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ORIGINAL ARTICLE

Investigation of Shift Work Disorders among Security Personnel

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ABSTRACT

In today's advanced world resulting from the improvement of technology, societies tend to encounter a large number of problems and accidents. As we know, university's security personnel are classified as shift workers and are exposed to health disturbing factors. The aim of this study was investigation of shift work disorders among security personnel of the hospitals Affiliated to Shiraz University of Medical Sciences, Central. This case-control study was conducted among 130 security personnel as well as 130 unexposed employees among the security guards working day shifts and the office workers. The unexposed individuals were not working in shifts, but were similar to the shift workers regarding age and health status. Data were collected using SOS (Survey of Shift Workers) questionnaire as well as measuring height, weight, and blood pressure of the shift workers in their work shifts. The findings revealed a significant difference between the two groups regarding the increase in blood pressure, sleep disorders, dissatisfaction in individual, family, and social lives, as well as increase in psychological, cardiovascular, gastrointestinal, and musculoskeletal disorders. Moreover, these disorders were significantly higher among the shift workers. The study results suggest the necessity to pay more attention to the shift workers' needs and problems, involving them in planning the shift schedules, and improving their working conditions.

Keywords: *Shift work, SOS questionnaire, Hospital, Security personnel*

INTRODUCTION

Shift work is defined as working out of the official work hours; i.e., between 7 a.m. and 6 p.m. [1]. Because of the society's needs, there are some individuals performing service jobs who have to work both days and nights [2]. In addition, young, single individuals tend to work night shifts more than the elderly because of being afraid from unemployment [3]. In general, shift work leads to reduction of performance, longer exposure to toxic compounds, change in the individuals' eating habits, increase in fatigue as well as insomnia, health disorders, and individual as well as social life disorders among the shift workers [4]. Moreover, shift work has both long-term and short-term effects. Its short-term effects include effects on sleeping, circadian rhythm, performance, and safety as well as disorders in one's individual and social life, while the long-term effects include gastrointestinal problems as well as cardiovascular diseases [5]. In fact, working after insufficient sleeping leads to excessive fatigue and

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Table 1. The shift workers' working shift information

Total number	Number	Work shift
130	65	8 h work, 16 h rest
	30	12 h work, 24 h rest
	35	12 h work, 24 h rest

sleepiness, which result in difficulty in concentration and performing tasks and, consequently, cause the incidence of errors and increase the risk of accidents [3]. The results of a study conducted on suicide among shift worker police officers in the U.S. in 2008 revealed that as the depression symptoms and the working hours during the day increased, the prevalence of suicide thoughts among the female police officers increased [6]. The increase in the evening shift working hours had also resulted in the increase in the stress disorders among the male officers.

In general, the security personnel of the hospitals are among the shift workers and are exposed to health disturbing factors more than the other shift workers. Of course, since the hospitals' security systems are controlled by surveillance cameras in most of the industrialized countries, the shift working security personnel are not faced with such problems. Although a great number of studies have been conducted on shift working in Iran, the effect of disorders resulting from shift working on this group of shift workers has not been investigated yet. Moreover, shift working accompanied by the patients' companions' behavior and other problems can negatively affect the hospitals' security personnel.

The present study aimed to investigate the effect of shift working on these personnel.

MATERIALS AND METHODS

This case-control study was carried out through census as for sampling. Data were collected using the SOS (Survey of Shift workers) questionnaire [7, 8] whose reliability and validity had been confirmed in advance. After getting license from the hospitals affiliated to Shiraz University of Medical Sciences, Shiraz, Iran, the study was conducted on 130 security personnel as well as 130 unexposed employees among the security guards working day shifts (from 7:30 a.m. to 3:30 p.m.) and the office workers. The unexposed individuals were not working in shifts, but were similar to the shift workers regarding age and health status. The shift workers' weight, height, and blood pressure were also measured at their work shifts.

SOS questionnaire consists of 57 questions, 11 of which are related to the demographic information and the rest separately deal with sleep disorders, dissatisfaction from individual life, dissatisfaction from family life, dissatisfaction from social life, and psychological, cardiovascular, gastrointestinal, and musculoskeletal disorders. Of course, the unexposed subjects had to answer 44 questions after removing the ones related to shift working.

Individuals' stature was measured by a tape in the standard condition [9]. Weight of the subjects was measured using a digital scale. The two variables were measured while the subject worn light clothing without shoes, hat and gloves. Body mass index (BMI) was calculated for each subject $(BMI = \frac{Weight_{(kg)}}{Height^2_{(m)}})$. Also, systolic and diastolic blood pressure (BP) was measured using a sphygmomanometer (Mercury Type) and stethoscope.

Data were entered into the SPSS statistical software (v. 15) and analyzed through Chi-square and *t*-test.

RESULTS

The present study was conducted on all the shift workers regardless of hospitals they worked in. Each shift worker had to work in specific shifts; for instance, 1 month in the emergency department, 1 month in the intensive care unit, etc. In some of the hospitals under the study, the shift workers had to work for 12 hours and rest for 24 hours. However, in some hospitals which were larger and presented more advanced medical services, they had to work for 8 hours and rest for 16 hours; in other words, they had to work every day.

Table 2. Demographic information of shift workers

Working experience (yr)	Mean	6.2
	SD	3.5
	Range	1-26
Shift type	Regular rotational shift	112 (2.86%)
	Irregular rotational shift	18 (8.13%)
Level of education	Under diploma	4.95%
	A.D.	9.3%
	B.A. or B.Sc.	0.8%
Age (yr)	Mean	32.1
	Age range	21.62
	SD	1.11
Marital status	Single	8.20%
	Married	2.79%

Table 3. Comparison of the two study groups regarding systolic as well as diastolic blood pressure and BMI (N=130)

Variable	Group	Mean	SD
Age (yr)	Control	34.1	1.12
	Shift workers	35.1	1.24
Systolic blood pressure	Control	6.134	1.7
	Shift workers	129.1	8.85
Diastolic blood pressure	Control	3.88	1.5
	Shift workers	7.84	7.49
BMI	Control	4.24	3.78
	Shift workers	22.1	2.87

Overall information regarding the subjects' shift works is briefly presented in Table 1. Besides, Table 2 shows the subjects' demographic information, including working experience, age, marital status, and type of shift change, based on both numbers and percents.

Considering the objectives extracted from the SOS questionnaire, the two study groups were compared. Two groups were compared regarding the difference in blood pressure, sleep disorders, dissatisfaction from one's individual, family, and social life, and psychological, cardiovascular, gastrointestinal, and musculoskeletal disorders as well as their relationships with age, working experience, marital status, second job, and BMI and the following results were obtained:

A significant relationship was found between sleep disorders and working experience (P=0.028). However, no significant relationship was observed between dissatisfaction from one's individual life and age, working experience, marital status, second job, and BMI. The results also revealed no significant relationships between disorders in family relations and age, working experience, marital status, second job, and BMI.

Furthermore, significant relationships were found between social life disorders and age (P=0.034), gastrointestinal disorders (decreased appetite) and working experience (P=0.013), psychological disorders and second job (P=0.027), and cardiovascular disorders and age (P=0.038), working experience (P=0.023), second job (P=0.042), and BMI (P=0.02). Significant relationships were also observed between musculoskeletal disorders and age (P=0.003), working experience (P=0.001), and BMI (P=0.033).

In comparison of the exposed and non-exposed groups, blood pressure and psychological, gastrointestinal, cardiovascular, and musculoskeletal disorders were multi-factor variables and, as a result, significant relationships imply that shift working, as a risk factor, can lead to such conditions. Information about blood pressure, BMI, and age in the shift workers and the unexposed group are presented in Table 3.

Systolic and diastolic plod pressures in the shift workers' group were 134.6 and 88.43 mm Hg, respectively, which is a little higher than the normal status compared to the table 3. On the other hand, the control group's systolic and diastolic blood pressures were 129.06 and 84.8 mm Hg, respectively, which is quite normal compared to the table. In addition, in comparison to the control group which worked day shifts, blood pressure was higher among the shift workers.

Moreover, BMI was compared between the two groups according to the WHO's standards, 2004. The shift worker BMI was 24.06 which was 22.04 more than the control group. Of course, based on the WHO's classification, both measures were located in the normal category.

The overall results obtained from the comparison of the two groups are as follows:

No significant difference was observed between the two groups regarding age (P=0.12). However, the two groups were significantly different concerning systolic as well as diastolic blood pressure (P=0.011 and P=0.015, respectively).

Comparison of the results between the two groups showed a significant difference between the two groups regarding sleep disorders. Such disorders were more among the shift workers and mostly included lack of sleep (P=0.018) and insomnia (P=0.001).

The study results revealed a significant difference between the two study groups regarding dissatisfaction from one's individual life (P=0.001), family life (P=0.001), and social life (P=0.001) which were more among the shift workers compared to the control group.

Moreover, comparison of gastrointestinal disorders revealed a significant difference between the two groups. Besides, such disorders affected the shift workers more than the control group and mostly included increased appetite (P=0.015) and peptic ulcer (P=0.035).

A significant difference was found between the two groups regarding musculoskeletal disorders (P=0.028) which were more prevalent among the shift workers. The two groups were also significantly different regarding psychological (P=0.001) as well as cardiovascular disorders (P=0.001) which were both more detected among the shift workers.

DISCUSSION

In this research, more sleep disorders and fatigue were observed among the shift workers compared to the control group. Moreover, a significant difference was observed between the two study groups regarding both systolic and diastolic blood pressure, which is in line with the study conducted by Motamed Zadeh et al. in one of the hospitals affiliated to Hamadan University of Medical Sciences, Hamadan, Iran [10]. In addition,

several studies have found a positive association between shift work and hypertension [11–13]. Working mostly at night has been suggested to be associated with deleterious consequences of general health, as a consequence of disturbance of chronobiological rhythms [14]. Disturbances of the circadian sleep rhythm could prevent the dipping pattern of blood pressure and increase the incidence of hypertension [15, 16].

No difference was observed between the shift workers and the control groups of the studies conducted on the issue regarding BMI, which confirms the accuracy of the findings of the present study.

The study results suggest the necessity to pay more attention to the shift workers' needs and problems, involving them in planning the shift schedules, and improving their working conditions. In fact, individual differences, problems resulting from sleeping and eating habit disturbances, gastrointestinal disorders, and the patients' companions' harsh behavior which imposes numerous psychological problems on the security personnel intensify the negative effects of shift working on such personnel [17-21].

CONCLUSION

No adaptive approach is there in order for the shift workers to solve their problems at once. Therefore, in order to eliminate the problems resulting from shift working, it must be investigated from different aspects and its various factors should be taken into account, as well. Limitation in this study is considering the study objectives, existence of some problems, and not having the opportunity to utilize a larger sample size, the above-mentioned results were obtained in the current study.

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REFERENCES

1. Monk TH, Leng VC, Folkard S, Weitzman ED. Circadian rhythms in subjective alertness and core body temperature. *Chronobiologia* 1983; 10(1): 49−55.
2. Monk TH, Kupfer DJ. Which aspects of morningness-eveningness change with age? *Journal of Biological Rhythms* 2007; 22(3): 278-80.
3. Soehner AM, Kennedy KS, Monk TH. Personality correlates with sleep-wake variables. *Chronobiology Int* 2007; 24(5): 889-903.
4. Lehtimäki A, Helander M and Pessi AM. Circadian periodicity of airborne pollen and spores; significance of sampling height. *Aerobiologia* 1991; 7(2): 129-135.
5. Spengos K, Tsivgoulis E, Tsivgoulis A, Zakopoulos N, Vemmos KN. Circadian and Seasonal Distribution of Cardioembolic Strokes Due to Atrial Fibrillation. *Hellenic J Cardiol* 2004; 45: 234-241.
6. Beers T M. Flexible schedules and shift work: replacing the '9 - 5' workday? *Monthly Labor Review* 2000; 123(6): 33-40.
7. Zamanian Z, Mohammadi H, Rezaeeyan MT, Dehghani M, An investigation of shift work disorders in security personnel of 3 hospitals of Shiraz University of Medical Sciences. *Iran Occupational Health* 2012; 9(1): 52-57.
8. Barton J, Folkard S, Smith LR, Spelten LR, Spelten ER, Totterdell PA. Standard shiftwork index manual. (Retrieved Feb. 2007) http://www.workingtime.org/images/3/31/SSIMAN.doc
9. Dwyer G, Davis SE. ACSM's health-related Physical Fitness Assessment Manual. 2nd ed. Wolters Kluwer ILIppincott Williams & Wilkins, USA, 2008; 111-124.
10. Motamedzade M, Ghazaiee S, Combined Effects of Noise and Shift Work on Workers' Physiological Parameters in a Chemical Industry. *Scientific Journal of human University of medical Sciences* 2003; 27(1): 39-46.
11. Sakata K, Suwazono Y, Harada H, Okubo Y, Kobayashi E, Nogawa K. The relationship between shift work and the onset of hypertension in male Japanese workers. *J Occup Environ Med* 2003; 45(9):1002–6.
12. Oishi M, Suwazono Y, Sakata K, Okubo Y, Harada H, Kobayashi E. A longitudinal study on the relationship between shift work and the progression of hypertension in male Japanese workers. *J Hypertens* 2005; 23(12): 2173–8.
13. Inoue M, Morita H, Inagaki J, Harada N. Influence of differences in their jobs on cardiovascular risk factors in male bluecollar shift workers in their fifties. *Int J Occup Environ Health* 2004; 10(3): 313–8.
14. Colligan MJ, Rosa RR. Shiftwork effects on social and family life. *Occup Med* 1990; 5(2): 315-22.
15. Colligan MJ, Frockt IJ, Tasto DL. Frequency of sickness absence and worksite clinic visits among nurses as a function of shift. *Applied ergonomics* 1979; 10(2): 79-85.
16. Smith L, Folkard S, Poole CJM. Increased injuries on night shift. *The Lancet* 1994; 2(8930) 1137–1139.
17. Morikawa Y, Nakagawa H, Miura K, Soyama Y., Ishizaki M, Kido T, Naruse Y, Suwazono Y, Nogawa K. Shift work and the risk of diabetes mellitus among Japanese male factory workers, Scand. J. work Environ. *Health* 2005; 31(3): 179-183.
18. Morikawa Y, Nakagawa H, Miura K, Soyama Y, Ishizaki M, Kido T, Naruse Y, Suwazono Y, Nogawa K. Effect of shift work on body mass index and metabolic parameters. *Scand J Work Environ Health* 2007; 33(1): 45-50.
19. Barger LK, Lockley SW, Rajaratnam SM, Landrigan CP. Neurobehavioral, health, and safety consequences associated with shift work in safetysensitive professions. *Curr Neurol Neurosci Rep* 2009; 9: 155–164.
20. Yamasaki F, Schwartz JE, Gerber LM, Warren K, Pickering TG. Impact of shift work and race/ethnicity on the diurnal rhythm of blood pressure and catecholamines. *Hypertension* 1998; 32: 417–423.
21. Lo SH, Liau CS, Hwang JS, Wang JD. Dynamic blood pressure changes and recovery under different work shift in young women. *Am J Hypertens* 2008; 21: 759–764.