

## Evaluating of Sleep Quality in Shift-Work Nurses; Iran

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Received date: Dec 01, 2015; Accepted date: Dec 28, 2015; Published date: Jan 06, 2016

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### Abstract

Sleep quality directly influences mental and physical acts of human. Shift workers, such as nurses are at extreme risk for poor sleep. In this article we have attempt to evaluate how the beliefs of nurses about their sleep quality were. The paper is a cross sectional study among 370 nurses and correlates to demographics. Totally 151 (41%) men and 219 (59%) women participated. All of them had nursing education degree and had work experience. We found the prevalence of sleep disturbances as high as 86% and total mean score of the Persian version of Pittsburg's Sleep Questionnaire Index (PSQI-P) calculated  $7.13 \pm 2.5$  in the study. The most common complaint of shift-work nurses was delay in sleeping initiation. We did not find any significant relation between sleep disorders and gender, age, years of nursing and hospital department of service. Although, inadequate sleep quality is a worldwide problem, but the wide difference between subjective findings of nurses and those of the general population is very significant.

**Keywords:** Sleep quality; Shift-work nurses; PSQI-P

### Introduction

Sleep is the complex bio-physiologic circadian vital process which directly and indirectly relates to many daily physical and mental functions of human. The most known hormonal mechanism of sleeping is the melatonin effect, the substance periodically secretes by pineal gland in brain [1]. The pineal secretion affects also cardiovascular, reproductive and neuroendocrine systems [1].

It may be a clue that while this small gland becomes calcified, mentioned systems and also sleeping features will negatively affect synchronously. Because of that darkness stimulates the pineal body, there is a rhythmic secreting pattern during every 24-hour. Since the serum level of melatonin -sleep hormone- maximizes at night [1], makes the desire of getting asleep. As shift-work staffs including nurses have to be awaked weather partial or total of some of their nights, they face to challenge with the hormone effects and this eventually makes them more susceptible to expose to sleep disorders. As nurses' work quality directly affects patient health status, it is very important to have regular observation programs and if needed, solve their sleep problems.

Insomnia or disturbed sleep as one of the most common sleep disorders has a wide range of definition including difficulty in sleep initiation or maintenance, early morning awakening and non-restorative sleep which may discover firstly by fatigue, irritability, malaise and decreasing in memory or concentration [1]. For instance about 32-54% of night workers have symptoms of insomnia or daytime sleepiness compared with 18% of day workers who claim of above symptoms [2].

The importance of paying more attention to sleep problems will be more bright when reports tell that about 1.3 million patient injuries and over 100,000 deaths occur annually due to hospital related errors

or preventable adverse events [2,3]. These measures magnify as doubled when nurses worked over 12 consecutive hours [3]. In this study we have attempt to find the prevalence of shift-worked nurses' sleep problems and its possible relation to some other considered features.

### Method and Material

This cross-sectional study was done among nursing staff who worked in hospitals of a Persian city in autumn 2014, Iran. Totally 370 nurses including 151 (40.8%) males and 219 (59.2%) females were selected over an automatic randomized sampling method among who had -at least cumulatively 24 hours per week - night shift in last four weeks. We considered just awaked time in each night shift that each nurse subjectively estimated for him/herself. For instance it was possible that a nurse had had four night shifts in shift-plan and the other had two, but based on subjective estimation both had at least 24 hours or more of awaking time along with all night shifts per each week.

In other word, the study criterion for considering shift working was the hours each nurse was awake in the work setting during the nights and not only having night shifts whether being awaked or not. All participants were 21 to 47 years old, married and had nursing education degree. Health status of them was subjectively near normal and they were under no regular prescription for sleep related or any other chronic disease. They did not drink or smoke. Females were not pregnant while study performed. All had work experience in range of one to 25 years. In order to measure the sleep quality, we used the Persian version of Pittsburg's Sleep Questionnaire Index (PSQI-P).

The PSQI-P is consisted of eighteen questions in a self-rating Likert answering system. The reliability of the alpha coefficient of Cronbach for this questionnaire was reported 0.77 [4]. This tool is well potent to distinguish sleep disorders such as primary insomnia, major

depression and daytime over sleepiness from normal sleep [5,6]. The PSQI-P is constructed of seven parts based on international classification of sleep disorders to find sufferers in a period of last four weeks [5-7].

The parts are including of subjective sleep quality, sleep latency, sleep duration, sleep efficiency, and sleep disturbances, daytime dysfunction and hypnotic medications use. Each category scores from zero to 3. Thus a fully filled questionnaire has a score range of zero up to 21 [5,6]. There is also another classification for the PSQI-P, which breaks the contents into three bigger factors [6]. In both platforms, everybody scores  $\geq 5$  marked as a low sleep quality person and who makes the points  $< 5$  considered as a good sleeper without significant sleep disturbance [5].

Authors promised all participants to save their personal privacy and made oral satisfaction. We measured shift-work nurses' sleep quality and its probable relation to gender, age, level of education, place of work -servicing patients in internal, surgical, emergency and other hospital departments- and also years of work experience. We estimated statistic indexes including minimum, maximum, means and standard deviations by using the SPSS version 18.

To evaluate study hypothesis regarding that shift work nurses more suffer by sleep disturbances than general population, we applied the T-test and also used the Chi-square test in order to find any relation between study variables and the constant of sleep quality. We also used

the One-way ANOVA test to calculate the means of answers of each seven part and other details of the PSQI-P between groups of poor and good sleepers. We considered value of significant p as less than 0.05.

## Results

The observational study was performed by collecting 370 fully filled questionnaires of totally 151 (40.8%) males and 219 (59.2%) females as shift-work nurse. The mean age was  $30.8 \pm 5.3$  with minimum age of 21 and maximum of 47 years. Females were  $29.7 \pm 4.8$  and males were  $32.3 \pm 5.6$  years old ( $p=0.05$ ).

All respondents were in subjectively acceptable health status and did not use any prescribed medication or therapy for any health condition during last year of study performance.

They also did not drink or smoke regularly. All of them had nursing license degree (360 had license and 10 had higher degrees). Nurses were distributed in below hospital stations: internal medicine (102 persons, 27.6%), surgery (127, 34.3%), cardiac care unit (75, 20.3%) and other minor sections (66, 17.8%).

Based on study findings, there were 317 persons (85.7%) with sleep disturbances; it means they were bad sleepers and had PSQI-P score  $\geq 5$ , and only 53 nurses (14.3%) were good sleepers and had PSQI-P score  $< 5$ . Table 1 shows findings over the seven parts of the PSQI-P among nurses.

Symptom Severity					
Factor	Normal	Mild Dysfunction	Moderate Dysfunction	Severe Dysfunction	p
Subjective Sleep Quality	Very good	Fairly good	Fairly bad	Very bad	0.649
	41 (11%)	215 (58.1%)	86 (23.2%)	28 (7.5%)	
Sleep Latency	$\leq 15$ minutes	16-30 minutes	31-60 minutes	$> 60$ minutes	0.143
	49 (13.2%)	105 (28.3%)	108 (29.1%)	108 (29.1%)	
Sleep Duration	$> 7$ hours	6-7 hours	5-6 hours	$< 5$ hours	0.714
	233 (62.9%)	84 (22.7%)	35 (9.4%)	18 (4.8%)	
Sleep Efficiency*	$> 85\%$	75-84%	65-74%	$< 65\%$	0.383
	75 (20.2%)	148 (40%)	98 (26.4%)	49 (13.2%)	
Sleep Disturbances	Never	Once or twice	Once or twice each week	Three or more times each week	0.652
	3 (0.0%)	173 (46.7%)	181 (48.9%)	13 (3.5%)	
Daytime Dysfunction	0	1-2	3-4	5-6	0.114
	202 (54.5%)	93 (25.1%)	55 (14.8%)	20 (5.4%)	
Hypnotic Medication Use	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week	0.318
	279 (75.4%)	47 (12.7%)	29 (7.8%)	15 (4%)	

\*(Number of hours slept/Number of hours slept in bed) x 100

**Table 1:** Prevalence of the PSQI-P parts in shift-work nurses. N=370.

The total score of each questionnaire was measured. The mean and the standard deviation of all total scores calculated  $7.13 \pm 2.5$ . Table 2 shows the questionnaire findings in detail. Data showed that the most

common complaint among shift-work nurses was delay in sleeping initiation (29.2%) and duration of  $30 \pm 31$  minutes.

Snoring (3%) placed in the bottom of the list of nurse complaints. The results showed no significant relation between sleep disturbances and other considered study features.

Factor	Times of Experience				p
	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week	
Cannot go to sleep within 30 minutes	49 (13.2%)	105 (28.3%)	108 (29.1%)	108 (29.1%)	0.502
Wake up in the middle of the night or early morning	50 (13.5%)	131 (35.4%)	119 (32.1%)	70 (18.9%)	0.131
Have to get up to use the bathroom	209 (56.4%)	82 (22.1%)	66 (17.8%)	13 (3.5%)	0.102
Cough or snore loudly	242 (65.4%)	78 (21%)	39 (10.5%)	11 (2.9%)	0.086
Feel too cold	140 (37.8%)	108 (29.1%)	94 (25.4%)	28 (7.5%)	0.244
Feel too hot	111 (30%)	102 (27.5%)	108 (29.1%)	49 (13.2%)	0.502
Have bad dreams	172 (46.4%)	118 (31.8%)	52 (14%)	28 (7.5%)	0.173
Have pain	194 (52.4%)	107 (28.9%)	52 (14%)	17 (4.5%)	0.401
Concentration disturbances	75 (20.2%)	148 (40%)	98 (26.4%)	49 (13.2%)	0.077
Having problem to be awake while driving	202 (54.5%)	93 (25.1%)	55 (14.8%)	20 (5.4%)	0.387
Hypnotic medication use	279 (75.4%)	47 (12.7%)	29 (7.8%)	15 (4%)	0.056
Other problem	274 (74%)	27 (7.2%)	44 (11.8%)	25 (6.7%)	0.069

**Table 2:** Prevalence of detailed features of the PSQI-P contents. N=370.

Data showed that the mean years of nursing experience was  $8 \pm 5.3$  with range of at least one year up to maximum 25 years. Suffering from low sleep quality had no relation with gender ( $p=0.7$ ), as poor sleepers involved of 85.8% of men and 85.4% of women. There was same finding over the age ( $p=0.7$ ). Data showed that the means for age of good and poor sleepers were  $30.5 \pm 5.8$  and  $30.8 \pm 5.2$  respectively. The number of years of the nursing experience did not influenced sleep quality ( $p=0.6$ ), while the means for years of nursing experience were  $7.7 \pm 6.2$  and  $8 \pm 5.8$  among poor and good sleeper respectively. Contrary to expectations, working in different hospital sections also did not significantly affect the sleep quality ( $p=0.3$ ). Therefore, working in more intensive parts such as CCU or emergency department in comparison with the other non-intensive one had same results and made problems up to 88.3% and 84.6% among intensive and non-intensive unit nurses, respectively. We also did not find any significant relation between poor sleep quality and the level of education ( $p=0.1$ ). The prevalence of complaints among licensed and who had higher degrees was 86.1% and 70% respectively.

## Discussion

This study was performed among shift-work nurses in order to detect how their sleep quality levels were. To achieve this goal we used the PSQI-P as a well-known scientific subjective self-answering questionnaire. Of all 370 participants who had subjectively acceptable health status the mean of the PSQI-P score was  $7.13 \pm 2.5$  which was reported  $6.8 \pm 3.8$  in another study [8]. The prevalence of poor sleep

quality was as high as 86% in our study, while it was subjectively reported about 57-76% among nurses and 26-39% among general population by a Taiwanese study performed in 2013 [2]. The other authors described this prevalence as 73.3% [8], 71.4% [9] and 57% [10] in earlier studies. Our finding showed the highest percent of involvement and it also determined that sleep disturbances have increased specifically among nurses. The convergence of findings over the issue of inadequate sleep quality implies on a worldwide problem which may not greatly relate to divergence of ethical origins, cultures, climate of living region, economy and genetic differences among nations. We found no relation between degree of education and the level of sleep quality as found in another study [9]. Although, reports of other study showed nurses with high school or lower degree of education had much higher as doubled risk ratio to have sleep disorders compared with those with higher degrees [2]. This difference may due to sample characteristics or regional culture and national instructions to register graduated persons for work. We found delay in sleep initiation was the most common complaint among participants. This was different in other studies which reported decreased total sleep duration time [11], digestive disorders [12,13], mental or psychological problems [14], musculoskeletal complaints [15] and improper daily sleeping [16,17] as their most common symptom followed by low sleep quality. This may due to personal, professional, social, cultural and life style differences among respondents. Our findings were compatible with those studies evaluating probable relationship between sleep discomfort and age, gender, work experience, department of nursing and further marriage status or number of children that the latter was

not considered in ours [2,18-20]. We did not find any major correlation between above variables and sleep quality, as the other authors did [2,8-10,18-20]. This compatible findings and considering that sleep complaints have increased during last decade, implies on having wider look to find causes of sleep problems is necessary, especially among nurses whose work outcomes directly influence patient health and prognosis. As mentioned above, over 2 million patient injuries occur annually due to preventable hospitalization errors if nurses have more working hour load and not enough restoration time [3]. Some Japanese studies revealed a great correlation between nursing errors and shifting work (odds ratio=1.1) [21], because of daily sleepiness and sleep latency [22]. Also in one Iranian study brightly stated poor sleepers suffered chiefly by disturbed sleep latency and this event induced in 2.58 time more daily sleepiness [23]. Eventually, considering this study and others' findings seems paying more attention to the issue of sleep problems and following adverse effects is a serious need for both general population and who has risky profession.

### Limitation

Consideration of samples including shift-work staff without having synchronous data of non-shift work nurses - although it is almost always impossible to have statistically valuable samples of nurses whose shifts are only along with days - and general population prevented us to have wider comparison. Making objective examination of sleep will help to have more reliable results. Considering at least other demographic features for instance body mass index would help to estimate effects of fatness - known as a hormone related event - on the study objectives. However, we claim that there is a long list of variables exist that may affect sleep quality but have ignored since now.

### Conclusion

This study showed that shift-work nurses are highly suffered by poor sleep quality. Gender, age, years of work experience and department of nursing have no significant effect on this issue. It seems planning new studies with deeper and more pervasive look to find what makes this highly poor sleep quality among nursing staff is a great need.

### Acknowledgement

We kindly thank the department of psychology and nursing unit of University of Medical Sciences, Qom, Iran, observing the study steps by all.

### Conflict of Interests

The team of authors promised that they had not any conflict of interests for making this paper.

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