

# Sleep Quality and Related Factors among the Nurses of the Hospital of Kashan University of Medical Sciences, Iran

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## Abstract

**Aim:** Sleep and rest are the essential physiological needs of human. Nurses are at risk of developing sleep problems than others because of having various shift work. The aim of the present study was to evaluate the sleep quality and related factors in the nurses. **Methods:** In this cross-sectional study, 200 nurses were selected randomly from Shahid Beheshti Educational Hospital of Kashan University of Medical Sciences, Iran, 2016. Persian version of Pittsburgh Sleep Questionnaire Index and demographic questionnaire were used for the detection of sleep quality. **Results:** The mean age of cases was 51.31 years, and most of them (73%) were female. The majority of them had rotating shift work and worked over 150 h per month. 95.5% (191 cases) of them had poor sleep quality. The mean total score of sleep quality in females was higher than males ( $P = 0.04$ ). The nurses with rotating shift work had higher mean total score of sleep quality than nurses with fixed shift work. Nurses with over 150 h per month had more problems in daily function than others ( $P = 0.04$ ). **Conclusion:** These results present that the majority of the nurses had poor sleep quality. Poor sleep quality could be affect function, mental and physical health, and secondary effect delivery service to patients. Therefore, attention to this issue and strategies for improved sleep quality is necessary.

**Keywords:** Hospital, nurse, sleep quality

## INTRODUCTION

Nurses are the largest group of professionals in the healthcare system. They form 40% of the total staff of a hospital and 55% of the total cost of staff, so they play have a significant role in the healthcare and treatment system.<sup>[1]</sup> Among jobs, nursing more than any job has different working shifts, especially night shift.<sup>[2,3]</sup> The nurses work in various daily shifts and have irregular activity so they are at risk for sleep disturbances. Irregular sleep-wake pattern causes reducing sleep time and daily dysfunction.<sup>[4]</sup> Stress caused by work shift can be one of the most dangerous enemies of nurses' health and one of the most important risk factors for diseases. Much research has shown that most people who work in shifts have sleep pattern disturbance.<sup>[5]</sup> Moreover, sleep deprivation reduces the level of individual's tolerance to the stresses of job and life with the tendency to take more different drugs. Sleep disturbance in night-shift people is over 50%.<sup>[6]</sup> Health of nurses as caregivers is effective on the quality of services provided to patients.<sup>[7]</sup> Sleep with poor quality increases incidents up to 30%.<sup>[8]</sup> Sleeping plays an important role in human health and can affect an

individual's life quality.<sup>[9]</sup> Nurses due to long work shifts and fatigue are always susceptible to health threats with different dimensions,<sup>[10]</sup> and certainly nurses with poor health are not able to provide good physical and mental care to patients; this raises serious occupational accidents and mistakes that finally consequences for the nurse and patient.<sup>[11]</sup> Ohiada *et al.* evaluated Japanese nurses' sleep quality using Pittsburgh Sleep Quality Inventory and concluded that only 8% of nurses with two shifts and 6% of nurses with three shifts had good sleep quality.<sup>[12]</sup> Mirmohamad (2001) conducted a cross-sectional study about occupational damages caused by sleep disturbance in night-shift nurses working in Imam Khomeini Hospital in Urmia. The study results showed that 57% of studied nurses were willing to leave the job. Forty-eight percent believed that they have biological imbalance, and 27% felt that they are mistaken in their

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work.<sup>[13]</sup> The prevalence of sleep disturbance in nurses of Imam Khomeini Hospital, Tehran, in Sadegh-Niat's study was 87.7%, 58.3% experienced drowsiness during the day, and 75.1% had insomnia.<sup>[14]</sup> In Salehi *et al.*'s study, among staff nurses in Imam Khomeini Hospital, Tehran (2010), 62.5% had low quality of sleep, 33.3% had relatively low, and only 4.2% had good sleep quality.<sup>[5]</sup> The results of conducted studies have shown a significant difference between the level of consciousness and attention of nurses in different hours of shift work and decreased level of consciousness and attention in the last hours of work shifts.<sup>[15]</sup> Sleep attacks have been reported during various work shifts of nurses; based on a study, 50% of nurses complained long nap during working overnight and short nap during the day and sometimes at the end of evening shift work.<sup>[16]</sup>

Since nurses' sleep quality can affect performance and providing services to patients, and regarding that in this field, no study has been carried out on nurses in the educational hospital of Kashan University of Medical Sciences; this study was conducted to evaluate nurses' sleep quality and related factors. It is believed that by improving sleep quality of nurses, we can increase quality of patients care.

## METHODS

This research is a cross-sectional study. The studied population included all nurses working in Shahid Beheshti Educational Hospital of Kashan University of Medical Sciences in 2016. Inclusion criteria included nurses with a bachelor's degree and master's degree working in Shahid Beheshti Hospital with work experience of at least 3 months and exclusion criteria included chronic and debilitating physical and mental diseases such as epilepsy, asthma, congestive heart failure, diabetes, multiple sclerosis, brain surgery, psychotic disorders, and bipolar disorder. In this study, the sample size was calculated using the following formula, about 173 nurses.

$$n = \frac{(1.96)^2 (0.87)(0.13)}{(0.05)^2} = 173$$

Using random sampling method, 200 nurses from various wards of the hospital were selected. After explanation about the study and emphasis on data confidentiality (the questionnaires with special code without name) and having the consent of the study participation, the questionnaires were filled by them. The instruments in the study were Pittsburgh Sleep Quality Index (PSQI) and a questionnaire containing the study variables (work history, shift work, work hours in a month, and type of ward) and demographic information.

The Pittsburgh Sleep Quality Index (PSQI) is a standard tool to examine sleep quality during the past month and is a self-report scale. Sleep quality questionnaire has nine parts; questions 1–4 are descriptive and 5–9 are based on 4-degree Likert. The onset of sleep in Q1, trouble in falling asleep in Q2, waking up early in Q3, sleep duration in Q4, disruption of sleep continuity in Q5, use of medication for asleep in Q6, daily drowsiness in Q7, impairment in carrying out daily activities in Q8, and subjective sleep quality from nurses' view in Q9

were individually examined. According to the measurement criteria of sleep quality, a score <4 is good sleep quality and a score ≥5 is poor sleep quality. Sensitivity and specificity of this questionnaire by Buysse *et al.* were reported to be 89.6% and 86.5%, respectively. The reliability of the questionnaire has been reported high ( $\alpha = 0.83$ ).<sup>[17]</sup> The validity of the questionnaire was also confirmed by Aloba *et al.*<sup>[18]</sup> Further, the tool validity was confirmed by Farrahi Moghaddam *et al.* in Iran; sensitivity and specificity have been reported to be 72% and 94%, respectively.<sup>[19]</sup>

The data were analyzed statistically by SPSS-16 (SPSS Inc., Chicago, USA) software and Chi-square test, Fisher's exact test, *t*-test, Leven test, Kolmogorov–Smirnov test, and logistic regression test.

## RESULTS

The findings of this study show that of 200 nurses, 27% were male and 73% were female. The mean age of the nurses was  $31.51 \pm 4.89$  years. Female mean age was  $31.75 \pm 4.76$  years and male mean age was  $30.87 \pm 5.23$  years. In terms of work experience in hospital, 38.5% had 5 years of work experience and 51.5% had >5 years of work experience. Seventy-three percent of the nurses were married and 27% were single. In terms of working hours, 13% worked 150 h, 87% worked over 150 h in a month. 96% of the nurses had rotating shift work, and 4% had fixed shifts. Fifty-six percent of nurses worked in internal wards, 24% worked in surgical wards, and 20% worked in special wards.

In overall, of 200 nurses, 191 (95.5%) had poor sleep quality (PSQI ≥5). Among seven subscales of sleep quality, they had more problems with sleep efficiency, 90%. In other subscales, they had problem sleep duration problem (29.5%), sleep latency (20%), taking drug for sleep (19.5%), daily dysfunction (19.5%), and somnambulism (sleep disturbances) (1.5%).

The mean score of sleep in women ( $10.62 \pm 3.55$ ) was significantly higher than men ( $9.46 \pm 3.11$ ) ( $P = 0.04$ ). In this study, there is no significant relationship between overall quality of sleep and other variables such as age, marriage, work experience, shift work, and work hours [Table 1].

In the evaluation of sleep quality and monthly working hours in nurses, the results demonstrated that working hours over 150 h caused daily dysfunction in 82.2% of nurses, while the nurses with less work hours reported less problems with daily dysfunction. Further, there was a significant relation between sex and daily dysfunction ( $P = 0.03$ ). In this study, there was no relation between sleep subscales and other demographic variables [Table 2].

The results of logistic regression test showed that nurses who had work hours more of 150 h in a month, 2.5 times of others, had daily dysfunction [Table 3].

## DISCUSSION

This study was conducted aimed to determine the quality of sleep and related factors in the nurses of Shahid Beheshti Hospital of Kashan University of Medical Sciences.

**Table 1: The mean of total sleep quality score and demographic variables in the nurses**

Total sleep score	Sex		Age		Marriage		Work experience		Work hours		Shift work	
	Men	Women	≤30	>30	Single	Married	>5	≤5	>150	≤150	Fixed	Rotating
Mean±SD	9.51±3.13	10.65±3.56	10.07±3.59	10.55±3.40	9.59±3.68	10.63±3.37	10.2±3.5	10.48±3.47	10.43±3.48	9.76±3.49	8.75±2.81	10.41±3.5
P	0.04		0.33		0.061		0.67		0.36		0.186	

T-test. SD: Standard deviation

**Table 2: Frequency of sleep quality and its subscales based on demographic variables in the nurses**

Total sleep score	Sex, n (%)		Age, n (%)		Marriage, n (%)		Work experience, n (%)		Work hours, n (%)		Shift work, n (%)	
	Men	Women	≤30	>30	Single	Married	>5	≤5	>150	≤150	Fixed	Rotating
Total sleep	51 (94.4)	140 (95.9)	80 (94.1)	111 (96.5)	141 (96.6)	50 (92.6)	116 (94.3)	75 (97.4)	165 (94.8)	26 (100)	8 (100)	183 (95.3)
P	0.70		0.49*		0.256*		0.48*		0.60*		1*	
OR	1.37*		1.73		0.44		0.44		-		-	
CI	0.33-5.69		0.45-6.6		0.11-1.71		0.089-2.185		-		-	
Sleep quality subjective	41 (75.9)	132 (90.4)	72 (84.7)	101 (87.8)	130 (89)	43 (79.6)	68 (88.3)	105 (85.4)	153 (87.9)	20 (76.9)	5 (62.5)	168 (87.5)
P	0.008**		0.54**		0.08**		0.55**		0.13*		0.0*	
OR	2.9		1.3		0.48		0.77		2.18		4.3	
CI	1.3-6.8		0.57-2.9		0.20-1.1		0.32-1.81		0.78-6.06		0.94-18.7	
Sleep latency	44 (81.5)	127 (87)	74 (87.1)	97 (84.3)	125 (85.6)	46 (85.2)	103 (83.7)	68 (88.3)	150 (82.6)	21 (80.8)	6 (75)	165 (85.9)
P	0.32**		0.59**		0.93**		0.37**		0.54*		0.32*	
OR	1.5		0.8		0.966		0.68		1.48		2.03	
CI	0.65-3.5		0.35-1.79		0.4-2.3		0.29-1.58		0.51-4.32		0.39-10.6	
Sleep duration	49 (90.7)	125 (85.6)	72 (84.7)	102 (88.7)	129 (88.4)	45 (83.3)	105 (85.4)	69 (89.6)	25 (96.2)	149 (85.6)	8 (100)	166 (86.5)
P	0.33**		0.40**		0.34**		0.38**		0.21*		0.600*	
OR	0.6		1.4		0.65		0.67		0.23		-	
CI	0.21-1.7		0.62-3.23		0.27-1.58		0.27-1.64		0.031-1.83		-	
Sleep efficiency	52 (96.3)	144 (98.6)	83 (97.6)	111 (96.5)	142 (97.3)	52 (96.3)	120 (97.6)	76 (98.7)	25 (96.2)	171 (98.3)	8 (100)	188 (97.9)
P	0.29*		1*		0.66*		1*		0.430*		1*	
OR	2.7		0.66		0.73		0.52		2.28		-	
CI	0.38-20.1		0.12-3.73		0.13-4.11		0.05-5.15		0.22-22.7		-	
Sleep disturbances	52 (96.3)	142 (97.3)	83 (97.6)	111 (96.5)	142 (97.3)	52 (96.3)	119 (96.7)	75 (97.4)	169 (97.1)	25 (96.2)	8 (100)	186 (96.9)
P	1*		1*		0.66*		1*		0.57*		1*	
OR	1.36		0.66		0.73		0.79		1.35		-	
CI	0.24-7.6		0.12-3.73		0.13-4.11		0.14-4.43		0.152-12.05		-	
Use of sleep medications	8 (14.8)	31 (21.2)	15 (17.6)	24 (20.9)	27 (18.5)	12 (22.2)	22 (17.9)	17 (22.1)	7 (26.9)	32 (18.4)	2 (25)	37 (19.3)
P	0.30**		0.57**		0.55**		0.46**		0.306**		0.65*	
OR	1.5		1.23		1.25		0.76		0.612		0.716	
CI	0.66-3.6		0.6-2.51		0.58-2.70		0.37-1.57		0.23-1.57		0.139-3.69	
Day time dysfunction	38 (70.4)	122 (83.6)	63 (74.1)	97 (84.3)	120 (82.2)	40 (74.1)	97 (78.9)	63 (81.8)	143 (82.2)	17 (65.4)	7 (87.5)	153 (79.7)
P	0.038**		0.07**		0.20**		0.61**		0.046**		1*	
OR	2.14		1.88		0.61		0.82		2.44		0.56	
CI	1.03-4.4		0.93-3.78		0.29-1.30		0.4-1.70		0.99-5.98		0.067-4.69	

\*Fisher exact test, \*\*Chi-square test. OR: Odds ratio; CI: Confidence interval

In the present study, it was found that 191 nurses (95.5%) suffered from sleep problems. This rate is more than conducted studies in other hospitals nurses such as Zahedan,<sup>[1]</sup> Tehran hospitals affiliated to Iran Universities of Medical Sciences,<sup>[20]</sup> Shahrood,<sup>[21]</sup> and the nurses of other countries.<sup>[22,23]</sup> The prevalence sleep problems in this study are equal to Salehi

et al.'s study and nearly consistent to the studies conducted by Shahsavand et al., Akbari et al., and Zamanian et al.<sup>[5,24-26]</sup> In Salehi et al.'s study conducted in Tehran Imam Khomeini Hospital, only 4.2% of nurses had good sleep quality. In Akbari et al.'s study, 85.7% of the nurses had poor sleep quality and Zamanian et al.<sup>[26]</sup> reported that most of the nurses in Tehran

**Table 3: Statistical indicators related to logistic coefficients**

Factors	B	SE	Wald	df	Significant	Exp	95% CI for Exp	
							Lower	Upper
Sex (1)	0.779	0.377	4.263	1	0.039	2.178	-	-
Code time (1)	0.917	0.464	3.898	1	0.048	2.502	1.04	4.562
Constant	0.083	0.494	0.028	1	0.867	1.086	1.007	6.216

Hosmer–Lemeshow test (significant: 0.883), overall percentage 80%, Method: Enter. SE: Standard error, CI: Confidence interval

and Shiraz had undesirable sleep and detected a significant association between quality of life and sleep quality.<sup>[26]</sup>

In a study conducted by Chien *et al.* on nurses in hospitals in Northern Taiwan, 75.5% of nurses had score  $\leq$  PSQI5 that is lower in comparison with the present study.<sup>[27]</sup> In Weaver study (2015) on nurses in University Hospitals of Dallas, America, 73.3% had poor sleep quality. The reason for high prevalence of sleep problems in the present study may be related to differences in time and/or more work pressure and more rotating working shifts in the nurses of Kashan University of Medical Sciences. It is mentioned that 96% of the Kashan nurses had rotating shift work.

In the present study, female nurses' score was higher than male's. This finding is consistent with the Oginska and Pokorski's study. In Oginska and Pokorski's study, women had much more sleep disturbance and also women need more sleep than men significantly.<sup>[27]</sup> The correlation between some demographic factors and sleep disturbance has been investigated in several studies, and it has been reported that sleep disturbance is more common in women than men.<sup>[28-30]</sup> It could be because of high sensitivity of women to stress and sleep problems. Frequent distresses and work stress can cause more sleep problems in women than men. However, in Akbari *et al.*'s study, this correlation between sex and sleep quality was not reported.

Sleep quality of nurses with rotating shift work was lower than those with fixed work. This finding is consistent with the results reported by Soleimany *et al.* and Ghaljaei *et al.*<sup>[1,4,19]</sup> The results of Soleimany *et al.* showed that nurses with fixed working shift to nurses with rotating shift work had better sleep quality. In addition, the results of Admi *et al.* and Ohida *et al.* confirm the findings of the present study.<sup>[31,32]</sup> Ohida *et al.* evaluated the effect of night work shift and lifestyle on sleep quality of nurses (using Pittsburgh Sleep Quality Questionnaire) in Japan; this study showed that nurses with night work shift had significantly lower sleep quality and a significant relationship was found between work shifts and sleep disturbance. Ohida *et al.* and Chien *et al.* reported that there was no significant difference in sleep problems between two shift work and three shift work.<sup>[12,24]</sup>

Gold *et al.* reported that nurses with shift working and fixed night working shift suffer more from sleep disorders and its complications.<sup>[33]</sup> In the study by Flo *et al.*, it has been reported that three shifts work and night work causes more insomnia problem.<sup>[34]</sup> In the present study, 95.8% of nurses with rotating shift work had poor sleep quality and their sleep

quality score was higher than the fixed shift. In addition, in sleep latency scale aspect, nurses with rotating shift work had more problems than those with fixed work shift. According to the results, probably nurses with fixed and regular work shift had more appropriate sleep pattern. In fact, the type of shift work with affecting the circadian rhythm can increase nurses' sleep disturbance.

In the present study, the most sleep problems of the nurses were related to sleep efficiency. While in the study by Salehi *et al.*, "sleep latency" was the most important problem of the nurses.<sup>[5]</sup> In Kolagary *et al.*'s study, 65% of the nurses had difficulty in daily function caused by sleep problems.<sup>[2]</sup> However, in our study, 19.5% of the nurses had daily dysfunction. The reason for this difference may be due to the use of different tool.

In the present study, nurses who were working more than 150 h (compared to nurses with less working hours) had daily dysfunction and no study was found in this field.

In the present study, 19.5% of the studied nurses used sleep medication to fall asleep. However, significant difference was not found between working shifts, working hours, gender, and marital status with sleep medication. In Soleimany *et al.*'s study, the average frequency of medication use in fixed shift nurses proved to be less than nurses working in different shifts.<sup>[20]</sup> Moreover, in Bagheri *et al.*'s study, 35.5% of the studied nurses were forced to use medication to fall asleep<sup>[21]</sup> that is greater than the present study.

In the present study, single nurses had more difficulty in deep sleep than married nurses; however, in total scale, no difference was found. This result is consistent with the study of Salehi *et al.* In Salehi *et al.*'s study, it was found no relationship between marital status and sleep quality.<sup>[5]</sup>

The study conducted by Gold *et al.* on nurses in America hospitals showed sleep disturbance effects on daily incidents, traffic accidents, and professional mistakes such as very evident mistakes in medication to patients.<sup>[33]</sup> In general, the effects of sleep disturbance on nurses can be shown as job dysfunction, mood disorders, and not being willing to cooperate.<sup>[2]</sup> The amount of sleep disturbance obtained based on this study, and other studies can affect nurses' performance to provide services and finally patients' treatment and recovery process.

## CONCLUSION

The study shows that most of the studied nurses had poor sleep quality and also the nurses who had work hours more than

150 in a month had more sleep problems. Since undesirable sleep affects physical and mental health, performance of nurses, and consequently service delivery to patients, there is a need for serious attention and measures. Hence, it is suggested to do intervention for reducing work hours and rotating shifts as well as evaluate sleep quality and performance of the nurses with rotating shift work periodically. These strategies could improve health-care service and reduce professional mistakes.

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### Conflicts of interest

There are no conflicts of interest.

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