



"CORRELATION STUDY OF HYPERTENSION AND DIABETES WITH OBESITY"

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ABSTRACT

Background: Hypertension, diabetes and obesity are one of the top risk factors for cardiovascular complications in the world. Indians have high burden of obesity compared to western population. Hypertension and type 2 diabetes mellitus are major non communicable diseases and it is important to examine modifiable risk factors such as obesity, physical inactivity, tobacco use and alcohol consumption. Obesity has become a global epidemic over the past few decades because of unhealthy habits and reduced physical activity, hypertension and diabetes are quite common among obese individuals and there is a linear relationship between the degree of obesity and these disease.

Materials and Methods: 1485 samples were selected from the patients attending OPD of Department of General Medicine JNKTMC Madhepura Bihar. They were assessed for height, weight and body mass index (BMI) measurement. Hypertension was defined according to the guidelines given in Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure. Abdominal obesity is defined as an abdominal circumference > 102cm in males and >88cm in females for NCEP criteria and > 90cm in males and > 80cm in females for IDF criteria for South Asians. Blood glucose concentration was measured, the diagnosis of diabetes was defined by either casual plasma glucose \geq 200mg/dl associated with symptoms of diabetes and on fasting samples- plasma glucose \geq 126mg/dl.

Results: Among all 1485 patients, 764(51.44%) were males and 721(48.56%) were females. It was observed that 32(2.16%) cases were obese, hypertension was observed in 289(19.5%) cases and diabetes in 168(11.3%). Among 289 hypertensive subjects, 214(74%) were obese and 75(26%) were non-obese. Out of 168 diabetic cases 96(57.1%) cases were obese and 72(42.9%) were non-obese. A statistically significant association was observed between diabetes, hypertension and obesity.

Conclusion: There is significant association between obesity, hypertension and diabetes. BMI can provide useful information to classify the presence of hypertension and diabetes in population, weight loss achieved through lifestyle interventions like dietary adjustments and regular physical activity are safe and moderately effective measures for management of hypertension and diabetes in obesity.

KEYWORDS : Obesity, Hypertension, Diabetes, BMI.

INTRODUCTION

Hypertension, diabetes mellitus and obesity together form 24% of the global risk for mortality cardiovascular disorder related to these life style diseases form the major cause of morbidity and mortality among the suffers worldwide. Obesity is increasing constantly in the population and is one of the major contributors of disease prevalence due to its pathophysiological link to other cardiovascular risks such as hypertension and diabetes. It was estimated that, in the year 2010, 6.4% of adults would have diabetes mellitus affecting 285 million in the world and it will increase to 7.7% by the year 2030, affecting about 439 million adults.

In India, reports suggest that age-adjusted prevalence of obesity has doubled in men and has increased 3 folds in women from 1970 to 1990.^{iv} It has also been suggested that increased consumption of fast food and limited or less physical activity have contributed to an increased prevalence of obesity and its co-morbidities. hypertension and type 2 diabetes mellitus (T2DM) are the major non-communicable diseases (NCDs) and it is important to examine the role of modifiable risk factors resulting in NCDs such as obesity, physical inactivity, tobacco use and alcohol consumption. Hypertension and obesity can increase the risk of various complications of T2DM which includes stroke, heart disease, vascular diseases, chronic kidney disease and death. Also it has been shown that relative risk of cardiovascular disease for persons with diabetes is twice or more than that of persons without diabetes.^{vi} Blood pressure control is shown to be associated with a decreased risk of T2DM related complications including stroke and death.^{vii} Weight loss has been shown to help correct insulin resistance and dyslipidemia found in patients with T2DM. The World Health

Organization (WHO) defined metabolic syndrome (MS) as the presence of type 2 diabetes or impaired glucose tolerance with any two of the following characteristics: obesity, low levels of high-density lipoprotein, high levels of triglycerides and hypertension. People with MS are 3-10 times more susceptible for developing cardiovascular disease with a high risk of morbidity and mortality.

This study aims to correlate and establish the relation between obesity with hypertension and diabetes.

MATERIAL AND METHODS:

This study was carried out of Department of General medicine, attending OPD at JNKTMC Madhepura Bihar.

Table 1: distribution of subjects according to obesity, hypertension and diabetes

Characteristics	N=1485	%
Obesity	321	21.6
Hypertension	289	19.5
Diabetes	168	11.3

It was observed that 32(2.16%) cases were obese, hypertension was observed in 289(19.5%) cases and diabetes in 168 (11.3%).

Table 2: Association of diabetes and hypertension with obesity

	Obese	Non-obese	Total	P value
Hypertension	214 (74%)	75 (26%)	289	P < 0.0001
Diabetes	96(57.1%)	72(42.9%)	168	
Nil	11 (1.1%)	1017(98.9%)	1028	
Total	321	1164	1485	

They were assessed for height, weight and body mass index

(BMI) measurement. Pregnant women, people with fever or acute illness and those doing heavy exercise were excluded from study. General information like age, sex, family history and medical history for kidney disease, high blood pressure, diabetes, cardiovascular disease was recorded.

Hypertension was defined according to the guidelines given in Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure, if systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mm Hg and/or use of antihypertensive medications. Body weight and height were assessed with all subjects and rounded up to the nearest 0.1 kg and 1 cm respectively and body mass index was calculated. Waist circumference was measured over light clothing at a level midway between the lower rib margin and the iliac crest in centimeters rounded up to nearest 0.5 cm. Abdominal obesity is defined as an abdominal circumference > 102 cm in males and > 88 cm in females for NCEP criteria and > 90 cm in males and > 80 cm in females for IDF criteria for South Asians.

Blood glucose concentration was measured, the diagnosis of diabetes was defined by either casual plasma glucose ≥ 200 mg/dl associated with symptoms of diabetes and on fasting samples- plasma glucose ≥ 126 mg/dl. Individuals with self reported, prior physician diagnosis of diabetes were classified as having previously diagnosed diabetes.

Data was entered in Microsoft Excel 2013. Data analysis was done using SPSS software. Frequencies were calculated, the differences in categorical variables were examined using test for proportionality.

RESULTS:

A total of 1485 subjects were screened in OPD ages 18 to 67 years. Among all 1485 patients, 764 (51.44%) were males and 721 (48.56%) were females. Among 289 hypertensive subjects, 214 (74%) were obese and 75 (26%) were non-obese. Out of 168 diabetic cases 96 (57.1%) cases were obese and 72 (42.9%) were non-obese. A statistically significant association was observed between diabetes, hypertension and obesity.

DISCUSSION:

In our study it is noted that there is a strong association between hypertension, diabetes and obesity. Also the proportion of hypertensive's was higher in obesity compared to diabetes.

Lee et. al. in their study observed that higher intake of micronutrients such as fruits and vegetables is associated with general obesity in China.

The healthy traditional plant based diets are being replaced by cheaper calorie dense high-fat foods and junk foods. These changes are resulting in rapid increase in obesity throughout India and the subsequent development of metabolic syndrome. Also middle-aged group had a high incidence of overweight or general obesity and abdominal obesity. In children and young adults, a high intake of n-6 PUFA (polyunsaturated fats) are correlated with hyperinsulinaemia. In adults, high carbohydrate meal consumption is related to hyperinsulinaemia, postprandial hyperglycemia, and hypertriglycerolaemia.

The prevalence of general obesity was observed to be greater than 10% even in rural settings, may reflect the rising trends of obesity observed even in rural areas. In our study obesity was observed in 21.6% cases. Also it has been observed that of the total 289 hypertensive cases 214 (74%) were obese and 75 (26%) were non-obese. Out of 168 diabetic patients, 96 (57.1%) were obese while 72 (42.9%) were non-obese. Statistically significant association was observed in obese

cases with hypertension and diabetes.

Abdominal obesity is an important factor because metabolic syndrome and increased abdominal fat are related to a reduction of adiponectin with antiatherogenic and anti-inflammatory properties. Also the abdominal adipose tissue results in release of free fatty acids directly in the portal veins and altered lipid levels in the blood.

CONCLUSION

Our study shows that there is strong association between obesity, hypertension and diabetes. BMI can provide useful information to classify the presence of hypertension and diabetes in the population weight loss achieved through lifestyle interventions like dietary adjustments and regular physical activity are safe and moderately effective measures for management of hypertension and diabetes in obesity.

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