI score. The total score has a value between 0-21. Those with a total score of less than five are considered to have good sleep quality and those with a score of 5 or more have poor sleep quality.

ESS was developed by Johns in 1991 (9). ESS is the most common scale used to assess the level of sleepiness in both clinical practice and researches. The scale has translated to many different languages. It aims to measure the overall daytime sleepiness, rather than evaluating sleepiness for special situations or specific time periods. ESS is a four-point likert scale. It is scored as 0,1,2,3 and a total score of 11 and above is accepted as excessive daytime sleepiness.

The Ethics Committee of the Harran University (approved on July 7, 2019 with the number 07/21) has approved the study. The nurses were informed about the purpose of the study and the questionnaires to be applied, and their verbal consent was obtained.

While evaluating the data, independent variables such as age, gender and dependent variable of PSQI score were used. The researchers coded the data obtained, a database was created and the data were analyzed in SPSS for Windows (Statistical Package for Social Sciences for Windows) 24-package program. Chi-square test was used for assessing the categorical data compared to other categorical characteristics. The statistical significance level was accepted as 0.05 in all analyzes.

## RESULTS

Among 115 (40.0%) male and 172 (59.9%) female nurses involved in the study, mean age was  $28.3 \pm 6.3$ .

		n	%
Gender	Male	115	39.8
	Female	172	60.2
BMI	Underweight (<20)	10	3.8
	Normal (20-24.9)	157	59.7
	Overweight (25-29.9)	87	33.1
	Obese (30 and above)	9	3.4
Comorbidities	Yes	49	17.1
	No	238	82.9
Shift	Yes	227	79.4
	No	59	20.6
Income rate	< ₺1600	4	1.4
	₺1600-2500	24	8.4
	₺2500-4000	76	26.6
	₺4000-6000	163	57
	> ₺6000	19	6.6
House size	2 rooms	4	1.4
	3 rooms	24	8.4
	4 rooms	76	26.6
	5 rooms	19	6.6
Number of persons at home together	1 person	22	7.7
	2 people	87	30.3
	3 people	66	23.0
	4 people	70	24.4
	5 people	42	14.6

PUKI Subgroups	Mean $\pm$ SD
Subjective Sleep Quality	1.4 $\pm$ 0.91
Sleep Latency	1.3 $\pm$ 0.9
Sleep Time	0.9 $\pm$ 0.8
Conventional Sleep Activity	0.3 $\pm$ 0.7
Sleeping disorder	1.1 $\pm$ 0.6
Sleep Drug Use	0.2 $\pm$ 0.5
Day Dysfunction	1,1 $\pm$ 0, 98
<b>TOTAL</b>	<b>6.5 <math>\pm</math> 3.1</b>

The mean PSQI scores of the patients were  $6.5 \pm 3.1$ , the mean ESS scores were  $7.3 \pm 4.6$  and mean BMI was  $23.9 \pm 4.3$ . It was found that 70.7% (203) of the participants had poor sleep quality ( $PSQI \geq 5$ ) and 22.9% (66) had excessive daytime sleepiness ( $ESS \geq 10$ ). The majority of the participants (59.7%) had normal body mass

index and 17.1% had a comorbid disease. The general characteristics of the participants are given in Table 1 and the PSQI subgroup averages are given in Table 2. PSQI scores were compared with Mann Whitney test according to gender, comorbidities and working shifts. No significant difference was found in any comparison (Table 3). Age, BMI, level of income, the number of rooms in their house, the number of people living at home and the relationship between PSQI scores were examined. According to Spearman's correlation there is no statistically significant relationship in any of the coefficients. The correlation between PSQI and ESS was significant, in the same direction but with a very low correlation coefficient. When the participants with poor sleep quality ( $PSQI \geq 5$ ) were assessed, it was found that shift workers had statistically significantly worse sleep quality than those working without shifts ( $p < 0.001$ ) (Table 4). No statistically significant difference was found between participants when daytime sleepiness levels were compared (Table 5).

		n	Average $\pm$ ss	Min .	Max .	p
Gender	Female	172	6.7 $\pm$ 3.1	1	14	0.516
	Male	115	6.4 $\pm$ 3.0	0	18	
Comorbidities	Yes	49	7.1 $\pm$ 3.6	1	13	0.175
	No	238	6.4 $\pm$ 3.0	0	18	
Shift	Yes	227	6.7 $\pm$ 3.0	1	18	0.058
	No	59	5.8 $\pm$ 3.3	0	13	
BMI	Underweight (< 20)	10	5.2 $\pm$ 2.9	2	12	0.713
	Normal (20 -24.9)	157	6.6 $\pm$ 3.2	1	18	
	Overweight (25-29.9)	87	6.4 $\pm$ 2.9	0	14	
	Obese (30 and above)	9	6.7 $\pm$ 2.8	2	10	
Income rate	< ₹1600	4	6.5 $\pm$ 1.9	5	9	0.34
	₹ 1600-2500	24	7.5 $\pm$ 3.4	2	13	
	₹ 2500-4000	76	6.6 $\pm$ 3.5	0	18	
	₹ 4000-6000	163	6.4 $\pm$ 2.8	1	14	
	> ₹ 6000	19	6.3 $\pm$ 3.3	1	12	
House size	2 rooms	16	6.5 $\pm$ 1.2	4	8	0.980
	3 rooms	69	6.3 $\pm$ 3.1	1	18	
	4 rooms	160	6.7 $\pm$ 3.1	0	14	
	5 rooms	39	6.3 $\pm$ 3.4	1	13	
Number of people living at home	1 person	22	5.9 $\pm$ 2.9	0	14	0.089
	2 people	86	6.2 $\pm$ 2.9	1	13	
	3 people	66	6.5 $\pm$ 3.4	1	18	
	4 people	70	6.9 $\pm$ 3.1	2	14	
	> 4 people	42	6.9 $\pm$ 2.8	2	13	

**Table 4. Comparison of poor sleep quality (PSQI  $\geq 5$ ) according to socio- demographic characteristics and clinical characteristics**

		Number of samples (n)	PSQI > 5 (n,%)	$\chi^2$	p
Age	<30	177	126	0.368	0.832
	30-40	61	44		
	> 40	17	11		
Gender	Female	172	127	2.000	0.157
	Male	115	76		
BMI	Underweight (< 20)	10	5	2.186	0.535
	Normal ( 20-24.9)	157	110		
	Overweight (25-29.9)	88	63		
	Obese (30 and above)	8	5		
Shift	Yes	227	164	12.681	<0.001
	No	59	38		
Income rate	< ₺1600	4	4	2.549	0.466
	₺ 1600-2500	24	16		
	₺ 2500-4000	76	51		
	₺ 4000-6000	163	118		
	> ₺ 6000	19	12		
House size	2 rooms	16	15	4.37	0.224
	3 rooms	69	50		
	4 rooms	160	111		
	5 rooms	39	27		
	> 5 rooms	22	17		
Number of people living at home	1 person	22	17	2.246	0.691
	2 people	86	60		
	3 people	66	43		
	4 people	70	51		
	> 4 people	42	32		
Comorbidities	Yes	49	36	0.214	0.644
	No	238	167		

**Table 5. Comparison of Excessive daytime sleepiness ( ESS  $\geq 10$ ) scores according to socio-demographic features and clinical features**

		Number of samples (n)	FWD > 10 (n,%)	$\chi^2$	p
Age	<30	177	46	2.939	0.23
	30-40	61	11		
	> 40	17	2		
Gender	Female	172	43	0.973	0.324
	Male	115	23		
BMI	Underweight (<20)	10	2	0.1	0.992
	Normal (20-24.9)	157	36		
	Overweight (25-29.9)	88	21		
	Obese (30 and above)	8	2		
Shift	Yes	227	56	2.364	0.124
	No	59	9		
Income rate	< ₺ 1600	4	0	4.912	0.296
	₺ 1600-2500	24	3		
	₺ 2500-4000	76	19		
	₺ 4000-6000	163	37		
	> 6000 ₺	19	7		
House size	2 rooms	16	1	2.932	0.402
	3 rooms	69	17		
	4 rooms	160	41		
	5 rooms	39	6		
	> 5 rooms	22	3		
Number of people living at home	1 person	22	3	4.241	0.374
	2 people	86	23		
	3 people	66	18		
	4 people	70	16		
	> 4 people	42	6		
Comorbidities	Yes	49	11	0.01	0.92
	No	238	55		

## DISCUSSION

Due to their profession, nurses had to cope with the difficulties of working as during their working lives, the work of changing overtime hours are in a position to cope with the challenges imposed. These working conditions can affect sleep qualitatively and quantitatively. Thus, both psychologically and physically negative outcomes can be seen (2). In our study, it was found that nurses had an average score of 6.5 in PSQI and had poor sleep quality overall. Many studies from Turkey showed that nurses' PSQI scores reported to be between 5.9 and 12.4. Sleep quality results of our study is consistent with other studies in the literature (1,2,10-12). In a recent meta analysis from Iran, it was seen that nurses' average PSQI score is 8.7 and 64% of nurses have poor sleep quality (13). Nurses have poor sleep quality, this could be caused by being under stress, working in difficult and tiring conditions and trying to keep up the pace.

There are studies reporting that sleep quality varies according to gender, and that women have worse sleep quality than men (10,12,14). In our study, we found that gender did not affect sleep quality. The literature argues that women can effectively maintain the Non-REM stage of sleep until older ages, whereas this stage rapidly declines in men after 40 years, and this (15) could cause the gender difference. In our study, the participants under the age of 40 are greater in number and this may have caused similar sleep quality of men and women.

The decrease in the rate of deep sleep after the thirties, compared to twenties may cause a decrease in sleep efficiency and quality in these ages (16). However, in our study, we found that sleep quality of nurses did not change according to age. Similar to our study, there are many others in the literature reporting that sleep quality does not change in relation to age (1,10,17-19). In Chan's study, it was reported that sleep quality changes with age and sleep quality decreases with age (20).

In the literature, it is reported that family's income status is directly proportional to sleep quality, and sleep quality may deteriorate as family income decreases (21). In our study, we found that both sleep quality and excessive daytime sleepiness were not related to income.

It is expected that shift-type working in nurses will affect sleep quality. The reason for this is thought to be due to disturbances in the sleep-awakeness cycle caused by changes in the circadian rhythm (1,10,14,22). In various studies, it was reported that up to 97.3% of nurses working in the night shift have poor sleep quality (11,20,23). In the study of Zverev et al., it was reported that the nurses who were working as shifts had worse sleep quality than their similar aged colleagues who did not work as shifts (24). In our study, no statistically significant difference was found between the mean PSQI levels of shift working nurses and the mean PSQI levels of non-shift working nurses. However, nurses with poor sleep quality (PSQI $\geq$ 5)

tended to have a higher number of shifts at a statistically significant level. Axelsson et al. (25) emphasized that the shift-type working disturbs the daily biological rhythm, disrupts the work of the homeostatic sleep centre in the brain, and causes acute total sleep deprivation or simulates the findings of chronic short sleep programs. For this reason, it can be concluded that working as shifts negatively affects sleep quality both in terms of cognitive awakening and total sleep quality.

Nurses had a high score in terms of subjective sleep quality, sleep latency, and sleep disorder and had daytime dysfunction related to sleep at least once a week. It is similar to the most common symptoms of night sleep deprivation, which are sleepiness and tiredness, as shown in literature.

Nearly 60% of nurses fall asleep within 30 minutes or later, which clearly shows that the majority of nurses have problems with falling into sleep. However, this does not have a reflection on sleep duration. Approximately 17% of nurses stated that they sleep less than 6 hours. Generally, recommended sleep duration for adults is 6 to 8 hours, a healthy sleep latency duration is within 15 minutes (26-28). In our study, it was found that the majority of nurses slept in accordance with the ideal sleep duration, but only a few of them falls into sleep within recommended time.

Excessive sleepiness may occur during the day in people suffering from insomnia. This may affect the person's daily functions. In a study comparing the quality of life of healthy sleepers and people with sleep problems, it was stated that the quality of life of the people with sleep problems was worse than the healthy sleepers, and increase in sleep problems affects life quality (29). A linear relationship between excessive daytime sleepiness and occupational accidents has been shown in shift working nurses. Suzuki et al. (30) found that daytime sleepiness was 26% in shift-working nurses. In this study, it was shown that occupational accidents (wrong medication, wrong operation device selection or needle prick) increased significantly in nurses with excessive daytime sleepiness. In the studies conducted in various occupational groups other than nurses, it is stated that individuals with excessive daytime sleepiness are more likely to have an occupational accident (31-34).

Limitations of our study are; sleep quality was evaluated by PSQI and excessive daytime sleepiness was assessed by ESS, objective measurement methods (polysomnography, multiple sleep latency test) to evaluate sleep were not used. Moreover, the fact that many of the employees were on annual leave during the period of the study was another limitation.

## CONCLUSION

In conclusion; we find out that most nurses have poor sleep quality and one fifth of them have excessive daytime sleepiness; and shift-type workers had poorer sleep



quality than non-shift workers. Besides, working in shifts negatively affects subjective sleep quality, sleep latency and leads to daytime function disorder. The number of nursing staff should be increased as much as possible, the number of shifts should be reduced and the working and resting hours of nurses should be re-arranged. In this regard, what needs to be done for better sleep quality should be discussed and managers' sensitivity should be increased on this topic.

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*Idris Kirhan ORCID: 0000-0001-6606-6078*

*Fatih Uzer ORCID: 0000-0001-9318-0458*

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