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Shift Work Effect on the Number of Sick Leave among Steel Industry Staffs: A Large Cross-Sectional Study

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Abstract

Background: Sick leave is one of the important areas inHealth Professional. Since various unknown factors may be result in sick leave, shift work can be considered as one of the effective factors on the number of sick leave in occupational Medicine.

Objectives: This study aimed to consider the effect of shift work on the number of sick leave among steel industry staffs.

Methods: This cross-sectional study is carried out on Esfahan's Mobarakeh Steel Company (EMSC) staffs in 2016 using census sampling method.

Results: A total number of 21168 staffs with mean age of 39.96years were entered in this study. 14248 staffs (67.3%) were shift workers. Our results revealed that shift working is significantly correlated with cardiovascular diseases (OR=1.891; p<0.001), leukemia (OR=2.29; p=0.039), respiratory problems (OR=1.29, p<0.001), infectious diseases (OR=1.55, p<0.001), mental disorders (OR=1.658, p<0.001), and poisonings (OR=0.724, p<0.001).

Conclusion: Shift workers are more susceptible to different diseases and subsequently they use higher number of sick leave. Therefore, preventive decisions are needed to reduce the negative effects of shift work.

Keywords: Cardiovascular diseases, Leukemia, Mental disorders, Poisoning, Shift work, Sick leave

1. Background

Shift work, which takes place on a schedule outside the traditional hours, is designed to increase the output of factories and equipment's (1,2).

What is shift work? Shift work is an employment practice designed to make use of, or provide service across, all 24 hours of the clock each day of the week. The practice typically sees the day divided into shifts, set periods of time during which different groups of workers perform their duties. The term "shift work" includes both shifts and day work schedules in which employees change or rotate shifts (3-6).

Recent evidences have revealed that the percentage of shift workers in developed countries is more than 15% (7).Although shift works can help business and technology, they can increase the risk of certain disorders and health problems. This social job canaffect human lifevia different mechanisms (8,9).

Shift work is quite-general in different industries such as steel, oil, petrochemicals and cement industries (7). Over the past few decades many studies considered the effect ofshift works onhealth, immunity, activity and quality of life in shift working staffs (8,10-12). The results indicated the negative impact of shift work on staff's health. Several studies showed a significant correlation between shift work and sick leave (13-16). However, there is no study that considered the relationship between shift work and sick leave among staffs who work in steel industry in Iran.

2. Methods

This cross sectional study was conducted on workers of Esfahan's Mobarakeh Steel Company (EMSC) in year 2016 using census method sampling method. EMSC is the largest steel producer in Iran country.

Inclusioncriteria were official employment with at least two years of work experience; exclusion criteria were dismissal or unwillingness to participate in the study. Medical Ethics Committee of Tarbiat Modares University Medical School approved the study (code number: IR.TMU.REC.1395.398).

In this study shift work defined (regular shift: 2 morning shifts, 2 evening shifts, 2 night shifts and 2 days off,weeklyshift:3 morningshifts,3 eveningshifts, and 1 day off every two weeks, Fridays always off, The morning, evening, and night shifts began at 7 AM, 3 PM, and 11 PM) and day workers worked from 7 AM to 3 PM on weekdays and had Thursdays and Fridays off.

Data Analysis

Data were analyzed using IBM's SPSS Software Version 21. Odds Ratio (OR), Chi-square test was used to compare categorical variables and T-test or Mann-

Whitney U test were used to compare continuous variables. In this study also Logistic regression was used to calculated adjusted OR. In this study, a p-value<0.05 is considered to be statistically significant.

3. Results

A total number of 21168 staffs were entered in this study, in which 14248 staffs (67.3%) were shift workers. The mean age of workers was 39.96 ± 7.47 years. The basic demographic characteristics of all staffs are summarized in Table 1. The mean number of sick leave for workday and shift work staffs was 12.67 and 12.56 days, respectively. There was no significant difference in the mean number of the sick leave between two groups; however, a significant difference was observed in mean of work experience between them. Comparison of the odds ratio of daily workers with shift workers and number of sick leave for these workers has been reported (see Table 2). Our results also revealed that shift working is significantly correlated with cardiovascular diseases (OR=1.891; p<0.001), leukemia (OR=2.29; p=0.039), respiratory problems (OR=1.29, p<0.001), infectious diseases (OR=1.55, p<0.001), mental disorders (OR=1.658, p<0.001), and poisonings (OR=0.724, p<0.001). Shift workers suffered from the respiratory problems, infectious disease, bone and joints pains, and poisonings more than workday staffs by 36.09%, 31.41%, 18.03%, and 15.94%, respectively. the mean and SD of the number of sick leave in daily and shift workers is presented in table 3. According to the

Table 1. the mean ±SD of age, BMI, work experience and the number of sick leave in daily and shift workers

Variables	Shift				p-value
	Day Worker		Shift Worker		
	Mean	Standard Deviation	Mean	Standard Deviation	
NSD	12.67	15.27	12.56	15.52	0.431
Age	36.68	7.51	39.96	7.47	<0.001
experience	6.544	6.262	8.735	6.085	<0.001
BMI	26.04	3.68	26.07	3.47	0.108

NSD:Number of sick leave days; BMI: Body mass index

Table 2. Comparison of the distribution and the possible chance of sick leave between shift and daily workers

Variables	Total	Shift				Crude		Adjusted		C	
		Day Worker		Shift Worker							
		N	%	N	%	OR	P-value	OR	P-value	Lower	Upper
Visual disturbances(Yes | No)	0.02%	2	0.02	2	0.01	0.523	0.611	0.420	0.969	.655	3.247
Diseases of the skin(Yes | No)	1.28%	88	1.01	236	1.42	1.408	0.007	1.413	0.015	1.229	2.916
Cardiovascular disease(Yes | No)	4.21%	235	2.71	830	5.00	1.891	<0.001	1.97	<0.001	1.068	1.259
Diseases of the joints and bones(Yes | No)	31.41%	2664	30.67	5283	31.80	1.054	0.068	1.046	0.175	.692	.798
Leukemia (Yes | No)	0.17%	8	0.09	35	0.21	2.29	0.039	1.444	0.378	1.110	1.913
Genital Diseases(Yes | No)	7.20%	643	7.40	1178	7.09	0.955	0.37	0.899	0.067	1.44	1.948
Respiratory diseases(Yes | No)	36.09%	2797	32.20	6333	38.12	1.297	<0.001	1.429	<0.001	1.850	2.634
Digestive diseases(Yes | No)	9.15%	748	8.61	1567	9.43	1.105	0.033	1.027	0.615	1.043	1.327
Disorders of mental organs(Yes |	6.34%	502	5.78	1103	6.64	1.159	0.008	1.132	0.049	.319	.999
Infectious diseases(Yes | No)	15.94%	1276	14.69	2757	16.59	1.155	<0.001	1.318	<0.001	.896	1.120
Endocrine diseases(Yes | No)	0.65%	40	0.46	125	0.75	1.638	0.007	1.529	0.059	.960	1.176
Psychopathy(Yes | No)	4.62%	285	3.28	885	5.33	1.658	<0.001	1.264	0.003	.986	4.589
Cancer(Yes | No)	0.22%	15	0.17	41	0.25	1.43	0.262	1.922	0.102	1.087	1.233
Injuries and poisoning(Yes | No)	18.03%	1824	21.00	2737	16.47	0.742	<0.001	0.762	<0.001	1.259	1.425

Table 3. the mean ±SD of the number of sick leave in daily and shift workers based on diseases type

Variables	Shift				p-value
	Day Worker		Shift Worker		
	Mean	Standard Deviation	Mean	Standard Deviation	
Visual disturbances	0.029	.02	0.000	0.00	0.042
Diseases of the skin	1.185	.13	1.818	.18	0.008
Cardiovascular disease	3.121	.24	8.219	.46	<0.001
Diseases of the joints and bones	41.821	.85	51.207	1.02	<0.001
Leukemia	0.130	.04	0.190	.05	0.373
Genital Diseases	9.205	.41	9.833	.45	0.330
Respiratory diseases	39.624	.72	55.131	1.00	<0.001
Digestive diseases	10.173	.37	11.567	.42	0.018
Disorders of mental organs	6.633	.29	8.640	.43	<0.001
Infectious diseases	16.243	.46	19.448	.52	<0.001
Endocrine diseases	0.419	.07	1.053	.16	0.002
Psychopathy	4.104	.25	7.819	.45	<0.001
Cancer	0.159	.05	0.618	.26	0.148
Injuries and poisoning	27.182	.58	22.487	.56	<0.001

information reported in this table we can say except , leukemia , genital and cancer diseases, the mean of sick leave is higher in shift worker rather than day worker.

4. Discussion

A great number of studies showed that shift working is correlated with sleep failure, stress and decreased activity of persons. On the other hand, organizations have recently focused on processes and subjects that affect the cost and efficiency. One of these subjects is staffs sick leave. In this study, we investigated the effect of shift work on the number of sick leave among male staffs who work at Esfahan's Mobarakeh Steel Company. Different parameters such as age, work experiences, BMI, and type of diseases were evaluated. Our data showed that shift work is significantly associated with increased risk of cutaneous, cardiovascular, pulmonary, infectious diseases, mental disorders, disturbance of the sensory organs, and poisonings. Our results were in agreement with a study by Merkuset al (13). Although we could not find a significant different in the mean number of sick leave between workday and shift work staffs, the distribution of sick leave among shift workers was significantly higher than that in daily workers. We also found that shift workers are more susceptible to cutaneous, cardiovascular, leukemia as well as, digestive problems, glands failure, mental disease, cancer andjobinjuries. Since shift workers are usually healthier than daily workers, their disease is more dangerous compared to the daily workers. For this reason, non-significant difference was observed in the mean number of sick leave between two groups.

This study also demonstrated that the chance of chronic diseases and as the result sick leave among shift workers is higher than daily workers. Since shift work staffs work higher than daily workers, they are more exposed to the workplace pollutions and tensions (6). Our findings have also revealed that age and work experiences have significant influence on the number of sick leave. Older individuals have the increased risk of different diseases and as the result they have to use greater number of sick leave. This result is in agreement with the findings of other previous studies (6,17,18).

In this research, the risk of cardiovascular disease in shift worker was greater (by 97%) than that in daily workers. Furthermore, the risk of pulmonary and infectious diseases in shift workers was higher by 42% and 31%, respectively. Additionally, the chance of mental disorders and poisonings in shift work staffs was 26% and 0.76% greater than daily workers. These findings were comparable with the results of studies provided by Pallesen et al (16), Norder et al (19), Oenning et al (15), Koller et al (20) and Merkus et al (13), that showed a significant effect of shift work on the number of sick leave. The strength of this study is related to its novelty and large sample size. In this study, all participants were men who working at steel industry. Since steel company is considered as a heavy industry, the results may be limited for this industry that is a limitation of the study.

5. Conclusion

According to the result of this study, shift workers are more susceptible to different diseases and subsequently they use higher number of sick leave. Therefore, preventive decisions are needed to reduce the negative effects of shift work.

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Conflicts of interest

In this study we have not any conflicts of interest

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