

# Sleep Quality and Correlated Factors among Retired Nurses in the North-east of Iran

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## Abstract

People in occupations with an extreme amount of stress, such as nursing, suffer from poor physical and mental health after retirement. This study was aimed at evaluating sleep quality scores and their correlates among retired nurses in the north-east of Iran. This cross-sectional study was conducted on 302 retired nurses in public hospitals of north-east Iran between April and May 2018. The data were collected using the Persian Version of Pittsburgh Sleep Quality Index (PSQI), a valid and reliable scale to evaluate sleep quality among Iranian people through phone calls. The mean age of subjects was  $56.6 \pm 4.6$  and 66.9% were female. Altogether 82.7% of retired nurses had poor sleep quality. According to multiple regression analysis, males had a significantly better overall sleep quality compared to females. Participants with evening and rotational shifts had a significantly lower sleep quality as compared to those working in the morning shift. Subjects suffering from musculoskeletal diseases, cardiovascular diseases (and a combination) had substantially poorer sleep quality as compared to those with no comorbidity. Findings suggest that Iranian retired nurses do not have good sleep quality. Health systems and their managers play an important role in preparing nurses for retirement. They can reduce post-retirement complications by designing a normal employee work schedule, increasing the nursing workforce when needed, and preventing overwork and long-term overtime hours.

**Keywords:** retirement; nurses; mental health; occupational health nursing; sleep initiation; maintenance disorders

## Background

Retirement has different effects on human life, including social and economic issues, and may affect individual health, well-being, and lifestyle (Osborne 2012; Wang et al. 2011). Some researchers believe that retirement may not only relieve stressors from the workplace but could also have a positive impact on the mental health of the retiree, while other researchers uphold the view that retirement can have detrimental effects on the retiree's mental health by reducing financial stability, purposefulness, and social activity (Zhang et al. 2016). Retirement appears to improve sleep quality (due to the elimination of workplace stress); however, the prevalence of sleep disorders is greater among elderly people compared to the other age groups (Gulia and Kumar 2018).

A recent study indicated that up to 68% of employed nurses experienced occupational stress (Tao et al. 2018). Early retirement is more likely to take place in nurses due to workplace stress, working long hours, fatigue, shift-work sleep disorder, mental disorders, and poor health status (Ferreira et al. 2016). Shifting work hours can lead to circadian rhythm disruption, sleep disorders, dysfunction, daytime sleepiness, physical and mental health disorder, all of which could reduce patient care quality and safety (Giorgi et al. 2018). Studies have shown that 50–70% of employed nurses suffer from poor sleep quality and sleep disorders (Chang et al. 2017; Zhang et al. 2016). In Iran, studies also reported that the prevalence of poor sleep quality and sleep disorders was 84.5% among employed nurses (Asadzandi et al. 2014; Aziz Zadeh Forouzi et al. 2014).

Other studies have shown that sleep duration and sleep patterns change with increasing age. Circadian rhythm is ineffective among elderly people, and sleep disorders and their complications are more common (Gulia and Kumar 2018). Elderly people have intermittent sleep and they wake up earlier. Disorders such as Restless Legs Syndrome (RLS), which cause sleep disorders, are also more common among this group (Suzuki, Miyamoto, and Hirata 2017).

Sleep disorders can give rise to physiological and psychological problems as well as enormous financial losses (Hillman and Lack 2013). Subjects with sleep disorders are at risk of developing diabetes mellitus, cardiovascular diseases, hypertension, and depression (Henry et al. 2016). Poor sleep quality or daytime sleepiness often goes hand in hand with poor health status, poor physical functioning, illness, increased risk of mental illness, decreased quality of life and diminished daily function in older adults (Gulia and Kumar 2018; Suzuki et al. 2017). The healthcare system is aimed at enhancing the health status of retired people (Wilson and Palha 2007). Also, health status impacts on current employers' expectations and uncertainties as well as their productivity in the organisation (Nobahar et al. 2013).

In the review of literature, no study was found that had been conducted on the sleep quality of retired nurses. Considering the high prevalence of sleep disorders among elderly people (Gulia and Kumar 2018)—and related health problems and diseases (Hillman and Lack 2013)—the aim of this study was to determine sleep quality scores and their correlates among retired nurses. The researchers set out to determine whether their sleep quality had changed (or not) during retirement, compared to what it was during employment. The motivation for this study stemmed from the contradictory occurrence that, on the one hand, eliminating workplace stress after retirement can reduce sleep disorders; but on the other hand, aging can exacerbate sleep disorders with resultant changes in the biological and mental systems.

## Method

### Design and sample

This cross-sectional study was conducted on 302 eligible retired nurses in the north-east of Iran (North, Razavi, and South Khorasan provinces) between April and May 2018. Nurses with an associate or higher degree in nursing, and who had entered retirement after at least 20 years of work, were included. Those with a wrong phone number at the university retirement centre, or those being unable to answer questions by phone, were excluded from the study. The proportional quota sampling was performed on retired nurses. Each university (Mashhad, Sabzevar, Neyshabur, Torbat-e Jam, Torbat-e Heydarieh, Gonabad, Birjand, Bojnurd, and Shirvan) was considered a class in the sampling; and with respect to the nurses' share of each university from the total number, the desired number of them were randomly selected from each university.

### Measures

The data were collected using both a demographic data form and the Persian Version of the Pittsburgh Sleep Quality Index (PSQI) through phone calls. The Persian Version of PSQI is deemed a valid and reliable scale to evaluate sleep quality among Iranian people (Mezerji et al. 2017). The Persian Version of PSQI consists of seven components and 19 individual items. Each component is rated between 0 and 3, and a total sleep quality score is calculated by adding the seven component scores, providing a total score range from 0 to 21, with a lower score indicating better sleep quality (Mezerji et al. 2017).

### Sample Size

According to the estimated prevalence of sleep disorder of 80% among elderly people (Tel 2013), and the precision of 5% and confidence level of 95%, the sample size was estimated to be 256 individuals, using the following equation: (However, in our study 302 participants were recruited.)

$$n = \frac{\left(z_1 - \frac{a}{2}\right)^2 p(1 - p)}{d^2}$$

### **Analytic Strategy**

Continuous and categorical data were expressed as mean ( $\pm$ standard deviation, SD) or median (Q1–Q3) and frequency (per cent). Normality was assessed using the Kolmogorov-Smirnov test. Model building was conducted in accordance with the stepwise backward approach using a 10% change in estimate (CIE) algorithm for confounding adjustment. Multiple regression modelling was performed, using all candidate parameters with a  $P < 0.2$  in the univariate analysis. The results were expressed as mean differences in sleep quality, with 95% confidence intervals. All the analyses were performed using STATA (version 12, Stata Corp, College Station, Texas, USA). Statistical tests were two-tailed and the significance level was set at  $P < 0.05$ .

### **Ethical Consideration**

This study was approved by the regional ethics committee of Sabzevar University of Medical Sciences, with the code number IR.MEDSAB.REC.1396.83. Oral consent was obtained from the nurses who were willing to participate in the study. No names and personal identification were used in the questionnaire.

### **Results**

The mean (SD) age of participants was  $56.6 \pm 4.6$ , and 66.9% were women. All the demographic data are presented in table 1.

Table 1. Baseline characteristic of participants		
Parameters		Mean $\pm$ SD, N (%)
Age, years		56.5 $\pm$ 4.6
History of management activity, years		13.2 $\pm$ 10.2
Work experience, years		28.6 $\pm$ 2.6
Work experience after retirement, years		1.9 $\pm$ 3.3
Clinical work experience, years		15.3 $\pm$ 10.0
Sex, female		202 (66.8)
Marital status	Single	19 (6.2)
	Married	267 (88.4)
	Divorced	6 (1.9)
	Widow	10 (3.3)
Educational status	Associate degree	15 (4.9)
	Bachelor's degree	253 (83.7)
	Master's degree and above	34 (11.2)
Post-retirement employment status	Unemployed	215 (71.1)
	Employed	87 (28.8)
Shift work during the employment	Morning shift	118 (39.0)
	Afternoon shift	11 (3.6)
	Morning and afternoon shifts	19 (6.2)
	Evening shift	53 (17.5)
	Rotational shift	101 (33.4)

As shown in table 2, the mean total score of sleep quality among retired nurses in the north-east of Iran was  $8.5 \pm 4.4$ . The mean score of subjective sleep quality was  $1.2 \pm 0.6$ ; sleep latency was  $1.5 \pm 1.1$ ; sleep duration was  $2.2 \pm 0.9$  ( $6.3 \pm 1.4$  hours); habitual sleep efficiency was  $0.8 \pm 1.1$ ; sleep disturbances was  $1.4 \pm 0.6$ ; use of sleep medications was  $0.5 \pm 1.1$ ; and the daytime dysfunction was  $0.6 \pm 0.06$ .

<b>Table 2. The scores of sleep quality dimensions for retired nurses</b>					
<b>Dimensions of sleep quality</b>	<b>Mean ±SD</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
Subjective sleep quality (C1)	1.2 ±0.6	Very good N (%)	Relatively good N (%)	Relatively bad N (%)	Very bad N (%)
		28 (9.2)	192 (63.5)	65 (21.5)	17 (5.6)
Sleep latency (C2)	1.5 ±1.1	Never N (%)	Once a week N (%)	Twice a week N (%)	Three times a week or more N (%)
		74 (24.5)	78 (25.8)	69 (22.8)	81 (26.8)
Sleep duration (C3)	2.2 ±0.9 (6.3 ±1.4 Hours)	More than 7 hours N (%)	From 6 to 7 hours N (%)	From 5 to 6 hours N (%)	Less than 5 hours N (%)
		62 (20.5)	85 (28.1)	83 (27.4)	72 (23.8)
Habitual sleep efficiency (C4)	0.8 ±1.1	Sleep efficiency of more than 85% N (%)	Sleep efficiency from 84% to 75% N (%)	Sleep efficiency from 74% to 65% N (%)	Sleep efficiency of less than 65% N (%)
		2 (0.6)	8 (2.6)	6 (1.9)	268 (94.7)
Sleep disturbances (C5)	1.4 ±0.6	Never N (%)	Once a week N (%)	Twice a week N (%)	Three times a week or more N (%)
		13 (4.3)	150 (49.6)	123 (40.7)	16 (5.3)
Use of sleep medication (C6)	0.5 ±1.1	Never N (%)	Once a week N (%)	Twice a week N (%)	Three times a week or more N (%)
		236 (78.1)	15 (4.9)	3 (0.9)	48 (15.8)
Daytime dysfunction (C7)	0.6 ±0.06	Never N (%)	Once a week N (%)	Twice a week N (%)	Three times a week or more N (%)
		203 (67.2)	45 (14.9)	13 (4.3)	41 (13.5)
Total PSQI score *	8.5 ±4.4	Non-poor sleepers % (95% CI)		Poor sleepers % (95% CI)	
		17.2 (13.3, 21.9)		82.7 (87.0, 86.6)	

\*PSQI scores range 0–21, with a lower score indicating better sleep quality.

The median (Q1–Q3) sleep quality score was greater among females and those with post-retirement employment, as compared to males and without post-retirement employment. The median sleep quality scores based on socio-demographic variables among retired nurses are summarised in table 3.

<b>Table 3. The median of sleep quality scores according to socio-demographic parameters among retired nurses</b>		
<b>Parameters</b>		<b>Sleep quality score Median (Q<sub>1</sub>–Q<sub>3</sub>)</b>
Sex	Female	8 (5–12)
	Male	7 (5–9)
Post-retirement employment status	Employed	8 (5–12)
	Unemployed	7 (5–9)
Education status	Associate degree	9 (6–11)
	Bachelor's degree	8 (5–12)
	Master's degree and above	6.5 (4–8)
Comorbidity	No comorbidity	6 (4–8)
	Musculoskeletal diseases	10 (7–12)
	Cardiovascular diseases	8 (5–12.5)
	Other diseases	7 (6–9)
	Combination <sup>a</sup>	10 (7–15)
Shift work	Morning	7 (5–10)
	Afternoon	10 (4–13)
	Morning and afternoon	8 (4–10)
	The evening	8 (6–13)
	Rotational	7 (6–12)
Sector name	SCU <sup>b</sup>	8 (5–13)
	General ward	7.5 (5–12)
	College	7 (5–11)
Marital status	Single	8 (6–13)
	Married	7 (5–11)
	Divorced and widowed	10.5 (6.5–15.5)
Organisational position	Nurse	8 (5–13)
	Head nurse	8 (5–12)
	Supervisor	7 (5–10)
	Nursing Management	7 (5–9)
	Office work	7 (6–10)

a: More than one chronic disease

b: Special care unit

According to table 4, based on multiple linear regression analysis, by increasing a year in age and work experience after retirement, the mean total score of sleep quality was increased by 0.14 ( $r^2$ : 0.26; 95%CI: 0.02, 0.25;  $P = 0.014$ ) and 0.17 ( $r^2$ : 0.26; 95%CI: 0.32, 0.02;  $P = 0.025$ ) respectively; and also the mean score of sleep quality among those with a history of management was decreased by 0.06 ( $r^2$ : 0.26; 95%CI: -0.11, -0.01;  $P = 0.008$ ). Males had significantly better overall sleep quality as compared to females ( $r^2$ : 0.26; mean: -1.6; 95%CI: -2.70, -0.66;  $P = 0.001$ ). Participants with evening and rotational shifts had significantly lower sleep quality as compared to those working the morning shift ( $P = 0.027$  and  $0.035$  in turn). Subjects suffering from musculoskeletal diseases, cardiovascular diseases, and a combination thereof, had substantially poorer sleep quality as compared to those with no comorbidity ( $P = 0.014, 0.007$ , and  $<0.001$ ).

<b>Table 4. The association between sleep quality scores and their correlates among the subjects</b>				
<b>Multiple regression analysis</b>				
<b>Variable (reference)</b>	<b>Sub Groups</b>	<b>Model <sup>a</sup></b>		
		<b>Sleep quality</b>		
		<b>Mean (95%CI)</b>	<b>P-value</b>	<b>R 2</b>
Age, years		0.14 (0.02, 0.25)	0.014	0.26
History of management activity, years		-0.06 (-0.11, -0.01)	0.008	
Work experience after retirement, years		0.17 (0.32, 0.02)	0.025	
Gender (Female)	Male	-1.6 (-2.70, -0.66)	0.001	
Shift work during the employment (Morning shift)	Afternoon shift	0.73 (-1.78, 3.24)	0.568	
	Morning and afternoon shifts	0.93 (-1.01, 2.88)	0.347	
	Evening shift	1.58 (0.18, 2.99)	0.027	
	Rotational shift	1.26 (0.09, 2.43)	0.035	
Comorbidity (No)	Musculoskeletal diseases	2.43 (0.49, 4.37)	0.014	
	Cardiovascular diseases	2.10 (0.57, 3.63)	0.007	
	Other diseases	0.89 (-2.12, 3.92)	0.558	
	Combination <sup>b</sup>	3.84 (2.81, 4.87)	<0.001	

a: Multiple linear regression

b: More than one chronic disease

## Discussion

This study was aimed at evaluating sleep quality scores and their correlates among retired nurse. The findings of this study revealed that 82.7% of retired nurses in the north-east of Iran have poor sleep quality. This value is similar to the prevalence of poor sleep quality and sleep disorders (84.5%) among Iranian employed nurses (Asadzandi et al. 2014; Aziz Zadeh Forouzi et al. 2014). Being away from stressful working



conditions and shifts has not been able to improve sleep quality among retired nurses. Thus, sleep disorders are probably the long-term side effects of nursing careers that remain unchanged in retirement. Other studies have shown that military retirees (Xiaohua et al. 2012) and teachers have better sleep quality than nurses (Musa et al. 2018). This difference may derive from the occupational nature of nursing, including stressful workplaces and shift working (Beebe et al. 2017).

The sleep duration of 23.8% of participants in this study was less than five hours per day. Other studies conducted on employed nurses were not consistent with the results of the present study; and 4 to 11% of participants in these studies reported a sleep duration of less than five hours (Beebe et al. 2017; Gómez-García et al. 2016). It appears that the difference in results is due to the different age of participants. The mean ages in the Gómez-García et al. (2016) and Beebe et al. (2017) studies were 41.1 and 38.8 years respectively; because sleep latency increases by aging (Miner and Kryger 2017).

The results of multiple regression analysis revealed that males and young nurses have better overall sleep quality as compared to females and older nurses. In this regard, other studies have shown a statistically significant negative correlation between age and sleep quality; namely that sleep quality diminished at an older age (Cui et al. 2017; Ghalichi et al. 2013).

Female nurses in the study conducted by Zhang et al. (2016) and female participants in the Middelkoop et al. (1996) study had lower sleep quality than male nurses. In general, female nurses had poor overall health and more sleep problems, as compared to the male nurses (Admi et al. 2008). As women age, events such as menopause, obstructive sleep apnoea, and women's differing responses to therapy appear to contribute to lower sleep quality (Krishnan and Collop 2006).

Subjects who had had evening and rotational shifts during their work life, had a significantly lower sleep quality in retirement, as compared to those working the morning shift. In Monk et al. (2013) shift workers who had gone into retirement had a poorer sleep quality than retired day workers. A study conducted by Ohida et al. (2001) showed that there is also a significant association between young female nurses who work the night shift, to induce sleep and daytime sleepiness. Shift work tends to cause disruption of the circadian rhythm, which in turn reduces sleep quality (Shao et al. 2010).

The findings of the present study indicated that subjects suffering from musculoskeletal diseases, cardiovascular diseases, and a combination, have substantially poorer sleep quality as compared to those with no comorbidity. The results of Shao et al.'s (2010) study are consistent with the present study. Malakouti et al. (2009) indicate that there is a statistically significant association between chronic diseases and sleep quality, and Lallukka et al. (2011) also indicates that there is a statistically significant association between sleep disorders and musculoskeletal disorders. Pain associated with

musculoskeletal disorders, shortness of breath associated with cardiovascular disease, as well as the side effects of medications used for these diseases, may be the reasons for reduced quality of sleep in retired nurses.

### Limitations and Strengths

The main limitations of this study were as follows. First, the cross-sectional nature of this study prevents making any causal relationships. Second, regarding self-reported survey data, there is a probability of social desirability bias; some individuals may have over- or under-reported their sleep. Finally, there was a lack of access to retired nurses in private sectors. Conversely, this is the first study that has assessed sleep quality scores among retired nurses, and it yielded valuable information, especially considering its sample size.

### Implications for public health nursing

Sleep is an essential human need that is closely connected to physical and mental health. The findings of this study showed poor sleep quality among the majority of retired nurses, which may suggest a higher risk of mental health issues among the mentioned group. Healthcare leaders can play an important role in preparing nurses for retirement by increasing the number of nursing staff in order to reduce compulsory overtime and workload. Recognition, counselling, and therapeutic strategies can lead to increased sleep quantity, improved sleep quality, and hygiene. Paying more attention to the nurses' quality of working life and its affecting factors, such as the adjustment of shift work programmes, will not only enhance their productivity and nursing care, but should also reduce the negative consequences experienced during the retirement age.

### Conclusions

Findings suggest that the majority of retired nurses have no good sleep quality and have major difficulty in sleep latency and sleep duration. The study findings can be considered by policymakers to improve the health status of nurses. They could consider special facilities for nurses, for instance, increasing the number of nursing staff in order to reduce compulsory overtime and workload; teaching the diagnosis and improvement of sleep quality and sleep hygiene during the student course and nursing; and modifying lifestyles and patterns that can be effective steps in the resolution of this disorder, thereby promoting health, quality of life and sleep quality for these people. Sleep disorders can be reduced by teaching sleep hygiene and emphasising preventive measures. Paying more attention to nurses, solving their problems and improving their quality of working life can reduce adverse consequences during the retirement period.

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