

Cardiovascular Disorders Risk Factors in Different Industries of Iran

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ABSTRACT

Background: Disorders of cardiovascular system can cause disability or death, screening is necessary specially in workers who maybe had risk factors. Hypertension, hyperlipidemia, obesity, smoking, genetic, exposure to chemicals, fumes, solvents, coldness are non occupational and occupational risk factors. Objective was comparison of cardiovascular disorders risk factors between workers in different industries of Iran.

Methods: In a cross-sectional study, workers of automobile, food industries and light works had been selected and cardiovascular disorders risk factors had been gathered then data analyzed in SPSS with one-way ANOVA, Chi-2 and multi nominal logistic regression with $P < 0.05$.

Results: 875 workers had been participated in the study, all of the cardiovascular disorders risk factors were in the normal range. Mean of high density lipoprotein (HDL) in food industry workers was 63.83 ± 17.42 mg/dl and it was protective, but in workers who work in automobile industry was 38.97 ± 11.08 mg/dl and the lowest, Also hypertension and hypertriglyceridemia were more prominent in this industry and after regression with $P < 0.05$, the differences were significant.

Conclusions: Screening of cardiovascular disorders risk factors were important and helpful in industries specially automobile industry, that might be preventive method for these disorders in the future.

Keywords: Automobile industry, food industry, hypertension, hypertriglyceridemia, light works

INTRODUCTION

One of the most important organ systems is cardiovascular that it's disorders specially ischemic heart diseases can cause disability or death. Some people specially workers who work in special industries are more in the risk of same disorders.^[1-3]

There were many studies work on workers' health but there were some of them, study on cardiovascular system because these disorders have more than one etiology and one of the modifiable risk factors or etiology is work exposure.^[1-4]

According to these realities; cardiovascular disorders risk factors were assessed and measured such as triglyceride, total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), blood pressure, obesity, smoking, genetic. Also shift work, stress, Carboxy hemoglobin (COHb), solvents, noise, vibration, temperature of environment, air pollution,... can affect on these parameters. By screening in periodic examination can find the high risk personnel with non occupational and occupational risk factors of cardiovascular disorders.

Exposure to fumes, solvents, additives and drugs, Carbon monoxide, Carbon disulfide, pesticides, heavy metals, cold or warm environment, air pollution, vibration and noise can cause occupational cardiovascular disorders.^[1,2,4]

Sancini *et al.* had demonstrated work as a farmer, have a heavy and manual work,^[5] exposure to noise and some physical or chemical were cardiovascular disorders risk factors.^[5-7]

Ghiasvand *et al.* in their study had shown that work in rail road industry was a risk factor and can cause hyper low density lipoprotein, specially in workers who had shift work.^[8] In study of National Heart, Lung, and Blood Institute had been shown that the work in tunnel can cause exposure to carbon monoxide and other study on foundry workers can cause the same exposure.^[9,10] Kim *et al.* in other study had demonstrated that work in refrigerated industry was not a risk factor but workers who work in cold place and environment had diastolic blood pressure in more amount, it was in comparison between exposure to cold and non exposure to it.^[11] Zdrenghea *et al.* had shown that work as a engine driver had cardiovascular risk factors, because they had more hypertension and hyperlipidemia than control group.^[12]

Kang *et al.* in their study had found that work in companies and related job mental stress specially in the background of decision making it was related to amount of cholesterol and triglyceride, in the background of demands of work these were related to systolic blood pressure.^[13] Chin-Ming LIN *et al.* had demonstrated that medical technicians had more hypertensive disorders than other healthcare workers.^[14]

Donaldson *et al.* Also Kim had shown the relationship between cold exposure and increasing of blood pressure or hypertension.^[13,15]

The objective of this study was comparison of cardiovascular risk factors between workers in different industries of Iran.

METHODS

Study setting

This study was performed in Khorasan Razavi and Tehran industries in 2007-2011, workers who divided to three groups; automobile industry who work in production saloon, food industry and light works such as office worker, administrative, healthcare, sanitary workers.

Study design and target population

In a cross-sectional study with simple randomized sampling method workers had been selected. With $\alpha = 0.05$, $\beta = 0.80$, $P = 25\%$ population were at least 150 person in each group from 10 factories of automobile, food industries and light work. About 1000 person had been evaluated for having inclusion criteria or excluded from study.

Checklist design

This study has been done by completing checklist from medical issues of workers. For validity and reliability of research tool; checklist have been written and improved in educational department with professors opinions, it had pilot study with correlation coefficient of 85% and it have been used.

Checklist of this study had non occupational and occupational risk factors for cardiovascular disorders. Data were gathered from medical issues because all workers had periodic physical and paraclinic examinations such as blood pressure blood sampling for triglyceride, total cholesterol, low density lipoprotein, high density lipoprotein, Fasting blood sugar, Age, body mass index, work duration, smoking, shift work.

Inclusion criteria was at least three year work duration in the same industries and exclusion criteria were previous cardiovascular disorders or dyslipidemias.

Three groups had been observed for age, work duration, body mass index, shift work.

Statistical analysis

Data were gathered in SPSS 11.5 and analyzed for calculation of frequency, mean, ANOVA

for quantitative variables, Chi-2 for qualitative variables and multi nominal logistic regression with $P < 0.05$. In regression cardiovascular risk factors such as Hypertension, Hyper triglyceridemia, Hyper cholesterolemia, Hyper low density lipoproteinemia (LDL), Lower high density lipoproteinemia (HDL), Diabetes Mellitus, Smoking has been analyzed.

Ethical consideration

This study has been approved by university board, for research ethics; with oral satisfaction and I told that cumulative data have been used result will be without name of industries.

RESULTS

Results are in three sections, general information, specific information and cardiovascular risk factors from 875 workers of industries. 403 (46.0%) from automobile industry, 166 (19%) from food industry and 304 (35%) from light works had been participated in this study. Workers had rotating shift work.

In general mean of age, work duration, body mass index, smoking had been calculated. The mean of age in automobile industry was 34.87 ± 6.19 years old, in food industry was 34.13 ± 8.64 years old and in light works was 31.40 ± 5.70 years old with $F = 25.146$ and $P < 0.001$.

The mean of work duration in automobile industry was 10.37 ± 4.86 years, in food industry was 5.94 ± 2.46 years and in light works was 5.16 ± 1.98 years with $F = 117.286$ and $P < 0.001$.

The mean of body mass index in automobile industry was 25.67 ± 3.39 kg/m², in food industry was 25.01 ± 0.01 kg/m² and in light works was 24.63 ± 3.09 kg/m² with $F = 4.022$ and $P = 0.018$.

76 (18.8%) of automobile industry workers were smoker, none of the food industry worker and 11 (3.6%) of light works were smoker.

In specific information mean of systolic blood pressure, diastolic blood pressure, triglyceride, total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), fasting blood sugar had been measured. In Table 1 these information had been demonstrated and there were comparison of related variables to cardiovascular disorders between industries workers.

Then number and percent of cardiovascular risk factors such as obesity, hypertension, hyper triglyceridemia, hyper cholesterolemia, hyper low density lipoprotein, lower high density lipoprotein, diabetes mellitus, were determined and compared in Table 2. Although The person-time in automobile industry, food industry and light works were 4179.11, 986.04 and 1568.64.

DISCUSSION

According to the results workers of food industry more healthy than other industries for cardiovascular disorders, mean of high density lipoprotein (HDL) was more than 63 mg/dl and it was preventive factor. Also according to results automobile industry workers had more obesity, hypertension, hyper triglyceridemia, hyper low density lipoprotein, lower the high density lipoprotein, diabetes mellitus. After the regression analysis, hypertension, hyper triglyceridemia, lower high density lipoprotein had significant difference and more in automobile industries. There were some same results in previous studies, but total cholesterol, systolic and diastolic blood

Table 1: Comparison of risk factors to cardiovascular disorders between industries workers

Industry variable	Automobile industry $\mu \pm SD$	Food industry $\mu \pm SD$	Light works $\mu \pm SD$	F	P
Systolic blood pressure	112.74±13.24	119.30±9.9	116.20±10.37	20.411	<0.001
Diastolic blood pressure	75.09±9.62	78.61±4.75	76.38±6.016	12.292	<0.001
Triglyceride	174.36±108.71	166.18±77.97	164.06±61.05	1.097	0.334
Total cholesterol	177.13±38.52	193.74±30.47	184.66±29.48	10.830	<0.001
Low density lipoprotein	105.62±33.43	110.23±19.91	104.45±28.34	1.214	0.298
High density lipoprotein	38.97±11.08	63.83±17.42	48.59±32.77	67.991	<0.001
Fasting blood sugar	85.17±17.18	90.01±0.01	82.86±8.21	0.950	0.338
Work duration	10.37±4.86	5.94±2.46	5.16±1.98	117.286	<0.001

$P < 0.05$

Table 2: Comparison the number of cardiovascular disorders risk factors between industries workers

Industry variable	Automobile industry	Food industry	Light works	<i>P</i> <0.05	After regression <i>P</i> <0.05
	<i>N</i> (%)	<i>N</i> (%)	<i>N</i> (%)		
Hypertension	14 (3.5)	2 (1.2)	1 (0.3)	0.008	<0.001
Hyper triglyceridemia	102 (25.2)	25 (15.1)	51 (16.8)	0.004	0.002
Hyper cholesterolemia	92 (22.7)	37 (22.3)	60 (19.7)	0.616	0.922
Hyper low density lipoproteinemia	56 (13.8)	12 (7.2)	21 (6.9)	0.004	0.060
Lower high density lipoproteinemia	282 (69.6)	10 (6.0)	77 (25.3)	<0.001	0.003
Diabetes mellitus	7 (1.7)	0	0	0.013	0.940
Smoking	76 (18.8)	0	11 (3.6)	<0.001	0.215

P<0.05

pressure were more in food industry workers but in the normal range.

Sancini *et al.* had demonstrated that exposure to noise and some physical or chemical were cardiovascular disorders risk factors.^[5]

Zdrenghea *et al.* had demonstrated that work as a engine driver had cardiovascular risk factors, because they had more hypertension and hyperlipidemia than control group.^[12] Ghiasvand *et al.* in their study had shown that work in railroad industry was a risk factor for cardiovascular diseases and can cause hyper low density lipoprotein and total cholesterol in blood, specially in workers who had shift work.^[8]

Cardiovascular disorders such as hypertension can cause stroke, heart diseases,... and had relation to long time disability and out of work.^[16,17] Forbidden the smoking, control of temperature were popular advices for managers of industries to have healthy workers.^[18-22]

There were fumes, solvents, stress, heavy metals,... In automobile industry that affect the cardiovascular system, although were controlled. In study of National Heart, Lung, and Blood Institute had been shown that the work in tunnel can cause exposure to carbon monoxide and other study on foundry workers can cause the same exposure.^[9,10]

But about food industry temperature of environment is more important risk factor, that was controlled in food industries of Iran. Personal protective devices and clothes were suitable for these environment. The workers in automobile industries had more work duration, older and body mass index. Also light works such as office worker, administrative, healthcare, sanitary workers had more risk factors than food industry workers,

that may be had better health with follow up of screening results.

Screening of cardiovascular disorders risk factors in all works and industries can helpful and benefit.

According to other studies in some industries controls of shift work,^[23-30] stress,^[31] noise, vibration and chemical exposures are helpful.

In this study, after multi nominal logistic regression; hypertension, hyper triglyceridemia, lower the high density lipoprotein were significant and the most in workers of automobile industry.

Automobile industry have a lot of cardiovascular risk factors, these were fumes and other chemicals, physicals, Control of them can reduce the risk of occupational cardiovascular disorders, one of the ways to control was engineering method, then administrative and at the end personal protective devices.

Medical surveillance with periodic examination for screening of non occupational^[32] and occupational disorders,^[33] specially risk factors of cardiovascular disorders can be helpful.

CONCLUSION

Screening of cardiovascular disorders risk factors were important and helpful in industries specially automobile industry, that might be preventive method for these disorders in the future.

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