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Original Article

Sleep Quality and its Main Determinants Among Staff in a Persian Private Hospital

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Abstract

Background: Having good quality of sleep is essential to good health. Sleep disorders could incur intangible expenses. The aim of this cross-sectional study was to evaluate the Persian version of the Pittsburgh Sleep Quality Index (PSQI-P) questionnaire administered to 3 categories of workers (clinical personnel, clerical staff, and logistics workers) in a private hospital located in Tehran, Iran.

Methods: In 2017, all Pars hospital personnel were invited to participate in the study. The PSQI-P questionnaire was distributed among Pars hospital staff, who consented to take part in the study.

Results: The total personnel in this private hospital was 1151 and 552 of them submitted their answers. According to the statistical analysis performed using SPSS version 19, there was no correlation between sleep quality and gender, marital status, age, job, shift work, or university degree (*P* value: 0.94, 0.42, 0.59, 0.67, 0.12, 0.23, respectively). However, participants with a lower body mass index (BMI) experienced better overnight sleep quality than overweight and obese participants (*P* value: 0.025 and 0.032, respectively). In addition, the prevalence of poor sleep quality was higher in those living in the suburbs compared to urban residents (*P* value: 0.02).

Conclusion: The study obtained a significant difference in sleep quality based on the participants' BMI and place of residence. Despite the fact that the *P* value of the job was not significant, it appeared that sleep disorders are common among clinical personnel. Quality of life may be improved by modification of the factors responsible for poor sleep quality.

Keywords: Healthcare worker, Iran, Pittsburgh Sleep Quality Index (PSQI), Sleep disorders, Staff

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Introduction

According to the National Sleep Foundation (NSF, USA), in young adults (18–25 years) and adults (26–64 years), the daily sleep requirement is between 7 to 9 hours, but for older adults (65 years and older) it decreases to 7 to 8 hours. Having sufficient sleep is important for human health. The National Blood, Lung, and Heart Institutes have stated that people who have insufficient sleep are at greater risk of developing heart and kidney diseases, high blood pressure, stroke, diabetes, and obesity. Enormous evidence show that sleep complaints and poor sleep quality are significant public health issues with high prevalence around the world.[1,2]

Patients with physical disorders, psychiatric depression, anxiety and stress, insomnia, schizophrenia, or side effects of medications, and those who consume psychoactive substances may present with poor sleep quality.[2–6] Sleep disorders result in a less pleasurable experience of social activities and reduce efficiency at the workplace; thus, it can have a negative effect on life.[2,3] Sleep duration, as one of the components of sleep quality, can even be directly related to mortality.[2,3,7] Therefore, the evaluation of sleep quality is considered noteworthy among a wide range of clinical practitioners, especially psychologists.[2]

The Pittsburgh Sleep Quality Index (PSQI), as a standardized self-administered questionnaire, was developed by Dr. Daniel J. Buysse in 1989. PSQI was expanded for various purposes: to present a standardized and credible scale of sleep quality; to differentiate between "good" and "poor" sleepers; to create a simple index for researchers and clinicians to use; and to provide a useful operational instrument for evaluation of sleep quality. The PSQI determines sleep quality over the past month. The items focus on the patients' experience and evidence of sleep problems.[7] Subjective sleep quality can be a significant clinical scale in patients with psychiatric problems.[8]

Moghaddam et al evaluated sleep quality in 125 psychiatric patients who were diagnosed to have primary insomnia, major depression, schizophrenia, and generalized anxiety disorder in conjunction with 133 controls with the help of the PSQI-P. The results of this study showed Cronbach's alpha coefficients of 0.77, 0.52, and 0.78 for all subjects, patient groups, and the control group, respectively.[2] Multiple

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research studies have been performed on sleep states in individuals with different diseases.[9–14] A few studies also focused on the relationship of sleep quality with type of job.[15,16]

Besides, in 2013, Ju et al studied 145 participants who were 45 years and older to detect the correlation between sleep quality and the main effective molecule of Alzheimer's disease (B-amyloid). The results showed amyloid deposition, as evaluated by AB42 levels, was noted in 22.5% of the volunteers. The interesting part is that this group suffered worse sleep quality. As amyloid deposition emerges in the preclinical stage of Alzheimer's disease, it can be connected with worse sleep quality.[17] Moreover, a large research study published in 2015, which focused on adult men and women, demonstrated that the duration and quality of sleep in healthy persons can influence cardiovascular health, as well as link to the prevalent enhancement of coronary artery calcification (CAC) and to brachial–ankle pulse wave velocity (PWV).[18] Likewise, Spiegel et al reviewed the relationship of sleep and glucose metabolism, as well. This review was based on laboratory and epidemiologic documents. It showed how poor sleep quality could increase diabetes mellitus and obesity.[19]

According to the International Classification of Sleep Disorders, effective treatment is available for more than 80 different sleep disorders. Notable causes of morbidity and mortality include difficulty in falling asleep and daytime sleepiness. Unfortunately, individuals and the society in general, overlook or ignore the prevalence, burden and management of sleep disorders. Hence, sleep disorders are not properly treated, making this group of disorders a serious health concern. In untreated cases, the financial implications of sleep disorders are enormous as a result of the high prevalence, severe complications and illnesses. The costs can be direct, indirect, related and intangible.[20] To enjoy good health, it is necessary to have adequate sleep. Positive features such as wellness, performance and adaptation are used to define the health of populations and not merely by the absence of disease. Several dimensions of sleep that are related to health outcomes have been revealed by empirical data and are measurable through the use of self-report and objective methods. Health care agendas such as empowering individuals and communities, improving population health and reducing health care costs reinforce sleep health.[21]

It has been revealed through studies that sleep may have a somewhat regulatory effect on health, mediated via the immune system, autonomic nervous system and endocrine function.[22–27] Sleep disorders reduce workers' efficiency and ability to concentrate, thereby increasing work accidents,[28–30] as indicated by increase in such accidents in Iran.[15,31] The present cross-sectional study was proposed to assess sleep quality among the staff of Pars hospital by using the Persian version of the PSQI-P, and assess its correlation with gender, age, marital status, job, shift work, education, residence, and body mass index (BMI).

Materials and Methods

The PSQI is a clinical instrument that is applied to evaluate the quantitative aspects of sleep through 19 self-related questions incorporating the 7 issues of sleep quality, habitual sleep efficiency, sleep duration, sleep latency, sleep disturbance, daytime dysfunction, and sleep medication.[2,7,15]

The study was conducted among all personnel of Pars hospital using a convenient sampling method. PSQI-P was distributed among the staff of the hospital. Pars hospital is a private hospital located in Tehran, Iran. It employs 1,151 personnel across 3 categories: clerical staff (office workers, secretaries), clinical personnel (nurses, paramedics, midwifes, operating room staff), and logistics workers (servers, kitchen personnel, orderly and protection workers). Filling the questionnaires was optional for all the staff, while the questionnaires were created without any name entries. A total of 552 questionnaires were returned and included in the study.

The personal information of the participants required for this study consisted of the following: gender (male or female); marital status (single, married, divorced, or widowed); job (clinical personnel, clerical and logistics workers); shift work (day shift, night shift, or rotation), education (primary, guidance or secondary education, diploma, technician and bachelor, master, or doctorate and higher degree); residence (urban, suburb, or village); age; and weight and height.

The weight (kg) and height (m) of the staff was used to calculate their BMI (kg/m^2). The computed BMI was considered as underweight (less than 18.5), healthy weight (between 18.5 and 24.9), overweight (between 25 and 29.9), and obese (more than 30.0).[32]

According to the PSQI scoring system, scores >5 and ≤5 are indicative of "poor" and "good" sleep quality, respectively.[7]

Statistical Analysis

Statistical analysis was performed using SPSS software, version 19. Normality was evaluated by the Shapiro–Wilk's test. Descriptive statistical methods were administered. A chi-square test and a *t*-test were applied to compare categorical and continuous variables between subgroups. *P* values less than 0.05 were considered significant.

Results

Out of the 1,151 people who worked in this private hospital in Tehran, 552 agreed to participate in the study. Fifty-eight percent of the participants were female and the mean age was 35.5 (±8.79) years. The mean weight and the BMI of the participants were 72.6 (±13.81) kg and 25.29 (±4.025) kg/m^2, respectively. The characteristics of the participants are demonstrated in Table 1.

Here, 50% of the respondents worked in the clinical section, 31% in logistics, and 19% in the clerical section. Of the 200 participants who mentioned their shift work status, 28% had some kind of a shift work schedule. Education was declared by 42% of the respondents, of whom 8% had a master or doctorate degree, 37% had some university education, and 56% did not have any university education. Only 29% declared their marital status; of which 72% were married and 28% were single. Only 13% lived in a suburban or rural area. Of the 399 patients with a complete PSQI

Table 1. The Comparison of Sleep Quality Based on Participants' Age, Weight, and BMI

		Good Sleeper	Poor Sleeper	CI Lower	CI Upper	*P* Value
Age	N	182	208			
	Mean	35.4	34.9	-1.26	2.21	0.59
	Standard Deviation	8.15	9.16			
Weight (kg)	N	186	208			
	Mean	70.8	74.0	-6.03	-0.39	0.025
	Standard Deviation	12.75	15.39			
BMI (kg/m^2)	N	183	207			
	Mean	24.65	25.545	-1.70	-0.07	0.032
	Standard Deviation	3.492	4.562			

score, 187 (47%) were good sleepers. People with a lower weight and a lower BMI had better sleep quality (Table 1).

There was no significant difference in sleep quality based on gender (*P* value: 0.94), shift work (*P* value: 0.12), education (*P* value: 0.23), being married (*P* value: 0.42), and job (*P* value: 0.67). The details of the analysis were displayed in Table 2.

Table 3 presents the scores of contributors for the seven scales of the PSQI, based on job.

Discussion

The effect of sleep quality and the quality of life of healthy individuals and patients have been investigated in numerous studies. However, as a consequence of scarce research conducted on workers and jobholders in this field, effect of sleep quality on occupational health is still highly debated among similar health experts.[33,34] Rose Babu et al investigated the relationship between sleep quality, anthropometric parameters, and body fat content in 100 adolescent students (67% females and 33% males). Their findings showed 45% of the participants experienced poor sleep; however, no significant difference was observed between good and poor sleepers.[35] In a large sample size study on American adults, Blumfield et al investigated the effects of eating behaviors including dietary restraint, disinhibition, and hunger as mediators in the relationships between sleep quality and BMI. Their findings showed negative relationship between sleep quality and both hunger and disinhibited eating behaviors so that people with poorer sleep quality also showed greater hunger and higher disinhibited eating behaviors. Similarly, people with higher BMI showed higher disinhibited eating behavior. These findings indicated a significant indirect relationship between sleep quality and BMI mediated by disinhibition. When they replaced total time in bed or sleep time as predictors in the mediation model, they observed no significant effects. The mediator role of the disinhibited eating behavior in the sleep quality- weight status relationship was observed in both males and females. They concluded that sleep duration does not contribute to the observed mediation but the other aspects of sleep quality do contribute. Their findings demonstrated that sleep quality improvement can lead to weight loss enhancement through reducing the overeating behaviors of the individuals.[36] On the other hand, Rahe et al examined the association of poor sleep quality with obesity in the Germanic population (35–65 years). Their findings indicated that poor sleep quality can forecast obesity and high body fat mass among adults.[37] Likewise, according to our results, a significant correlation was confirmed between poor sleep quality and being overweight. Also, it was found that individuals with higher BMI had worse sleep quality.

Shao et al studied factors affecting sleep and quality of life of 435 female shift work nurses from five regional hospitals in Taiwan. According to the results, 57% of female shift workers experienced poor sleep due to professional damage, premenstrual dysphoria, illness, and medication consumption.[38] Martino et al examined the correlation of nurses' sleep patterns with shift work. The study was conducted on 60 nurses with a mean age of 31.76 years. It showed a statistically significant difference between

Table 2. The Comparison of Sleep Quality Based on Gender, Shift Work, University Degree, Being Married, Suburban Residence, and Job

		Good Sleeper		Poor Sleeper		OR	95 CI Lower	95 CI Upper	*P* Value
		Total	No. (%)	Total	No. (%)				
Gender (female/male)		184	104 (56)	211	120 (56)	0.986	0.662	1.469	0.94
Shift work		73	18 (25)	80	29 (36)	1.737	0.862	3.501	0.12
University degree		73	55 (75)	80	51 (64)	1.447	0.79	2.652	0.23
Being married		57	42 (74)	73	49 (67)	1.371	0.638	2.949	0.42
Suburban residence		79	6 (8)	91	18 (20)	3.00	1.127	7.987	0.02
Job	Clinical*	171	88 (51)	203	103 (51)	-	-	-	0.67
	Clerical**		36 (21)		37 (18)	0.878	0.512	1.507	
	Logistics***		47 (28)		63 (31)	1.145	0.714	1.838	

* Clinical personnel included nurses, paramedics, midwives, and operating room staff.
** Clerical staff included office workers and secretaries.
*** Logistics workers included servers, kitchen personnel, and orderly and protection workers.

Table 3. Contributors' Scores for the 7 Scales of the Pittsburgh Sleep Quality Index (PSQI) Based on Job

The Scales of the PSQI	Number of Contributors (Job)	Number (%)			
		0	1	2	3
Sleep duration	Clinical Personnel: 232	92 (39.7)	73 (31.5)	30 (12.9)	37 (15.9)
	Clerical Staff: 95	33 (34.7)	30 (31.7)	27 (28.4)	5 (5.2)
	Logistics Workers: 140	34 (24.3)	43 (30.7)	40 (28.6)	23 (16.4)
Sleep disturbance	Clinical Personnel: 251	20 (8)	113 (45)	112 (44.6)	6 (2.4)
	Clerical Staff: 96	6 (6.3)	45 (46.9)	40 (41.6)	5 (5.2)
	Logistics Workers: 157	12 (7.7)	74 (47.1)	52 (33.1)	19 (12.1)
Sleep latency	Clinical Personnel: 239	119 (49.8)	78 (32.6)	31 (13)	11 (4.6)
	Clerical Staff: 92	56 (60.9)	25 (27.2)	6 (6.5)	5 (5.4)
	Logistics Workers: 143	80 (55.9)	43 (30.1)	18 (12.6)	2 (1.4)
Daytime dysfunction	Clinical Personnel: 240	117 (48.7)	53 (22.1)	42 (17.5)	28 (11.7)
	Clerical Staff: 92	45 (48.9)	26 (28.3)	11 (11.9)	10 (10.9)
	Logistics Workers: 145	71 (49)	40 (27.6)	21 (14.5)	13 (8.9)
Habitual sleep efficiency	Clinical Personnel: 201	132 (65.7)	32 (15.9)	19 (9.4)	18 (9)
	Clerical Staff: 77	57 (74)	8 (10.4)	5 (6.5)	7 (9.1)
	Logistics Workers: 124	97 (78.2)	13 (10.6)	7 (5.6)	7 (5.6)
Subjective sleep quality	Clinical Personnel: 238	37 (15.6)	140 (58.8)	45 (18.9)	16 (6.7)
	Clerical Staff: 94	13 (13.8)	53 (56.4)	19 (20.2)	9 (9.6)
	Logistics Workers: 146	22 (15.1)	74 (50.7)	27 (18.5)	23 (15.7)
Sleep medication	Clinical Personnel: 238	182 (76.5)	34 (14.3)	11 (4.6)	11 (4.6)
	Clerical Staff: 93	78 (83.8)	6 (6.5)	3 (3.2)	6 (6.5)
	Logistics Workers: 145	107 (73.8)	19 (13.1)	10 (6.9)	9 (6.2)

* Zero and 3 indicate the best and worst status, respectively.

night-time sleep and day-time sleep. In addition, the findings indicated that nurses who work shifts have poor sleep quality because of shift work habits and absence of sports activities.[39] Surani et al assessed the relationship between inpatient nurses' sleep quality and lucubration based on differences in their work shift and unit setting in a hospital in the United States. The results of this research demonstrated that the nurses (especially night-shift workers) lack desirable sleep quality; they feel extreme sleepiness and unusual exhaustion, which can put them at greater risk of making medical mistakes and hurting patients.[40] Zhang et al studied the factors which influence sleep quality among 513 shift work nurses in a hospital in China. Specifically, they evaluated sleep efficacy, sleep quality, and daily dysfunction. The findings showed that doing shift work remarkably led to poor sleep quality.[41] Fido and Ghali identified the side effects of 8-hour uncertain work shifts on sleep quality, work performance, and general health at the Kuwait Oil Company. These researchers showed that the majority of workers on an uncertain shift schedule encountered different health difficulties and poor sleep quality and were at an enhanced risk for making mistakes at work, as compared with those on a direct daytime shift.[16] Nakashima et al studied white-collar workers engaged in long working hours and sleep problems. Their research studied 1510 male white-collar full-time workers (18–59 years) in Japan. The conclusion of the study suggested that long work hours are linked to lower sleep quality in a dose-response manner.[42] Also, the shift work status of female hospital employees regarding poor sleep quality was shown by Lajoie et al[43] Meanwhile, no relationship was found between hospital staff's shift work and their sleep quality which is linked to small sample size and great diversity of jobs in our study.

Koopman et al reported that sleep problems in women with metastatic breast cancer are correlated with lower education level.[44] In contrast, our findings showed no correlation between sleep quality and education level which support the findings of the Ghalichi et al conducted on the health care workers.[15] Also, Davari-Tanha et al studied women with endometriosis who reported that there was also no remarkable difference between education level and sleep quality.[45]

The literature has no report about residence location and sleep quality while our study revealed a significant relationship in this regard and it seems that sleep quality in urban residents is better in contrast to suburban residents.

Previous cross-sectional studies have shown that reduced sleep duration resulted in gradual accumulation of fatigue.[22,46] The importance of fatigue in quality of life and health should not be underestimated. For example, Karoshi (sudden work death) has been linked to long term accumulated fatigue.[22,47] Itani et al studied the possible association between industrial accidents and sleep-related parameters among factory workers (n = 714) and reported that sleep education effectively improved sleep status. They assessed the effects of sleep education intervention which consisted of attending at a lecture and reading a leaflet with instructions on improvement of sleep habits. They conducted a follow-up assessment to study the effectiveness of the intervention The assessment showed that the sleep hygiene education program significantly increased the number of early risers among the participants less than 40 years of age. In addition, in participants aged 40 years or older, the intervention significantly increased the number of workers who did not drink an alcoholic beverage before sleeping.[48] However, there is a limitation in interpreting the

results of this study because of its cross-sectional design. This design could not show the temporality in the association of study variables and reverse causality may occur.

In conclusion, This is a cross-sectional study that shows the significant effects of sleep quality on daily activities. The most important finding of this study was the effect of BMI on sleep quality. This effect has been reported by some other research groups. It could be safe and easy to start weight loss programs for hospital staff. Among hospital personnel, it has been reported that sleep disturbances are common and a modification of the effective agents of poor sleep quality (such as diet and environmental conditions) and also targeted training may improve their life quality. About the location of residence, the authors believe that because of the small sample size of this study, no conclusion could be made and further studies with larger sample sizes should be conducted.

Authors' Contribution

BN designed the project. MA, BK, FS, and MS cooperated to data gathering. YA and MC analyzed the data. BM, MEH, and MB collaborated to prepare the primary draft. LG contributed to interpret the results. SC revised final version of the manuscript and supervised the research.

Conflict of Interest Disclosures

The authors have no conflicts of interest.

Ethical Statement

All staff were free for contribution in the study and filled the questionnaire with oral satisfaction.

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