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INVESTIGATING THE RELATIONSHIP BETWEEN WORK-SHIFT AND RISK FACTORS FOR CARDIOVASCULAR DISEASE (CVD) IN NURSES AFFILIATED TO JAHROM UNIVERSITY OF MEDICAL SCIENCES

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ABSTRACT

Introduction: The studies about the effect of shift work on cardiovascular diseases (CVD) have inconsistent results. The shift has adverse effects on the health of nurses. This study was conducted to assess the relationship between shift work and the CVD risk factors.

Methods: A cross-sectional study was carried out during 2017 The participants were divided into two groups: shift workers (work shift between 3 pm and 7 am) and day workers. The shift workers were selected from among the Healthcare workers of 3 teaching hospitals of Jahrom and the day workers also were selected among the office workers by simple sampling. Demographic data, smoking, regular exercise, medical and occupational history were collected through a check list and interviews. Physical examination was done by a physician. Blood cholesterol, triglyceride and glucose were measured in a blood sample after standard fasting time.

Results: A total of 439 subjects including 225 women and 214 men with a mean age of 33.7 years old participated in this study. In terms of work schedule, 229 participants (52/2%) were day workers and 210 subjects (47/8%) were shift workers.

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The effect of covariates such as age, employment duration and regular exercise was controlled statistically. Of all factors studied, diastolic blood pressure ≥ 90 mmhg and blood triglyceride level ≥ 150 mg/dl were associated with shift working.($p \leq 0.001$).

Conclusion: shift work is associated with high levels of diastolic blood pressure and triglyceride. This association could be attributable to altered life style like diet or health behaviors or due to an independent effect.

Key words: Health care worker, Cardio Vascular Disease, Risk factor, Shift work.

INTRODUCTION

By changing the pattern of life and work in today's societies, the "community-based society" has been formed. One of the necessities of such a model is work in unusual hours for some jobs. Different definitions are given for the shift. Based on this, the prevalence of shifting in different countries is different. On average, out of every 5 people in the world, one person is in turn (1).The shift has adverse effects on the health of nurses. These include sleep disorders, fatigue, mental problems, reproductive disorders, gastrointestinal problems, and cardiovascular disease. (2) Work shift is considered today as a threat factor, which can have adverse effects on various aspects of human life (3). Various types of shift work are: constant shifts that a person typically works in a shift (like night work), a shift in work that does not work in different shifts and unplanned hours(On-call) is a special kind of shift that is called in emergency cases, a special group of employees to perform their duties, but the most used shifter system is a system that generates or serves in 8-hour shifts. It is adjusted to the shifts of the morning, evening and night (4). Work in a large and complex work environment has a higher prevalence, so in such environments, its adverse effects will be significantly higher. The combination of work shift with multiple workplace hazards, high physical and cognitive needs, reduced individual control over their work, and other psychosocial stressors, impose additional negative impacts on staffing (5). Several studies have been done on the relationship between work-shift and cardiovascular disease since the last century. There are different results. In a large review published in 1999, the risk of cardiovascular disease in shift workers was reported to be 12% more than day care (6). In the following years, criticisms were made on this article, and several other studies were conducted in this regard. Currently, systematic reviews and critical articles suggest a positive relationship between cardiovascular disease, but the results are not conclusive. An epidemiologic evidence for the relationship between work shift and cardiovascular disease has been reported in a review article published in 2011. (7) This study was designed to investigate the relationship between work-shift and

cardiovascular risk factor in health personnel, which is a partial shift in the nature of Their work is done.

METHOD

A descriptive cross-sectional study was performed in Jahrom University of Medical Sciences in 1996. The prevalence of cardiovascular risk factors among working and working day groups was evaluated. The criteria for entering the study were a record of at least one year of occupation in the current job and consent to participate in the study. Exit criteria, history of congenital heart disease, heart failure, renal disease, secondary hypertension, metabolic syndrome and interfering drugs with the variables studied. Pregnant women were also excluded from the study. The shift work group was randomly selected from the occupational records of personnel employed in three teaching hospitals of Jahrom University of Medical Sciences. The job was defined as work outside the hours from 7 am to 3 pm.The non-work group was randomly selected from among the administrative staff referred to the University of Medicine's Occupation Center. These people came to the Center for various occupations and all were day-care workers. Demographic data such as age, sex, work experience, work shift, smoking habits and regular exercise, as well as history of any cardiovascular disease were extracted through a questionnaire as well as a person's health record. All people who exercise at least three times per week for 32 minutes were registered as regular people. Smoking was also evaluated qualitatively and smokers were considered as those who mentioned a smoker or more in a daily smoker questionnaire.A history of cardiovascular disease was considered positive by the physician if diagnosed. Blood pressure was measured by a calibrated mercury device. First, it was first asked about the physiological activity and the consumption of tea and cream in half an hour before the visit. If the answer is negative, the person will rest for 5 minutes and his pressure will be measured in a quiet environment. Weights were measured in light and non-shoe style with a standard scale and no shoe height, and the heel, buttock and posterior surfaces were measured in a vertical direction. FBS and cholesterol (chol) and triglyceride (TG) Blood samples were measured by standard laboratory methods while the person was fasting 14-12 hours.Shift workers were compared for cardiovascular disease including age, gender, systolic blood pressure (SBP) and diastolic blood pressure (DBP), total cholesterol, triglyceride, and smoking history, body mass index, and regular exercise with non-shift work. Systolic and diastolic blood pressure was abnormal of SBP 140 ≤ DBP≤90 ≥ 200 ≥ Cholesterol, ≥150 Triglycerides, ≥25 BMI and ≥126 FPG were also considered as a risk factor for cardiovascular disease (8, 9).Data was entered into

SPSS software. First, the variables were evaluated in terms of distribution and frequency. Then, to test the relationship between the quantitative variables and the shift, T-test was used and for qualitative variables, we used the Squared statistical test. A significant level of 0.5 was considered. In the next step, to remove The effects of confounding were used on regression test and the independent effect of the relevant variables in the initial tests with the outcome variables was examined.

RESULTS

In this study 439 patients (225 women) (51.7%) and 214 men (49.3%) participated in the study. 210 (47.8%) were shift workers and 229 (52.2%) were working day. Table 1 shows demographic data in two groups of work-shift and day-work. Comparison of the findings shows that there is a significant statistical difference between the working shift group (36 ± 8/8) and the non-shift work group (33 ± 8/1) in the mean age. Also, the work experience (9.8 ± 7.6) in the shift worker group (8.4 ± 6.6 in the day care group and regular exercise) was 30% in the shift group versus 8% in the working group (between the two The group is significantly different. Other variables, smoking habit, body mass index and cardiovascular disease were not significantly different between the two groups. Table 2 shows the prevalence of risk factors of cardiovascular diseases in two groups of work-shift and working day. The comparison of these values shows that abnormal levels of fasting blood sugar, total cholesterol and blood triglyceride, systolic and diastolic blood pressure are higher in the control group than in the control group, although this difference in fasting blood glucose and systolic blood pressure is not statistically significant.In the next step, regression analysis was performed to eliminate the effect of age, duration of employment and exercise activity between the two groups, the results of which are presented in Table 3. As the table shows, all cardiovascular risk factors are related to the age of the participants, but after eliminating the effect of the associated variables, the abnormal level of diastolic blood pressure and triglyceride levels remained statistically significant between the two groups.

Table 1 - Distribution of independent variables studied in two groups of work shift and working day

P-value	work shift	**Working day**	**Variable**
0/48	**100(49/3%)** **104(47/8%)**	**114(51/7%)** **1** **21(52/7%)**	Man: 214(41/3%) Woman: 225(51/7%)
0/01	**8/8±36**	**8/1±33**	Age (M ± SD)
0/03	**7/6±9/8**	**6/6±8/4**	Work experience (M ± SD)
0/39	**4/5±24/3**	**4/3±26**	Body mass index
0/58	**5/2%**	**4/5%**	smoking
0/001	**3/4%**	**8%**	Regular exercise

between two groups of work shift and working day

Table 2. Percentage of risk factors for cardiovascular disease and their significance were

P-value	Percentage in total sample	Percentage in group work shift	Percent in the day group Work	**Variable**
0/39	**%2/9**	**%3/3**	**/2%5**	**FBS≥126**
0/02	**%23**	**%34**	**%21**	**chol≥200**
%0/00	**%26**	**%33**	**%22**	**TG≥150**
%0/75	**%45/3**	**%41/2**	**%44/2**	**BMI≥25**
0/05	**%7/4**	**%6/3**	**%5/2**	**SBP≥140**
0/00	**%10/1**	**%9/5**	**%4/4**	**DSP≥90**

Table 3. Regression analysis results The relationship between independent variables and cardiovascular risk factors

DBP≥90 β±SE	SBP≥140 β±SE	BMI≥25 β±SE	TG≥150 β±SE	Chol≥200 β±SE	FBS≥126 β±SE	Variable
2/29± 2/18	**2/38± 2/93**	**2/32± 2/28 -**	**2/53± 2/29 -**	**2/33± 2/34 -**	**- 4/48± 2/89**	Sex
213/2 ±43/2	**22/2 ±29/2**	**21/2 ±23/2**	**22/2 ±28/2**	**23/2 ±28/2**	**23/2 ±42/2**	Age
2/223± 2/18	**2/22± 2/22 -**	**- 2/21± 2/23**	**2/21± 2/23**	**- 2/223± 2/23**	**2/21± 2/23 -**	work experience
- 4/9± 4/49	**2/35± 2/89 -**	**- 2/42± 2/35**	**2/99± 2/14**	**- 2/225± 2/98 -**	**2/99± 2/94**	Regular exercise
- 4/9± 4/49	**2/35± 2/89 -**	**- 2/42± 2/35**	**2/99± 2/14**	**- 2/225± 2/98 -**	**2/99± 2/94**	Shift work

DISCUSS

The findings showed that increased diastolic blood pressure and triglyceride levels were associated with work shift. Other cardiovascular risk factors such as non-fasting blood sugar, blood cholesterol, body mass index and elevated systolic blood pressure after eliminating the effects of confounding There was no significant relationship with the type of work plan. Studies have shown that high blood pressure, whether systolic or diastolic, can be predictive of cardiovascular events (10).The study of the relationship between work shift and high blood pressure in different studies has had different outcomes of 31. In a review study that analyzed 34 case-control studies by the end of 2011, the researchers concluded that there was a significant relationship with cardiovascular events (myocardial infarction, coronary events, etc)(7). A large cohort study has also been carried out in this area (11.12). A 14-year-old study in Japan showed that the switching effect affects both systolic and diastolic blood pressure, as reflected by the effect of age and body mass index It has also been greater (13).In a large cohort study, which evaluated 10173 different tasks for people with programs of 27.5 years (from 1981 to 2009), the risk of high blood pressure (140.90 BP) was calculated by multivariate regression model. Male entrepreneurs They were employed in different industries in Japan who had no specific disease and their age at the start of the study was less than 32 years old. All of these people had a fixed work schedule during the study period. Comparison of routine workers with routine showed that the risk of hypertension (systolic and diastolic) (for rotational rotation) was 1.85 (with a confidence range of 95% 0.83-0.33) (8).In a recent cross-sectional study, the association between the average blood pressure and the work schedule of general hospital personnel in Brazil was evaluated. Finally, after removing the effect of confounders, there was no relationship between the time of staff shift and the average of four times the blood pressure measurement. There was no significant difference in This female gender prevalence study was among the participants (88%). A cross-sectional study of German automotive workers showed a high correlation between high blood pressure and shift work, but reported this correlation with the behaviors of shift workers (14). A lot of cohort studies have been conducted in our country, but there are quite different results. The secretary of the race, who has followed 50 nurses and 50 day-care workers for 5 years, has not seen a connection between hypertension (systolic and diastolic) (and no work shift). (15) The examination of the occupational records of the two large industry workers in Isfahan also showed that From the 8 years of follow up, there was no significant difference between the two groups of shift work and daily work. (Pressure) In the study, the difference in blood pressure levels between the two groups was related to age, work experience, body mass index

and education level (16).In general, it seems that several factors affect the combined results of high blood pressure and switching in different studies: demographic characteristics and follow-up duration of the participants - the mean age of the participants in different studies was different. In this study, age with all cardiovascular risk factors was statistically significant. Gender is one of the variables that influences the effects of shift work. The behavioral and physiological responses of male and female workers to work shift (1718) showed that cross-sectional studies on female workers reported fewer side effects between high blood pressure and shift work (14). Race is also one of the variables that has been considered in recent research. Livia reports that the turnaround in the African American race is considered a risk factor for hypertension, but it is not the case for white race (19). Another factor is the difference in the behaviors and habits of workers in different societies, which results in a kind of life and culture and economy and welfare. Several studies have shown the effect of behaviors and habits on the frequency of high blood pressure in shifters (20,21). In the present study, among the variables studied, smoking was higher among shift workers. Although no significant difference was observed. There is a significant difference in the habit of regular exercise between the two groups. As with 32% of shift workers, 8% of regular workers are regularly in regular exercise. However, the amount of obesity (defined as BMI) (25 ≤) was not significantly different in two groups. This can be due to different nutritional patterns , The effect of circadian rhythm disorder on blood transfusion and leptin and ghrelin hormone levels, or poor accuracy in filling the questionnaire by personnel (22-24).In the present study, after eliminating the effect of confounding factors, the frequency of non-fasting blood sugar, cholesterol, and body mass index in the shift group was higher than the working day but did not show any significant difference. (Table 3). This result is similar to the results of a cohort study in the country in which there was no relationship between work shift and blood cholesterol levels in nurses (15). Another study in Iran reported reverse outcomes of this study: the unconventional level of cholesterol There was a significant relationship between shift work and non-naturally occurring triglyceride levels. (25). This difference in the results may be attributed to the gender of the participants who were all gentlemen, the higher mean age and work experience than the present study, the different definition of the shift and the non-normal level of triglyceride.) In the study, it has been noted that level 202 is higher for non-natural triglycerides. (Some studies have attributed increased triglyceride to dietary habits and genetic factors (26.27.28).Some studies have found that there is a clear relationship between the work shift and the level of triglyceride, which may reduce the amount of triglyceride by adjusting the shift. For example, in one study, changing the

direction of rotation of the shift according to the counterclockwise, the clockwise increase of 49% of the clock triglyceride decreased by 1%, and the rotation of the counterclockwise shift shifts increased 49% in the triglyceride level of the blood (29 and 30).Fasting blood glucose and diabetes mellitus are considered as a risk factor for heart disease. Physiologically, shifting with disturbances in circadian rhythm and sleeping and awakening habits may lead to changes in blood glucose regulation (31). However, various studies have reported different effects on long-term shifting effects. A 10-year-old futuristic study of two day care groups and shift rotation work in a Japanese industry followed a hazard ratio of HbA1C≥6 as diabetes (1.35 / 1.50 / 1.75) for shift work (11) Another 8-year cohort study in Japan had similar results (32).In Sweden, researchers in a study conducted over 22 years of follow up of 488,000 female nurses. The risk ratio for diabetes in different groups (working experience under 4 years old, 4-42 years and over 4 years) was different, with a significant relationship with a work history of more than 42 years, and this increase to a large extent attributable (33). In a cross-sectional study in Urmia, comparing the drivers of night work in Iran with working day workers showed a significant increase in the incidence of fasting blood glucose (110 mg / dL and above) (OR = 1 / 9 p <0/001). According to the drivers' work schedule, this work has been referred to at least 49 hours of weekly work between 9 o'clock and 8 o'clock, which is different from the definition of shift work in hospital staff and in the present study (34). In this study, fasting blood glucose 126 mg / dl and above was more common in the shift group, but the difference was not significant with the day care group. The difference between the findings of various studies, together with our study, may be different from definitions of hyperglycemia or diabetes, the differences in the type of studies, the length of the participants' tracking time, the race and the age of the worker, the various definitions of night work and work shift. Returns. The average work experience in this study was less than about 5 to 10 years in comparison to conflicting studiesOn the other hand, in our study, the shift group has varied over the years of work, and some have been in daily work. This change in the work schedule in the hospital workforce is not unusual and may be part of the difference between the results of cross-sectional and prospective studies on this issue. Among the limitations of this study, the following are noteworthy: the shift has been taken into account with the general definition, and the work of the night has not been distinguished from the rotary shaft. The reason for this was the very low number of night work personnel. The study type does not confirm the causality relationshipTherefore, the design of data recording systems and conducting prospective studies and long-term follow-up of the workforce are recommended for accurate determination of the causality relationship. There is also the possibility of

premature displacement or early retirement of staff with cardiovascular disease in this study, therefore, the prevalence cardiovascular risk factors among shift workers are higher than those listed in this study.) Healthy worker effect (due to resource constraints, other factors affecting cardiovascular diseases such as stress and occupational safety, nutritional patterns, work schedule details such as the number of days off at the moon, long hours of work and income levels were not investigated in this study, which could Future studies should be considered.

CONCLUSION

Considering the results and comparing them with other studies, it can be said that switching can be considered as one of the risk factors for cardiovascular disease. On the other hand, since the sampling from 3 educational hospital in different parts of the city ofjahrom, the results of this study are largely applicable to the health staff of Jahrom University of Medical Sciences. Therefore, the study of occupational health of shift workers and support programs includes the modification of professional tensions by the team, the balance between work and personal life, personal lifestyle modification and nutrition patterns, planning for regular exercise and recreational and entertainment programs. It turns out.It is also necessary to identify high risk individuals for cardiovascular diseases and to determine the fitness of employees to work in the form of occupational health programs. Obviously, the benefits of such interventions are both for the individual themselves and for achieving the ultimate goals of the implementing organization, including increasing productivity, creativity, reducing absenteeism, costs of treatment and the severity of employees, and ultimately increasing general public health.

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