

# Sleep quality and sleepiness in South East Iranian nurses

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## Abstract

There are a few studies that at the same time assessed both nurses' sleep quality as well as sleepiness and their correlation in the Iranian context. The study applied a descriptive, correlation design. 252 nurses randomly were selected. Using Epworth Sleepiness Scale (ESS) and Pittsburgh Sleep Quality Index (PSQI) prevalence of sleepiness and sleep quality of sample was examined. The participants were mainly female (86.9%) and married (73.4%) as well, most of them had Bachelor in nursing (74.2%) and less than 10 years experience (57.9%). The prevalence of sleepiness was 45.6%. Daytime sleepiness correlated with job experience and education. 84.5% of the participants reported that they have poor sleep quality. In PSQI, The highest mean scores belonged to sleep latency ( $1.8 \pm 0.9$ ) and the lowest belonged to hypnotic medication use ( $0.54 \pm 0.97$ ). There was no significant difference between gender, marriage status, education, job experience, and sleep quality. A significant association was found between sleep quality and sleepiness. According to Binary logistic regression study, the risk of sleepiness among participants with poor sleep quality was 2.58 times more than that among those who had good sleep quality. The study indicate almost high prevalence of poor sleep quality and moderate prevalence of sleepiness among South East Iranian nurses. It is imperative that more attention is paid to this subject since; it may affect the quality of care and the health of nurses negatively.

**Keywords:** Health, Sleep quality, Nurse Sleepiness

## Introduction

Shift workers are prone to many symptoms of sleep disturbance because of their irregular and often long hours of work [1]. Inadequate sleep is a common problem among nurses [2]. Prevalence of experienced sleepiness during work in nurses was reported between 20.3%

and 53.6% [3]. According to Kalagary et al. [4] prevalence of sleepiness among Iranian nurses was 65.5%. As well, 20% of critical care nurses in the United States reported actually falling asleep on duty [5]. Poor sleep quality was reported about 37.1% by Soleimany et al. [6]. Nurses need to obtain

7–8 hours' sleep per night to protect both the health of their patients and their own health [7]. Sleepiness refers to a tendency to fall asleep [8]. According to European Academy of Sleep Medicine [9] Sleepiness could be divided into 3 categories: mild, moderate, and severe sleepiness. They go on that the symptoms of three types of sleepiness produce an impairment of social or occupational function even if the severity of the symptoms is different between these three types [9]. Buysse *et al.* [10] asserted sleep quality as a "complex phenomenon that is difficult to define and measure objectively. Sleep quality generally improves, with increasing deeper sleep and, possibly, some decrease in the amount of dreaming" [9]. Lack of sleep can have serious consequences, both for the person suffering from lack of sleep and for those around them [1].

Daytime sleepiness is associated with stressful working conditions and burnout and is believed that this type of sleep disturbance is a result of inadequate sleep, rather than a direct result of stressful working conditions or burnout. There is enough evidence that suggest inadequate sleep can have adverse effects on patient safety and the health of nurses [8]. Scott *et al.* [5] suggested that a relationship might exist between alertness and errors among nurses. They continue, drowsiness and sleepiness during working hours were associated with considerably greater risks of making an error [5].

Nurses' sleep disturbance negatively affects their decision making, initiative, combination of information, planning, and implementation [8]. Earlier studies [1,8,11] reported that inadequate sleep has been related to cognitive problems, mood alterations, reduced job performance, and reduced motivation, increased safety risks, mental health and physiological changes. In one study [12] that was conducted among nurses, reported that the daytime sleep quality following a night shift was very poor. Karagozoglu and Bingol [13] asserted that nurses reported disturbed sleep during 25.9% of day times. And work-related concerns were responsible for 14.8% of this sleep disturbance. Problems such as sleepiness and waking too early were

reported on about one third of workdays (30% and 29%, respectively). In Iran Kalagary *et al.* [4] conducted a study among nurses and they reported that 65.5% of participants have excessive day time sleepiness. In addition Solymani *et al.* [5] showed 37/1% of Iranian nurses experienced poor sleep quality. Hughes and Stone [14] ascertain that inadequate sleep compromises the health of nurses and puts the patients at risk. They go on that working too many hours and sleeping too few caused excessive sleepiness that can worsen a nurse's awareness, productivity and safe patient care [14]. Despite these unfavorable consequences, there are limited studies among Iranian nurses to assess nurses' sleep quality. This study thus aimed to examine sleep quality and sleepiness among nurses in South- East of Iran.

### **Method**

This study applied a descriptive, correlational design. The ethics committee of Kerman University of Medical Science Vice Chancellor for research approved the study protocol. Sample of this study consisted of 252 nurses were working in four hospitals supervised by Kerman University of Medical science including Afzalipur, Shahid Bahonar, Shafa and Shahid Beheshti. A stratified sampling method was used. The sample size was selected based on earlier published studies (4). "P = 0.65,  $\alpha$ =0.05, d = 0.065".

First, a questionnaire was developed to obtain demographic information which was assumed to effect on sleep quality and Sleepiness. It included questions about gender, age, marriage status, educational level and work experiences. A translated version of Epworth Sleepiness Scale (ESS) was employed to examine daytime sleepiness in adults. This questionnaire designed by Johns, M.B., in 1993. This scale measures the likelihood of falling asleep. Participants were asked to rate particular situations based on the likelihood that they may doze during the day, with 0 indicating "would never doze" to 3 indicating a "high chance of dozing. ESS scores range from 0 to 24 and scores greater than 10 indicate a high

level of daytime sleepiness [15].

The Pittsburgh Sleep Quality Index is a standardized quantitative measure of sleep quality. It is a 19-item questionnaire that measures seven components including sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications and daytime dysfunction. Each of the seven components are weighted equally on a 0-3 scale (0= Not during the past month, 1= Less than once a week, 2= Once or twice a week, 3= Three or more times a week) and the scores are summed to yield a global score among 0 to 21. The higher score indicated, the poorer the quality of sleep [16]. In earlier studies in Iran validity and reliability of both questionnaires (PSQI, ESS) were conducted by Farrahi et al. [17] and Masood Zadeh et al [18]. They used content validity and alpha coefficients of internal consistency. The alpha coefficient for ESS was (0.70) and for PSQI was (0.88).

Accompanied by a letter including some information about the aim of the study, the questionnaires were handed out by the first author to 252 nurses (RN and Auxiliary nurses) who were introduced by the head of each ward at work at four hospitals supervised by Kerman University of Medical Science. These nurses were selected through stratified random sampling. Each of four hospitals considered as a strata and a proportion of total computed sample were as sign to each hospitals. All of nurses who had more than 6 months experience of working as a nurses (RN and Auxiliary nurses) in selected hospitals were included in this study. In chosen wards nurses are permitted to have a 3-hour break, during night shifts. They can spend their break in a room which is equipped with some beds. To ensure that all eligible staffs were provided with an opportunity to participate, the wards were repeatedly visited by a researcher, covering all three staff shifts (days, evenings, and nights). The questionnaires were completed by consenting participants during their regular working shift, with a research assistant in attendance to answer any questions about the survey. Informed consent was obtained for subjects. They were

also told not to state any name or other personal information on the questionnaires in order to secure confidentiality. The Statistical Package for Social Scientists (SPSS version 15) was used for data analysis. To determine characteristics of samples, descriptive analysis was performed. Independent t-test and One-Way ANOVA were conducted to compare categorical variables. Pearson correlation coefficient was used to identify relationship between sleepiness and sleep quality. In addition, multivariate logistic regression analysis was used to determine factors effecting EES and PSQI. The significance level was set to  $P < 0.05$ .

## Results

A descriptive analysis of background information (Table 1) reveals that the participants belonged to the age group of 20 to 48 years with a mean age of 32.98 years and were mainly female (86.9%) and married (73.4%). Most of respondents had Bachelor of Science in nursing (74.2%) and less than 10 years experience in nursing (57.9%).

**Table 1** Background information

characteristics	N	%
<b>Gender</b>		
Male	33	13.1
Female	219	86.9
<b>Marriage status</b>		
Single	67	26.6
Married	185	73.4
<b>Age (years)</b>		
25 $\geq$	53	21
26-35	119	47.2
36-45	58	23
46 $\leq$	22	8.7
<b>Education</b>		
Diploma	65	25.8
Bachelor	187	74.2
<b>Job experience</b>		
10 $\geq$	146	57.9
10<	106	42.1

A descriptive analysis indicated that prevalence of sleepiness among participants was 45.6% (Table 2). In ESS questionnaire, the two highest score of Sleepiness belonged

to item 5 “lying down to rest in the afternoon when circumstances permit” (mean 2.02). And item 7 “Sitting quietly after a lunch without alcohol” (mean 1.04). Also the lowest mean score belonged to item 8 “In a car, while stopped for a few minutes in the traffic” (mean 0.24) A descriptive analysis also showed that most

of the participants (84.5%) reported poor sleep quality (Table 2). In PSQI the highest mean scores belonged to sleep latency (mean 1.58 (and the lowest belonged to hypnotic medication use (mean 0.54) (Table 4).

**Table 2** Sleep quality and sleepiness score

	Variable	N	%
Sleepiness	Yes	115	45.6
	No	137	54.4
Sleep quality	Good	39	15.5
	Poor	213	84.5

**Table 3** The Epworth Sleepiness Scale (ESS) scores

Situation	Would neverdoze (%)	Slight chance of dozing (%)	Moderate chance of dozing (%)	High chance of dozing (%)	Mean ±SD
1. Sitting and reading	41.3	31	20.2	7.5	0.94 ± 0.96
2. Watching television	46.8	33.3	13.5	6.3	0.97 ± 0.90
3. Sitting inactive in a public place (e.g. a theater or meeting)	60.3	26.6	7.1	6	0.59 ± 0.86
4. As a passenger in a car for an hour without a break	54.3	21	15.9	8.3	0.78 ± 1
5. Lying down to rest in the afternoon when circumstances permit	11.9	17.1	27.8	43.3	2.02 ± 1.04
6. Sitting and talking to someone	85.7	9.9	4	0.4	0.19 ± 0.51
7. Sitting quietly after a lunch without alcohol	35.7	33.3	22.2	8.7	1.04 ± 0.96
8. In a car, while stopped for a few minutes in the traffic	82.5	11.9	4.4	1.2	0.24 ± 0.59

**Table 4** The Pittsburgh Sleep Quality Index (PSQI)

PSQI component	0 (%)	1 (%)	2 (%)	3 (%)	Mean± SD
Sleep quality	7.5	58.3	28.6	5.6	1.32±0.69
Sleep latency	11.5	35.7	36.1	16.7	1.58±0.90
Sleep duration	20.6	28.6	39.7	11.1	1.41±0.94
Sleep efficiency	63.9	20.2	6.7	9.1	0.61±0.96
Sleep disturbance	3.6	69	27.4	0	1.24±0.50
Hypnotic medication use	71.8	10.7	8.7	8.7	0.54±0.97
Daytime dysfunction	28.6	42.1	21.4	7.9	1.09±0.90

According to t-test there was no correlation between sleepiness and gender, age, education, as well as marital status. The independent T-test showed an association between job experiences and sleepiness. This means that participants who have more than 10 years experiences, have higher rates of sleepiness ( $p=0.028$ ) compared to those who have less than 10 years of experience. Furthermore, a correlation was found between education and sleepiness so that those who have bachelor degree, were more likely to be sleepy ( $p=0.0036$ ) compared to those who have diploma degree. There was no significant difference between gender, marriage status, education, job experience, and sleep quality. Pearson correlation coefficient showed a significant association between sleep quality and sleepiness [ $p=0.014$ ] among participants. According to Binary logistic regression study, the risk of sleepiness among participants with poor sleep quality was 2.58 times more than that among those who had good sleep quality.

### Discussion

The aim of this study was to examine sleep quality and sleepiness among nurses in South-East of Iran. The study of this study revealed that the incidence of sleepiness among a sample of nurses in South-East of Iran was moderate (45.6%) and most of the participants (84.5%) reported poor sleep quality. In Tehran (Capital of Iran) Kalagary et al. [4] reported that 65.5% of nurses have excessive day time sleepiness. Scott et al. [5] reported that 20% of critical care nurses in the United States reported actually falling asleep on duty. Karagozoglu and Bingöl [13] evaluated Turkish nurses' sleep quality and assert that nurses reported disrupted sleep on 25.9% of days. Based on the findings, 84.5% of the participants reported poor sleep quality. Solymani et al. [6] used PSQI to assess Iranian nurse's sleep quality and they found that 37.1% of nurses reported poor sleep quality. Solymani et al. [19] stated that 43.8% of fix and 30.4% of rotated shift work Iranian nurses respectively reported poor sleep quality. Hasson et al. [20] found a small, but continuous decline in sleep quality among Swedish nurses during the three

years of follow-up. These disturbances may be secondary to situational, environmental or developmental stressors. Karagozoglu and Bingöl [13] concluded that, work-related concerns were responsible for this sleep disorder on 14.8% of occasions 13. Ng and Tan [21] reported that shift work was a risk factor for daytime sleepiness.

According to Nasrabadi et al. [22] shift workers experience many health-related problems like fatigue, anxiety, gastrointestinal problems and sleep problems. These adverse effects indicate that night shift work is a stress factor that affects the physical, psychological and social health of night shift workers. Working nights is a challenge for most nurses, especially when one is forced to work nights involuntarily. This situation can cause much physical and emotional stress.

Calalang-Javier [23] also, stated that lack of quality sleep and chronic sleep deprivation often leads to chronic sleep deprivation. Chronic sleep deprivation affects memory, communication, attention, reaction time and agility. Poor sleep quality and sleepiness found in this study could be related to sleep deprivation and misalignment of circadian phase that experienced during rotating shift work. Sleep deprivation is also associated with frequent lapses of attention and increased reaction time, leading to increased error rates on performance tasks [14,21]. During shift work behavior and sleep/wake patterns are out of sync with endogenous clock, so the environment circadian misalignment can result. Misalignment that is an outcome of shift work is related with an increased risk of health problems [24] However, the deterioration in sleep quality because of stress, work environment, and work/family interferences may cause malfunctioning recovery processes. Earlier studies also showed a correlation between sleep quality and job satisfaction [13], errors on shifts [25], increase stress [26], poor job performance, reduced ability to handle daily stresses, and a higher incidence of drowsy driving [27].

The study of this study indicated that sleep

quality correlated with sleepiness. According to Binary logistic regression study, the risk of sleepiness among nurses with poor sleep quality was 2.58 times more than that among those who had good sleep quality. Findings also showed that sleepiness influenced by job experience. In a study Karagozoglu and Bingöl [13] found significant correlation between Turkish nurses' sleep quality and years of their employment. They concluded that those who worked more than 6-9 years, had lower sleep quality compared to those who worked less than 6-9 years [13]. Hughes and Stone asserted that working too many hours and sleeping too few caused excessive sleepiness and consequently worsen the nurse's awareness, productivity and safe patient care [14].

The study also showed that nurses, who had bachelor degree, had higher prevalence of poor sleepiness compared to those who had diploma. Several studies [28-30] indicated that nurses with higher education have more distress compared to those who had not higher education. So the higher prevalence of poor sleepiness found among nurses in this study could be related to the distress mentioned in above studies. Inconsistently, Patel *et al.* [31] concluded that level of education was associated with an increasing protective effect upon sleep quality. They found that low education level was significantly associated with poor sleep quality [31]. This contradiction could be related to the difference levels of education which are studied in these two studies.

### **Conclusion**

The study indicate almost high prevalence of poor sleep quality and sleepiness among South EastIranian nurses. Nursing is a profession which requires readiness and wakefulness shift work. Nurses give care to the patients who require continuous assessment, intervention, and vigilance, regardless of time of day or night. This work environment may cause nurses to be at high risk for sleep deprivation. Working on night shift negatively affects nurses' quality of care during the day. Nurses who are sleep deprived are often unable to

recognize their impairment, and this may lead them to the increased risk of injury, accident and error. Nurses, nurse managers, nursing administrators, and policymakers need to change the work organizational culture so that nurses, who work long hours, have sufficient time to sleep. It is suggested that sleep quality of nurses working in rotational evaluated periodically. Nurse Managers should not schedule nurses for more than 12-hour shifts. Limiting the duration of nursing shifts and mandating sufficient rest periods between shifts would also benefit nurses and patients as well. Nurses should be allowed to nap during their break and meal periods. Naps should be short, e.g., less than 45 minutes, to reduce the likelihood of awakening from deep sleep and experiencing sleepiness. Some nurses may prefer to take a shorter nap, and have a 15 minute wake up period before they resume patient care. Use of the self-report questionnaires may have led to an overestimation of some of the findings due to variance which is common in different methods. The sample of nurses in this study, which is not representative of all Iranian nurses, could limit the generalization of the findings. Furthermore, all data in this study were collected by use of self-report questionnaires. The dependence on self-report aspects in this study may have led to an overestimation of some of the findings due to variance, which is common in different methods. In addition, we did not consider how many of participants were menopause. Since, Sleep problems (*i.e.*, insomnia) affect women as they approach and pass through menopause at rates higher than at most other stages of life. It was could be beneficial to reflect some other variables and their correlation with nurses sleep quality and sleepiness. Including number of night shift and overtime work hours of nurse and nurse-patient ratio in each ward.

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### Contributions

Study design and analysis: MAF, RS, FR

Data collection: FR

Manuscript preparation: BT, SI

### Conflict of Interest

"The authors declare that they have no competing interests."

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