

A Prospective Study Evaluating the Relationship between Hypertension and Obesity

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ABSTRACT

Introduction: The most common cardiovascular disease is hypertension and its prevalence varies between 10 to 20% among adult population. Amongst these factors abdominal obesity is an important risk factor and is harmful to health as it is very frequently associated with cardiovascular mortality. The aim of the present study was to evaluate the association between obesity and hypertension.

Material and methods: The present cross sectional study was conducted in the Department, Institute, State. The study was conducted for a period of 1 year. Data was collected from all the subjects in a predesigned proforma. Demographic details, information regarding their habits, socioeconomic status was also obtained. Serum tests were done to determine the total cholesterol levels. Amount of physical activity of each subject was noted. All the data was arranged in a tabulated form and analysed using SPSS software. Chi square test or Fischer exact test were used for analysis. Probability value of less than 0.05 was considered significant

Results: The study consisted of 240 subjects, out of these 50% (120) were males and 50% (120) were females. The mean age of the subjects was 38.23 +/- 12.51 years. Amongst males, 25% and 40.8% were obese based on waist hip ratio and waist circumference respectively. Amongst females, 83.8% and 73.8% were obese based on waist hip ratio and waist circumference respectively. There were 23.3% males (n=28) who consumed alcohol and 76.7% males didn't consume alcohol. Amongst females 5% (n=6) consumed alcohol and 95% (n=118) didn't consume alcohol. There was a significant difference amongst male and female alcohol consumers. Total cholesterol was normal amongst 75% (n=90) males and 69.2% females.

Conclusion: From the above study we can conclude that obesity is a significant risk factor for hypertension. The risk of obesity varies with the type of work, lifestyle habits, socioeconomic status and alcohol use. Obese people tend to be hypertensive more often than non obese individuals.

Keywords: Hypertension, Obesity, Risk, Waist

such as obesity, diabetes, smoking and sedentary lifestyle.⁵ Amongst these factors abdominal obesity is an important risk factor and is harmful to health as it is very frequently associated with cardiovascular mortality.⁶ When abdominal obesity is associated with dyslipidemia, hypertension or glucose intolerance leading to a metabolic syndrome, the risk of cardiovascular disease increases several times.⁷ The prevalence and incidence of obesity and obesity-related disorders is increasing worldwide. According to the Center for Disease Control and Prevention, it was estimated that obesity would cost the United States at least \$147 billion in the year 2008. Therefore, there has been a paradigm shift in the various policies and strategies to prevent obesity. Cardiovascular mortality is also increasing at a parallel rate with obesity in the developing countries.⁸ Various cross-sectional and longitudinal surveys have demonstrated an association of blood pressure with body weight and concluded that this association increases with time as the weight increases.⁹⁻¹² This fact holds true even for lean individuals.¹³ However, there have been not much studies regarding this association amongst hypertensive subjects, more frequently studies have been performed on general population.¹⁴ The aim of the present study was to evaluate the association between obesity and hypertension.

MATERIAL AND METHODS

The present cross sectional study was conducted in the Department, Institute, State. The study was conducted for a period of 1 year. The study was approved by the institute's ethical board and all the subjects were informed about the study and a written consent was obtained from all in their vernacular language. In this study a total of 240 hypertensive subjects reported. Data was collected from all the subjects in a predesigned proforma. Demographic details, information regarding their habits, socioeconomic status was also obtained. Serum tests were done to determine the total cholesterol levels. Amount of physical activity of each subject was noted. Waist and hip measurements of all the subjects were obtained with an inextensible measuring

INTRODUCTION

The most common cardiovascular disease is hypertension and its prevalence varies between 10 to 20% among adult population.¹ Hypertensive patients have two times higher risk of developing coronary artery disease and four fold higher risk of congestive heart failure when compared to normotensive subjects.^{2,3} According to a study by Global Burden of Disease study by 2020, coronary artery disease and cerebrovascular disease will be the leading cause of death worldwide.⁴ Patients with hypertension require control of certain co morbidities and risk factors

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tape which had a width of 1.0 cm. For the measurements, individuals were made to stand upright and wear minimal clothing as possible. For obtaining waist circumference, the measuring tape was placed on an imaginary line between the iliac crest and the last rib at the level of the umbilicus. The largest extension of the buttocks was used for hip measurement. It was taken care that the soft tissues were not pressed during measurement. The WHR was calculated by dividing the waist circumference from the hip circumference. Individuals with WHR ≥ 1.0 for men and ≥ 0.85 for women were considered obese. For the waist circumference, cut off points were ≥ 102 cm for men and ≥ 88 cm for women.

STATISTICAL ANALYSIS

All the data was arranged in a tabulated form and analysed using SPSS software. Chi square test or fisher exact test were used for analysis. Probability value of less than 0.05 was considered significant.

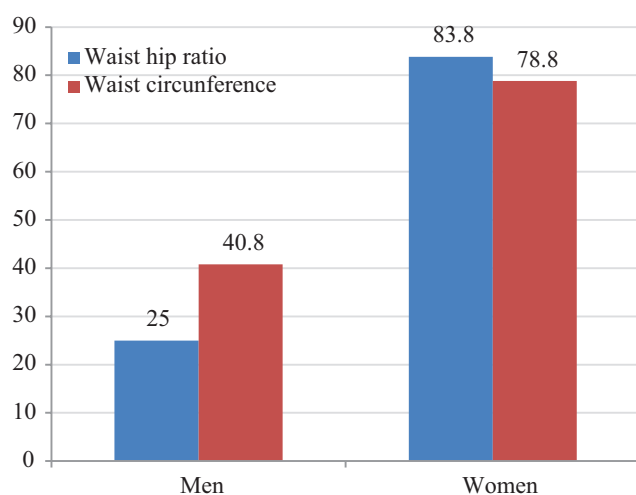


Figure-1: Prevalence of abdominal obesity amongst the study subjects

RESULTS

The study consisted of 240 subjects, out of these 50% (120) were males and 50% (120) were females. The mean age of the subjects was 38.23 ± 12.51 years. The average waist-hip ratio was 0.98 ± 0.05 for men and 0.93 ± 0.05 for women. Waist circumference average was $98.2 \text{ cm} \pm 10.3$ and $98.5 \text{ cm} \pm 11.9$ for men and women, respectively.

Figure 1 shows the prevalence of obesity amongst males and females that was denoted by the waist hip ratio and waist circumference. Amongst males, 25% and 40.8% were obese based on waist hip ratio and waist circumference respectively. Amongst females, 83.8% and 73.8% were obese based on waist hip ratio and waist circumference respectively. There was a significant difference in the prevalence of obesity amongst males and females.

Table 1 denotes the demographic details of the subjects. There were 95 males and 64 females who were married. 25 males and 56 females were unmarried. There was a significant difference amongst the males and females. Majority of the hypertensive males were more than 40 years of age and females were less than 40 years of age. There were 53.3% males and 48.3% females who were more than 40 years of age. There were 46.7% males and 51.7% females who were less than 40 years of age. There was no difference in age amongst both the groups. 53.8% males and 34.2% females were employed and 44.2% males and 65.8% females were unemployed. There was significant difference in employment amongst males and females. There were 40% males and 25.8% females who belonged to upper class, 28% males and 38% females belonged to lower class. There was a significant difference in socioeconomic status amongst males and females. There were 16.7% (n=20) males and 10.8% (n=13) females who were smokers. Rest of the subjects were non smokers. There was no significant difference amongst male and female smokers. There were 23.3% males (n=28) who consumed alcohol and 76.7%

Variable	Subgroup	Male		Female		P Value
		N = 120	%	N=120	%	
Marital status	Married	95	79.2	64	53.3	<0.05
	Unmarried	25	20.8	56	46.7	
Age	Less than 40 Yrs	56	46.7	62	51.7	>0.05
	More than 40 yrs	64	53.3	58	48.3	
Paid work	Yes	67	53.8	41	34.2	<0.05
	No	53	44.2	79	65.8	
Socioeconomic status	Upper class	48	40	31	25.8	<0.05
	Middle class	44	36.7	51	42.5	
	Lower class	28	23.3	38	31.7	
Smoking	Yes	20	16.7	13	10.8	>0.05
	No	100	83.3	107	89.2	
Alcohol use	Yes	28	23.3	6	5	<0.05
	No	92	76.7	114	95	
Total cholesterol	Normal	90	75	83	69.2	>0.05
	Raised	30	25	37	30.8	
Regular physical activity	Yes	32	26.7	19	15.8	<0.05
	No	88	73.3	101	84.2	

Table-1: Demographic details of the subjects

males didn't consume alcohol. Amongst females 5% (n=6) consumed alcohol and 95% (n=118) didn't consume alcohol. There was a significant difference amongst male and female alcohol consumers. Total cholesterol was normal amongst 75% (n=90) males and 69.2% females. It was raised in 25% (n=30) males and 30.8% (n=37) females. There was no significant difference in the level of cholesterol amongst the group. There were 32 males and 19 females who opted for regular physical activity. Rest 73.3% males and 84.2% females were not involved in regular physical activity. There was a significant difference in the proportion of males and females who opted for regular physical activity.

DISCUSSION

According to studies conducted in LMICs indicate that obesity increases the chances of hypertension amongst both children and adolescents. There is 2.1 times and 7.2 times, more risk of developing hypertension amongst overweight and obese children respectively.¹⁵ As per a study conducted in the year 2004 amongst the school going children at Texas, it was observed that the burden of hypertension was 4.5%, which were strongly associated with obesity.¹⁶ According to World Health Organization (WHO), there are about 7.5 million (12.8%) deaths caused due to hypertension and 57 million (3.7%) disability adjusted life years are lost because of hypertension.¹⁷ In various studies conducted among children in the Western world indicate the prevalence of hypertension to be between 7% and 19%.¹⁸ According to a study conducted in New Delhi amongst 12–18 years adolescents, concluded the prevalence of systolic and diastolic hypertension to be 7.84% and 2.15% and that of overweight/obesity was 18.6% and 16.5% amongst males and females, respectively.¹⁹ High BP was directly proportional to overweight/obesity. In our present study, There were 16.7% (n=20) males and 10.8% (n=13) females who were smokers. Rest of the subjects were non smokers. There was no significant difference amongst male and female smokers. There were 23.3% males (n=28) who consumed alcohol and 76.7% males didn't consume alcohol. Amongst females 5% (n=6) consumed alcohol and 95% (n=118) didn't consume alcohol. There was a significant difference amongst male and female alcohol consumers. Total cholesterol was normal amongst 75% (n=90) males and 69.2% females. It was raised in 25% (n=30) males and 30.8% (n=37) females. The reason behind increased blood pressure amongst overweight/obese adolescents might be due to excess sympathetic nervous system action, insulin resistance, and abnormality in structure and function of the blood vessels.²⁰ Studies conducted by Abolfotouh MA et al amongst Egyptian children and AK singh et al amongst Indian Adolescents show that obesity carries an increased risk of high systolic and diastolic blood pressure.^{18,19} In a study conducted by AK singh, addition of extra salt and smoking were significant risk factors that were associated with hypertension.¹⁹ Whereas these were not significant risk factors in our study. Family history of hypertension was significantly associated with hypertension in studies conducted by Abolfotouh et al.¹⁸ and Sunder et al.²¹ As per

a studies conducted by Sunder et al and others, physical inactivity was not found to be associated with risk of hypertension whereas in our study, lack of physical activity was significantly associated with hypertension.²¹⁻²⁷

Limitations

The effect of blood pressure on systolic and diastolic BP was not assessed separately. The division of age group was very gross in our study. Younger age group should have been assessed separately.

CONCLUSION

From the above study we can conclude that obesity is a significant risk factor for hypertension. The risk of obesity varies with the type of work, lifestyle habits, socioeconomic status and alcohol use. obese people tend to be hypertensive more often than non obese individuals. Awareness about obesity and hypertension and the risk of various other cardiovascular disease associated with obesity is important to bring a change in lifestyle habits.

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