

Relationship between Sleep Quality and Job Stress in Health Care Staff

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ABSTRACT

Background: There are several factors involved in creating job stress. Shift work can be considered one of these factors which affect sleep quality among the staff. This study was conducted to investigate the effect of job stress on the sleep quality of the healthcare personnel. **Methods:** This was a descriptive-analytical study conducted in 2011-2012. Data collection tools consisted of demographic information; HSE job stress questionnaires and Pittsburgh sleep Quality Index (PSQI). Descriptive statistics, Chi-square and Anova tests, Spearman correlation, and SPSS software version 26 were used for data analysis. The significance level of the test was 5%. **Results:** The mean score of sleep quality was 7.18 ± 3.5 and work stress was 98.7 ± 12.14 . 61.8% of nurses did not have good sleep quality. The results of a one-way analysis of variance showed that there was a significant difference between the mean scores of work stress in work shifts ($P = 0.019$). The results of the Spearman correlation test showed a significant and inverse correlation between work stress and sleep quality ($r = -0.17$ $p = 0.001$). **Conclusion:** The results of this study showed that the employees' sleep quality affects their job stress, reduces their productivity and causes some problems for them; therefore, managers must heed the results of this research and schedule the shifts in such a way as to reduce job stress. They can also hold training sessions and workshops to regulate sleep patterns and manage stress in due course of time.

Keywords: Occupational stress; Health personnel; Sleep quality

Introduction

Sleep is an important physiological process which has profound effects on a person's mental and physical health. ^{1,2} The sleep-wake cycle is one of the biological cycles which are affected by the physiological functions during day and night, work schedules, healthcare and other activities. Indeed, the biological clock of man plays an

important role in this cycle. ^{1,3} One of the factors affecting this cycle is irregular sleep patterns, and in other words, shift work. ^{4,5}

Many professions involve shift work, such as medical occupations (for example, physicians, nurses, and lifeguards), security guards and firefighters, industrial, telecommunication, transportation

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industry, and night service workers (e.g. restaurants, shopping malls, and leisure centers).⁶

In our country, 80% of healthcare workers are nurses, who generally work morning, evening and night shifts irregularly, and are exposed to stress more than other medical fields.⁷

The detrimental effects of shift work are largely chronic. These effects include disruption of physiological processes such as sleep-wake cycles; impaired physical and physiological health; stress; problems regarding consciousness, efficiency, safety, family and the social life of shift workers.^{8,9} Thus, sleep disorders are considered one of the most common health problems respecting shift work.¹⁰ Humans create a daily routine for themselves⁵(for example, they sleep at night and stay awake during the day). This daily cycle remains constant from day to day, so people are more aware and effective during the day. If this daily rhythm is disturbed, the body undergoes significant changes and sleeping becomes difficult¹¹. Those who have shift jobs are frequently forced to work for hours. They sleep during the day and are deprived of the sleep people usually enjoy during the night. This is partly due to the fact that during daytime sleep, the body warns them "now is the day." When a person spends most of his or her sleeping hours during the day, he or she wakes up more easily and more often, so that their sleep quality changes a lot.^{12,13} Sleep quality refers to depth of received sleep. Lesser quality of will increases a person's arousal. Regarding sleep, there are some things that are sometimes more important than the amount of sleep. Quality of sleep is more important than the quantity of sleep.^{13,14}

Having night shifts with irregular sleep patterns, sleep deprivation and fatigue can lead to health risks associated with job, which in turn can lead to reduced accuracy and poor professional performance.¹⁵ People working shifts are more likely to have traffic accidents than those working

in non-shift jobs. In addition, they are at a higher risk of injuries and accidents.¹⁶

Studies have shown that people who work shifts are exposed to a variety of health problems, such as poor sleep quality, digestive problems, emotional disorders, and an increased risk of cardiovascular disease.¹⁷ Nursing and other medical professions are among the occupations that, need to be on call round-the-clock, thus available, meaning that shift work is quite common for them.¹⁸ Medical professions strive to match the work shifts with their life plans. People doing these jobs suffer more from severe sleep disorders and increased risk of diseases such as cancer, cardiovascular and gastrointestinal diseases, and irregular menstrual cycles.¹⁹ These people have a lot of difficulties falling asleep and staying asleep, as a result, this group leaves their job at a higher rate. Currently, there is a lot of research on the impact of human resources and personal preferences on assigning shifts, while the concept of internal rhythms has received little attention.²⁰ Moreover, this group of employees, involved in the patient's care and treatment, is exposed to a variety of stresses such as occupational stress. Job stress is defined as the interaction between working conditions and personal characteristics in such a way that the demands of the work environment (and consequently the pressures associated with it) are too much to handle. This definition considers the context of a person's relationship with the environment and helps examine the characteristics of the employees, their working conditions, and their relationship in causing job stress.²¹ Stress and sleep can be described as two opposing parts, each of which affects the other differently. Stress leads to disruption of homeostasis, while sleep appears to be important in maintaining homeostasis. Therefore, sleep seems to be an important anti-stress treatment which counteracts the effects of stress on the individual.^{22,23} Furthermore, it is clear that stress

leads to sleep disorders and is considered the main cause of it. On the other hand, it seems that disorders in sleep are themselves stressors, and can lead to depression and distress.^{23, 24} Therefore, this study was conducted to investigate the relationship between the quality of sleep and occupational stress regarding the shift work of the staff in educational hospitals.

Method

This descriptive-analytical study was performed on 419 staff working shifts in hospitals affiliated with universities of medical sciences including Shahid Sadoughi, Shahid Rahnemoun, Afshar and Yazd Burn Injuries Hospital. Census method was used for sampling. Then, data collection tools, such as demographic information, Pittsburgh sleep quality measurement and job stress (HSE) questioners were used. The correlation coefficient between HSE and GHQ questionnaire (General Health Questionnaire) was $r=-0.48(P <0.000)$. Also, reliability was estimated to be %78 and %65 using the Cronbach's Alpha and split-half method.²⁵ The Pittsburgh Sleep Quality Questionnaire is an effective tool for measuring sleep quality and sleep patterns in adults. The psychometric properties of the Persian version of the PSQI were acceptable.²⁶ These tools can differentiate poor sleep quality from good sleep quality by specifying seven different areas of sleep quality, sleep delay, sleep duration, sleep habits efficiency, sleep disorders, medication used for sleepiness and daily dysfunction over the past month. The surveyed units measure each of these seven areas. The scoring of the answers was based on the scale from 0 to 3, with 3 indicating a high negative level on the likert scale.^{26, 27}

The HSE Job Stress Questionnaire was designed to measure work-related stress. This questionnaire included 35 phrases and 7 subscales: 1. demand 2. control 3. officials, 4. Colleagues's support 5. communication 6. role, and 7. changes. The

questionnaire was subscale as: never = 5, rarely = 4, sometimes = 3, often = 2, and always = 1 point, respectively, and the score of the demand subscale were reversed. The average score of each subscale indicated its measured value, which ranged from 1 to 5, in which 1 was desirable and 5 was stressful and undesirable.

The amount of skewness and elongation statistics of work stress scores (0.643, - 0.059) was in the range (2, -2); therefore, work stress scores have a normal distribution. Characteristics of participants were reported using descriptive statistics. The relationship between sleep quality and work shift pattern was investigated using Chi-square test. To compare the mean score of work stress between work shifts, one-way ANOVA test and Tukey post-test were used. Spearman correlation test was employed to examine the correlation between work stresses and sleep quality. The significance level of the test was considered to be 5%. Analysis was performed using SPSS software version 26.

Table 1. Basic characteristics of employees at the Beginning of the Study

Variable	mean±SD
Age(year)	32.54±7.26
Work Experience	9.62±9.53
Gender	frequency (percentage)
Male	70(16.8)
Female	347(83.2)
Married status	frequency (percentage)
Married	334(80.7)
Bachelor	76(18.4)
Divorced	2(0.5)
Widow	2(0.5)
Personal of Hospital work	frequency (percentage)
Shahid sadoghi Hospital	142(34)
Afshar Hospital	125(29.9)
Rahnemoun Hospital	122(29.2)
Accident and Burn Hospital	29(6.9)
Level of education	frequency (percentage)
Diploma	42(10.1)
Associate degree	48(11.6)
Bachelor's	320(76.4)
Master's	4(1)
Work shift type	frequency (percentage)
Rotating shift	331(80.5)
Fixed morning shift	52(12.7)
Fixed morning and evening shifts	20(4.9)
Fixed evening or night shift or Fixed evening and night shifts	8(1.9)

Table 2. The Relationship between Shift Work and Sleep Quality

shift work	Sleep quality TOTAL	Suitable (≤ 5) frequency (percentage)	Weak (> 5) frequency (percentage)	P-value
Rotating shift	331(80.5)	121(36.6)	210(63.4)	0.3
Fixed morning shift	52(12.7)	23(44.2)	29(55.8)	
Fixed morning and evening shifts	20(4.9)	12(60)	8(40)	
Fixed evening or night or fixed evening and night shifts	8(1.9)	5(62.5)	3(37.5)	
Total	411	157(38.2)	254(61.8)	

* Chi-Square test

Table 3. Comparison of the average work stress score between nurses' work shifts

Shift work	mean \pm SD	F	P-value
Rotating shift	98.00 \pm 12.09	3.376	*0.019
Fixed morning shift	95.18 \pm 12.79		
Fixed morning and evening shifts	106.05 \pm 11.18		
Fixed evening or night or fixed evening and night shifts	95.33 \pm 7.91		

*One-Way Anova

Results

Out of 419 nurses, 8 nurses did not report their shift work. The average age of the employees was 32.54 ± 7.26 and working history 9.62 ± 9.53 respectively. Most of the participants (80.7%) were married and the majority (83.2 %) were females. 34% were employees from Shahid Sadoughi Hospital (n=142). 76.4% had a bachelor's degree (n=320) and 1% had a master's degree (n=4). The majority of nurses (80.5%) had shift work (Table 1).

The mean score of nurses' sleep quality was 7.18 ± 3.5 with a maximum of 18 and a minimum of 0.

Most of the nurses (61.8%) (n = 254) did not have good sleep quality and nurses with rotating shifts had a worse sleep quality than other nurses, but no significant relationship was found between sleep quality and work shift (P = 0.3). (Table 2).

The mean score of work stress was 98.07 ± 12.14 with a maximum of 143 and a minimum of 55. The results of one-way ANOVA test showed that there was a significant difference between the mean scores of work stress and work shifts (F (3,367) = 3.376, p = 0.019)

Tukey post-test results showed that the mean scores of work stress in employees with fixed morning and evening shifts (long) (106.05 ± 11.18) were significantly higher than employees with rotational shifts (98.00 ± 12.09 , P = 0.031) and fixed morning shifts. (95.81 ± 12.79 , p=0.031) (Table 3).

The results of Spearman correlation test showed a significant and inverse correlation between work stress and sleep quality (r = -0.17 p = 0.001). So that nurses with high work stress were associated with poor sleep quality and the severity of the relationship between sleep quality and work stress was low.

Discussion

In today's world, it is no secret that job stress causes problems such as physical and mental illnesses which imposes staggering costs on the employees. In this regard, many studies have been done, especially in the fields of nursing, midwifery and other professions, but its impact on the sleep quality of the employees in Iran has not received much attention.²⁸ In community hospitals, nurses are often exposed to public health problems and various inspections. This contributes to daily uncertainty and higher occupational stress. However, it is obvious that job stress affects the sleep quality of nurses.²⁹

Sleep is one of the factors that reduces stress, anxiety and nervousness and helps a person regain energy, concentrate and enjoy daily activities and work.³⁰ This study was consistent with the study

by kohnavard et al. regarding the hospital staff's low quality of sleep,³¹ but the result of the study by Pars Hall et al. revealed that the quality of sleep in nurses is moderate, which was inconsistent with the results of this study regarding nurses on rotating shifts.³²

In this study, the mean score of job stress was 98.01 ± 12.14 which was considered high. The results of the present study are consistent with the result of the study conducted by Mohammad Reza Abarkhovi et al. which implied a high stress score.³³

The findings showed a negative and significant relationship between job stress score and sleep quality, which was consistent with the study by Rocha et al. on 203 hospital nurses in 2008.³⁴ In addition, the study of Nadson et al. showed that there was a direct relationship between sleep quality and job stress.³¹ The results of these two studies were consistent with the results of the current study, and also with the study by Ebrahimzadeh et al.²⁴ The study of Rudbandi et al. on nurses suggested that 83.20% of employees suffer from lack of sleep³⁵. A study by Xuexue Deng et al. showed that the high level of job stress was associated with sleep problems which corroborated the previous findings.²⁹ However, the study by Reza Gholi et al. revealed that there was no significant difference between job stress and sleep quality, which can be due to the fact that it was performed only on technicians of the operating room. In this research, 55.8% of the staff with a fixed morning shift was dissatisfied³⁶ which was consistent with the study by Rocha et al. on the nurses working in morning shift suffering from higher rate of stress and low sleep quality.³⁴ Therefore, according to the information provided by managers, the results of this research can reduce job stress by properly scheduling shifts as well as forming training courses and workshops to develop strategies for regulating sleep patterns

and managing stress by holding sessions to improve working environment conditions.

Conclusion

This study revealed that providing training sessions could assist the healthcare staff in improving professional skills, which resulted in reducing job stress and enhancing sleep and healthcare quality.

Conflict of interest

The authors declare that they have no conflict of interest.

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Authors contribution

All authors contributed equally to the study.

References

1. Abbasi M, Monazzam MR, Akbarzadeh A, Zakerian SA, Ebrahimi MH. Impact of wind turbine sound on general health, sleep disturbance and annoyance of workers: a pilot-study in Manjil wind farm, Iran. *Journal of Environmental Health Science and Engineering*. 2015;13(1):71.
2. Wu W-W, Jou S-T, Liang S-Y, Tsai S-Y. The mediating role of exercise on relationships between fatigue, sleep quality, and quality of life for adolescents with cancer. *Cancer nursing*. 2019;42(2):E10-E9.
3. Hirotsu C, Tufik S, Andersen ML. Interactions between sleep, stress, and metabolism: From physiological to pathological conditions. *Sleep Science*. 2015;8(3):143-52.
4. Chuang T-Y, Chiu Y-C, Fan Y-H, Hung S-C, Cheng W-M. Better sleep quality could reinforce the relationship between sleep posture and kidney stone laterality in obstructive sleep apnea patients. *Urolithiasis*. 2019:1-5.
5. Kumar S, Wong PS, Hasan SS, Kairuz T. The relationship between sleep quality, inappropriate medication use and frailty among older adults in aged care homes in Malaysia. *PloS one*. 2019;14(10).
6. Pease EC, Raether KA. Shift working and wellbeing: a

- physiological and psychological analysis of shift workers. *Journal of Undergraduate Research*. 2003;3:1-5.
7. Farzianpour F, Nosrati SA, Ferooshani AR, Hasanpour F, Jelodar ZK, Keykale MS, et al. Relationship between shift work and personality traits of nurses and their coping strategies. *Global journal of health science*. 2016;8(5):166.
 8. Moreno CR, Marqueze EC, Sargent C, Wright Jr KP, Ferguson SA, Tucker P. Working Time Society consensus statements: Evidence-based effects of shift work on physical and mental health. *Industrial health*. 2019;57(2):139-57.
 9. Iliescu EA, Coo H, McMurray MH, Meers CL, Quinn MM, Singer MA, et al. Quality of sleep and health-related quality of life in haemodialysis patients. *Nephrology Dialysis Transplantation*. 2003;18(1):126-32.
 10. Garde AH, Nabe-Nielsen K, Aust B. Influence on working hours among shift workers and effects on sleep quality—An intervention study. *Applied ergonomics*. 2011;42(2):238-43.
 11. Su Y, Foppen E, Mansur Machado FS, Fliers E, Kalsbeek A. The role of the daily feeding rhythm in the regulation of the day/night rhythm in triglyceride secretion in rats. *Chronobiology international*. 2018;35(7):885-95.
 12. Koh D-H, Park J-H, Seo-Hyun Y, Hyun-Joo K. O4A. 4 The relationship between shift work and sleep disturbance in hospital workers. *Occupational and Environmental Medicine*. 2019;76:A33.
 13. Chan MF. Factors associated with perceived sleep quality of nurses working on rotating shifts. *Journal of Clinical Nursing*. 2009;18(2):285-93.
 14. Mathew JJ, Joseph M, Madonna Britto BJ. Shift work disorder and its related factors among health-care workers in a tertiary care hospital in Bangalore, India. *Pakistan journal of medical sciences*. 2018;34(5):1076.
 15. Niu S-F, Chung M-H, Chen C-H, Hegney D, O'Brien A, Chou K-R. The effect of shift rotation on employee cortisol profile, sleep quality, fatigue, and attention level: a systematic review. *Journal of Nursing Research*. 2011;19(1):68-81.
 16. Vedaø Ø, Harris A, Erevik EK, Waage S, Bjorvatn B, Sivertsen B, et al. Short rest between shifts (quick returns) and night work is associated with work-related accidents. *International archives of occupational and environmental health*. 2019;92(6):829-35.
 17. Nena E, Katsaouni M, Steiropoulos P, Theodorou E, Constantinidis TC, Tripsianis G. Effect of shift work on sleep, health, and quality of life of health-care workers. *Indian journal of occupational and environmental medicine*. 2018;22(1):29.
 18. Carugno M, Crespi E, Bollati V, Tarantini L, Dioni L, Ferrari L, et al. O4A. 1 Night shiftwork, dna methylation, and telomere length in female nurses. *Occupational and Environmental Medicine*. 2019;76(Suppl 1):A32.
 19. Papantoniou K, Devore EE, Massa J, Strohmaier S, Vetter C, Yang L, et al. Rotating night shift work and colorectal cancer risk in the nurses' health studies. *International journal of cancer*. 2018;143(11):2709-17.
 20. Lim S, Han K, Cho H, Baek H. Shift-work nurses' work environments and health-promoting behaviours in relation to sleep disturbance: A cross-sectional secondary data analysis. *Journal of clinical nursing*. 2019;28(9-10):1538-45.
 21. Jeong J-Y, Gu M-O. The influence of stress response, physical activity, and sleep hygiene on sleep quality of shift work nurses. *Journal of the Korea Academia-Industrial cooperation Society*. 2016;17(6):546-59.
 22. Fang R, Li X. A regular yoga intervention for staff nurse sleep quality and work stress: a randomised controlled trial. *Journal of clinical nursing*. 2015;24(23-24):3374-9.
 23. Hasson D, Gustavsson P. Declining sleep quality among nurses: a population-based four-year longitudinal study on the transition from nursing education to working life. *PLoS one*. 2010;5(12).
 24. Ebrahimzadeh M, Akbarzadeh A, Rezaghole P, Ebrahimzadeh M, Tavana H. The Relationship between Sleep Disorders and Job Stress: A Case Study among 160 Nurses. *Archives of Occupational Health*. 2018;2(2):96-101.
 25. Azad ME, Gholami FM. Reliability and validity assessment for the HSE job stress questionnaire. 2011.
 26. Moghaddam JF, Nakhaee N, Sheibani V, Garrusi B, Amirkafi A. Reliability and validity of the Persian version of the Pittsburgh Sleep Quality Index (PSQI-P). *Sleep and Breathing*. 2012;16(1):79-82.
 27. Curcio G, Tempesta D, Scarlata S, Marzano C, Moroni F, Rossini PM, et al. Validity of the Italian version of the Pittsburgh sleep quality index (PSQI). *Neurological Sciences*. 2013;34(4):511-9.
 28. Fasbender U, Van der Heijden BI, Grimshaw S. Job satisfaction, job stress and nurses' turnover intentions: The moderating roles of on-the-job and off-the-job embeddedness. *Journal of advanced nursing*. 2019;75(2):327-37.
 29. Deng X, Liu X, Fang R. Evaluation of the correlation between job stress and sleep quality in community nurses. *Medicine*. 2020;99(4).
 30. Hosseini F, FasihiHarandi T, Kazemi M, Rezaeian M, Hosseini R. The relationship between sleep quality and general health of nurses in Rafsanjan university of medical sciences in 2012. *Journal of Rafsanjan University of Medical Sciences*. 2013;12(10):843-54.
 31. kohnavard B, Rajaei Behbahani, N, Soleimani N. Comparisons between quality of sleep and chronic fatigue syndrome in the radiology staff and nurses working in hospital. *Iranian Occupational Health*. 2017; 14(3), 26-36.
 32. Palhares VdC, Corrente JE, Matsubara BB. Association between sleep quality and quality of life in nursing professionals working rotating shifts. *Revista de saude publica*. 2014;48:594-601.
 33. Abarghouei MR, Sorbi MH, Abarghouei M, Bidaki R, Yazdanpoor S. A study of job stress and burnout and related factors in the hospital personnel of Iran. *Electronic physician*. 2016;8(7):2625.
 34. Rocha MCP, De Martino MMF. Stress and sleep quality of

- nurses working different hospital shifts. *Revista da Escola de Enfermagem da USP*. 2010;44(2):279-85.
35. Jafari Roodbandi A, Choobineh A, Daneshvar S. Relationship between circadian rhythm amplitude and stability with sleep quality and sleepiness among shift nurses and health care workers. *International journal of occupational safety and ergonomics*. 2015;21(3):312-7.
36. Rezagholi P, Hanani S, Nasiri Ziba F, & Azadi, NA. Relationship Between Sleep Quality with Job Stress and Quality of Life of Operating Room Technologists Working in University Hospitals Affiliated to Iran University of Medical Sciences in 2016-17. *Pharmacophore*. 2017;8(2):103-8.