Research Paper

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Impact of Occupation on Occurrence of Hypertension and Obesity Among Mine Workers in Western India

Medical Science

KEYWORDS : mine worker, Body mass index, Hypertension, obesity

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ABSTRACT

Mining is one of the physically demanding occupation and mine workers are involved in heavy physical work. 1401 mine workers engaged in various sub-occupations were divided according to their job profile to study prevalence of hypertension and obesity. The objective of the study was to determine the impact of their occupations on BMI and hypertension and also to examine the relation between body mass and blood pressure. On the basis of their occupation in the mining area study workers were divided into two groups, The Light occupation group (n=335) and Heavy occupation group (n=1066). The overall prevalence of hypertension was 10.3 %. The prevalence of hypertension amongst light occupation workers (14.9%) was higher in comparison to the heavy occupation workers (8.9%). Obesity (BMI ≥ 30) was more pronounced in light occupations group than heavy occupations groups thereby showing that the obesity is common amongst sedentary workers. It has been observed occupation is potential confounders and play a role in the relation between body mass and blood pressure.

INTRODUCTION:

It is a well-recognized fact that overweight, obesity and hypertension are some of the major public health concerns in recent times. Obesity is characterized by increased waist circumference (WC), waist-height ratio (WHtR), conicity index (CI) waist-hip ratio (WHR) and body mass index (BMI)[1]. Many factors have been identified as the causative agents of obesity which includes hormones, heredity, altered metabolic mechanism, lack of physical exercise and over-eating. The most common factor responsible is consumption of calories in excess of the normal body requirements [2]. WHO reported that a change in lifestyle and eating habits and less physical activity has resulted in increase in the number of overweight and obese individuals. This epidemic is on rise and needs to control [3]. Obesity has a potential detrimental effect on blood pressure and increases cardiovascular events. Hyper-insulinemia and leptin released from adipose tissue play an important role in the development of hypertension in obese individuals. Insulin and leptin increase sympathetic tone, which results in sodium retention and hyper-responsiveness of blood vessels [4]. Hypertension is caused by numerous factors such as genes, age, alcohol intake, excessive intake of salt, overweight, obesity and a sedentary lifestyle. It has been observed that overweight could be a major factor in determining the increasing rates of coronary heart disease by its influence on blood pressure [5]. Mining being one of the occupation demanding strenuous physical activity where in the mine workers have to put in lot of hard work in their job and hence it is generally assumed that lifestyle diseases especially obesity is not a concern however related data is not available and hence the present study was carried out to study the prevalence of lifestyle diseases like obesity and hypertension and relationship of hypertension in mine workers.

MATERIALS AND METHODS:

The data of periodical medical examination of 1401 mine workers in western India was analyzed. Mine workers were categorized in two groups depending upon their job profile. The first category comprising of 335 workers working in the administrative office were labeled as "Light occupation group" while the second category comprising of 1066 workers involved in active mining operations which included face workers, maintenance and transport were labeled as "Heavy occupation group". A complete history including personal, medical, family and occupational history recorded in a questionnaire was analyzed. Weight in kilograms and height in centimeters were recorded. The body mass (BMI) index was calculated dividing the weight by squared height and categorized according to the criteria recommended by the world health organization as follows 1) Normal weight: BMI < 25 kg/m2 2) Overweight: 25 ≤ BMI < 30) Obese BMI ≥ 30 [6]. Systolic and Diastolic Blood pressure (SBP) (DBP) were measured. The VI Joint National Committee criterion was used for defining arterial hypertension [7].

RESULTS:

Personal information about the subjects, such as age, height, weight, body mass index (BMI), and smoking habits are presented in Table 1. Smoking was more common in heavy occupation group (47.6%) compared to the light occupation group (30.7%).

Table 1: Personal information, educational status, BMI, Blood Pressure and duration of work exposure of mine Workers

Characteristics	light occupation group (n=335)	heavy occupation group (n=1066)	p-value
Age (years)	45.40 ± 8.20	40.83 ± 9.65	< 0.001*
Weight (kg)	67.44 ± 11.34	59.88 ± 11.70	< 0.001*
Height (cm)	166.03 ± 6.40	164.33 ± 8.01	< 0.001*
BMI	24.30 ± 3.60	22.05 ± 3.81	< 0.001*
Systolic Blood Pressure	125.4 ± 12.4	120.5 ± 13.2	< 0.001*
Diastolic Blood Pressure	81.8 ± 7.2	80.0 ± 8.5	< 0.005*
Work exposure (years)	21.35 ± 8.60	17.57 ± 8.80	< 0.001*
Education			
Illiterate	21 (6.26%)	252 (23.6%)	
Primary	32 (9.55%)	352 (33.0%)	
Secondary	68 (20.2%)	335 (31.4%)	
Graduate	214 (63.8%)	127 (11.9%)	
Smoking Habits			
Smoker	103 (30.7%)	508 (47.6%)	
Non-smoker	232 (69.2%)	558 (52.3%)	

*** statistically significant**

The overall prevalence of hypertension was 10.3% in the mine workers. Occupation wise status of hypertension and obesity in mine workers is shown in Table-2. It was observed that 21.2% and 14.9 % of the obese were having hypertension in light occupation group and heavy occupation group respectively. Whereas it was observed that 64% and 36.8% of the hypertensive was obese among light occupation group and heavy occupation group respectively. The "chi square" test shows significant relations between hypertension, obesity and occupation group ($P < 0.01$).

Table 2: Occupation wise Hypertension and obesity in mine workers

Hypertensive Status	Non obese	obese
Light Occupation (n=335)		
Non Hypertensive	166 (49.4)	119 (35.6)
Hypertensive	18 (5.3)	32 (9.5)
Heavy Occupation (n=1066)		
Non Hypertensive	772 (72.4)	199 (18.6)
Hypertensive	60 (5.6)	35(3.2)

Figures in parenthesis indicate percentage

The occurrence of hypertension in relation to high BMI is shown in Table 3. These differences are all statistically significant ($p<0.01$).

Table 3: Occurrence of Hypertension in relation to BMI in mine workers

	Light Occupation (n=335)	Heavy Occupation (n=1066)
BMI < 25 without HT	166	772
BMI < 25 with HT	18	60
BMI > 25 with HT	32	35
BMI > 25 without HT	119	199

$X^2 = 72.79$ $p < 0.0001$

DISCUSSION:

Life style diseases are on rise in both developing and developed countries which is now a major cause for mortality. Mine workers are assumed to be engaged in strenuous physical activity and hence they are less prone to obesity and hypertension. In this study the mine employees were divided into two groups to study and compare occurrence of obesity and hypertension. Obesity is well knows predisposing factor for hypertension. Also high blood pressure is considered to be the result of environmental influences acting over time on the genetically predisposed individual[8]. The present study findings showed that the mean SBP and DBP workers in light occupation group is higher than that of workers involved in heavy occupations workers even where both occupational groups share a common environment.

The findings are in line with a study conducted by Miall , et.al who observed that arterial pressure was significantly higher in light occupations than in those heavy occupations [9]. Morris and Crawford have shown a relationship between physical activity, hypertension and ischemic heart disease. In their analysis of national necropsy survey they found that hypertension was less common and occurred 10 to 15 years later in men previously employed in heavy occupations than in others [10]. One of the studies in Europe showed blood pressure to be higher in persons with occupations involving little physical activity than in those who were more active. In the present study the difference may be due to difference in degrees of physical activities. The job involved in light occupation group is more of sedentary nature as compared to heavy occupation group who are actively engaged in mining operations.

It was observed that 64% and 36.8% of the hypertensive was obese among light occupation group and heavy occupation group respectively indicating an association between higher blood pressure also had higher body mass index and vice versa. The association in the body mass index and hypertension between the light occupation workers and heavy occupation workers were statistically significant. This association has been well documented [11].

CONCLUSION

In present study occupations plays an important determinant of blood pressure and BMI as blood pressure and BMI among heavy occupations workers was less as compare to light occupation group workers which may be contributed to their level of physical activity. There is a positive relation between increased BMI and occurrence of hypertension.

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