

## Review Article

## Work Intensity and Cardiovascular Disorders

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**Abstract: Background:** Heavy physical activities could be affected the cardiovascular systems and might be caused cardiovascular disorders. Objective of this study was the effects of heavy manual work on cardiovascular disorders. **Methods:** It was a review study and was done by research in text and related articles; metabolic equivalent tasks (METs), cardiovascular disorders assessed. Data were analyzed with SPSS 16, t-test, ANOVA and Chi-2 were calculated with considering  $P < 0.05$  as significant level. Relative risks were calculated with confidence interval 95%. **Results:** Arrhythmia, varicose veins, unstable angina and stable angina were the most in heavy workers. Relative risks were the most in heavy physical activities for arrhythmia and relative risk of varicose veins. **Conclusions:** Heavy physical activities could be caused arrhythmia and varicose veins and may be related to unstable angina and stable angina too. Prevention and suitable exercises should be useful in this situation.

**Keywords:** Cardiovascular disorders, Heavy physical activities, Risk factors.

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### BACKGROUND

Heavy physical activities could be affected the cardiovascular systems and might be caused cardiovascular disorders.

Cardiovascular disorders were more prominent in recent decade those could be caused impairments and disabilities in the world [1].

Cardiovascular disorders had many risk factors. Some changeable risks were obesity (BMI 30 and more than 30), smoking (1 pack year and more), stress (environmental and occupational), hyper low density lipoprotein (LDL > 130 mg/dl) and hyper triglyceride (TG > 200 mg/dl) and hypertension (blood pressure 140 mmHg and more than 140 for systolic pressure and 90 mmHg and more than 90 for diastolic pressure), air pollution and occupational exposures [2-4].

In recent decades the physicians worked on ischemic heart diseases [5]. In the occupational situations and in the workplaces chemicals were more prominent item that could be caused disorders. Metals, solvents, gases and other pollution had negative effects on heart and vessels [6-8]. In some studies were worked on physical factors. Some of them could be affected the cardiovascular system such as noise, vibration and coldness [9-11].

But another studies studied about the role of work load on cardiovascular system and showed the negative effects of its [12].

In synergistic effects of these factors we saw the increased numbers of cardiovascular disorders [10,12]. In some study demonstrated the effects of night shift work on cardiovascular systems [13-16]. Another studies showed the negative effects of stress on heart diseases [17-19].

Cardiovascular disorders could be caused the disability and attention to these was important specially in the workplaces [20]. There were little studies worked on intensity of physical activities and its effects of cardiovascular systems and disorders [21].

Some studies demonstrated the effects of heavy physical works on cardiovascular systems and other organ systems such as musculoskeletal [22,23].

Tests were necessary for checking the physical capacity at the beginning of the job [24]. That could be predicted the future physical fitness. Standard exercises must be helpful but work activities could not be the same effects [25]. In pre placement occupational health centers must be emphasized on physical and psychological items too [26].

Objective of this study was the effects of heavy manual work on cardiovascular disorders.

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## METHODS

Study Setting; articles and text related to subject.

In study design; It was a review study, was done, about cardiovascular risk factors and disorders. The data were taken from articles about aerobic tests (Mc Ardle step test). According to metabolic equivalent tasks (METs) the studies were divided to 3 groups.

Inclusion criteria in studies were workers who worked in the same industries with at least 5 years work experience in the same intensity of work activities. Exclusion criteria were having the cardiovascular disorders before beginning this job.

In studies participants were evaluated and observed for risk factors for cardiovascular disorders: age (40s and more than 40s), obesity (BMI 30 and more than 30), smoking (1 pack year and more), stress (environmental and occupational), family history (cardiovascular disorders related disorders), hyper low density lipoprotein (LDL>130 mg/dl) and hyper triglyceride (TG>200 mg/dl) and hypertension (blood pressure 140 mmHg and more than 140 for systolic pressure and 90 mmHg and more than 90 for diastolic pressure).

In checklist design for the study; the validity and reliability were checked with professors' opinions and also a pilot study was done with correlation coefficient 91%. The author interviewed and did aerobic tests in suitable site. Standard step test (Mc Ardle) was done.

Exposure assessment; for exposure assessment in this study: According to metabolic equivalent tasks (METs) of works; participants were divided to three groups; light physical activities (group 1: METs<3), moderate physical activities (group 2: 3≤METs<6) and heavy physical activities (group 3: 6≤METs).

They had the same rotating shift work. Occupational exposures were measured.

For statistical analysis, data was analyzed with SPSS 16. Chi-2 and ANOVA were used to compare qualitative and quantitative variables and P value less than 0.05 was considered for significant levels and relative risks were calculated with confidence interval 95%.

## RESULTS

According to exposures, in these studies participants were divided to 3 groups. The mean age of population was 33.52 years old. The mean of work duration was 8.03 years at the beginning of study. The mean of body mass index (BMI) was 25.30 kg/m<sup>2</sup>.

The comparison between frequencies of cardiovascular disorders risk factors in three

groups. (P<0.05) Hyper low density lipoprotein (LDL>130 mg/dl), hyper triglyceride (TG>200 mg/dl), smoking, obesity and stress were the most in heavy work but had not significant differences. Hypertension (blood pressure 140 mmHg and more than 140 for systolic pressure and 90 mmHg and more than 90 for diastolic pressure) the most in heavy work and had significant differences (P<0.05).

The comparison between frequencies of cardiovascular disorders in three groups (P<0.05). Unstable angina and stable angina, myocardial infarction and others such as thrombosis and cardiomyopathy were the most in heavy work and not significant differences. Arrhythmia and varicose veins were the most in heavy work with significant differences (P<0.05).

The relative risks of cardiovascular disorders in three groups. The risk for varicose veins were the most with in heavy work. Arrhythmia had the most relative risk in heavy work too.

Relative risks for unstable angina and stable angina were more but had not significant differences with P<0.05.

## DISCUSSION

Also according to study results, the number of workers with hypertension was the most in heavy work.

The number of workers with hypertension were the most in heavy work with significant level P<0.05. But numbers of hyper low density lipoprotein (LDL), hyper triglyceride (TG), smoking, obesity and stress were the most in heavy work but not significant differences.

Arrhythmia and varicose veins were the most in heavy work with heavy physical activities and had significant differences.

Cardiovascular disorders could be resulted to morbidity and mortality and unfortunately some of the related workers were disabled from these [20]. Work intensity was an important fact that could be affected many organ systems and one of the most important organs was cardiovascular but musculoskeletal and reproductive systems could be affected [21-23]. The risk of occupational poisoning to chemicals should be increased with increased activities.

Physical capacity of workers could be increased with some standard and suitable exercises, regular working could not had the same results [24].

Attention to exercises, nutrition, mental health and habits must be done. In this study there were not significant differences for smoking, obesity and stress between three groups.

There were some studies about the physical fitness of workers. Fitness was an important item in having the better working health. Study showed that increased occupational physical activity did not improve physical fitness [25]. But previous preparation for work could be useful [26].

There were other studies about the occupational health those emphasized on fitness of workers. The workers must be helped themselves for having the better fitness and wellbeing in the career development [27]. In this situation cardiovascular systems could be protected with some activities. In this study the numbers of unstable angina and stable angina were the most in heavy physical activities but not significant. It seemed that these disorders may be related to other risks for example hypertension. Arrhythmia could be triggered with vigorous activities and varicose veins maybe increased with heavy works [2,4].

According to this Study, researcher told that job analysis and determination of occupational risk factors for different industries specially with heavy physical activities were necessary.

Author found that heavy physical activities had risk for cardiovascular disorders. Intensity of physical works was important in this situation.

Although the heavy activities could be the effective occupational hazards for cardiovascular disorders specially arrhythmia and varicose veins, however the physical and psychological risks should be assessed.

## CONCLUSIONS

Arrhythmia, varicose veins, unstable angina and stable angina were the most in heavy workers. Heavy physical activities could be caused arrhythmia and varicose veins and may be related to unstable angina and stable angina too. Prevention and suitable exercises should be useful in this situation.

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