Assessment of body mass index in hypertensive patients among rural population

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Abstract

Background: Body Mass Index has been identified by World Health Organization (WHO) as the most useful epidemiological measure of obesity. Obesity is one of the major risk factor for hypertension and body mass index has been described as a significant predictor of blood pressure. Several studies have shown that there is a significant relationship between relative weight and height. The anatomical distribution of weight has also been shown to be a factor in determining which people are more susceptible to hypertension and thus at risk of developing cardiovascular diseases.

Methodology: The present study was designed to assess the body mass index in hypertensive patients. Body Mass Index provides a reliable indicator of body fatness for most of the people and is used to screen weight categories that may lead to various health problems. The study was conducted on 30 hypertensive patients aged 45-65 years. The measurements taken include Systolic blood pressure, Diastolic blood pressure, Body weight and Height. Information was obtained about lifestyle and occupation as well as familial history of hypertension, Diabetes Mellitus, Cardiac and renal diseases.

Results: The result suggests that there is a consistent relation between body mass index and hypertension. Also there is relation between age with body mass index and hypertension in both males and females. It showed a higher trend of hypertension with increasing body mass index. The risk of hypertension is higher among population group with overweight and obesity.

Conclusion: A significant relation between body mass index and systolic as well as diastolic blood pressure was demonstrated among hypertensive patients.

Keywords: Hypertension, Body Mass Index, Blood Pressure.

Introduction

Obesity has been particularly recognized as a major independent risk factor for cardiovascular diseases[1]. This is because increased body fat is accompanied by profound changes in the physiological and metabolic functions of the body which are directly dependent on the degree of excess weight and on its distribution around the body. The prevalence of obesity is rising in developed and developing nations and it is cited as an important risk factor for early mortality[2].

Body Mass Index (BMI) is calculated as weight in kilograms divided by height in meters squared (Kg/m2). The current WHO expert committee proposed BMI cut-off points of <16 kg/m2 for severe underweight, 17.0 to 18.49 kg/m2 for mild underweight, 18.50 to 24.90 kg/m2 as Normal range, 25.0 to 29.90 kg/m2 for overweight grade I (Preobese), 30.0 to 39.90 kg/m2 for overweight grade II (Obese) and > 40.0 kg/m2 for overweight grade III (Obesity).

Body Mass Index (BMI) has been identified by the World Health Organization (WHO) as the most useful epidemiological measure of obesity.

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Obesity has a strong relationship with cardiovascular diseases like hypertension, coronary artery disease, Diabetes Mellitus etc[3]. Obesity hypoventilation syndrome also known as Pickwickian syndrome is a complication of extreme obesity characterized by hypercapnia, right-sided heart failure and somnolence. It is also associated with gastrointestinal patho-physiology, including hiatus hernia, gastro-esophageal reflux, as well as with an increased risk of gastric cancer. A number of clinical measurements for obesity have been used to determine susceptibility to cardiovascular diseases[4]. These include anthropometric indices such as body mass index, Waist-hip ratio (WHR) and waist circumference (WC)[5]. BMI is more accurate in assessing excess weight than the measurement of weight alone, due to its accessibility and reproducibility[6].

Cardiovascular diseases are one of the leading causes of death in both men and women in most of the countries[7]. From age group of 35-60 yrs, the systolic and diastolic blood pressure increases at an average of 20/10 mm of Hg, however the systolic BP is the most consistent and significant risk factor for cardiovascular diseases compared to the diastolic BP[8]. The prevalence of overweight and obesity is increasing and obesity is estimated to be a major leading cause of mortality and morbidity causing an estimated 2.6 million deaths worldwide and 2.3% of the global burden of disease[9]. Worldwide about 58% of diabetes mellitus (DM) and 21% of ischemic heart disease are attributable to BMI of above 21.0 kg/m2[10].

Several studies showing the relationship between BMI and BP have been carried out[11]. Some studies have documented a consistent but modest association between BMI and BP whereas others suggested a BMI threshold at which level the relationship with BP begins[12]. This study was therefore designed to assess the BMI in hypertensive patients in rural population.

Material and methods

The present study was carried out on all cases of hypertension either attending the outpatient department or admitted in Medical wards of Dr. Vikhe Patil Medical College and Hospital, Ahmednagar. Total 60 patients of either sex who met the inclusion criteria were recruited for the study. Only confirmed cases of hypertension were included in the present study. Prior to the commencement of the study, institutional ethical committee approval was obtained. Informed valid consent was obtained from the patients. Freshly detected cases as well as known cases of hypertension who were on anti-hypertensive treatment were included in the study group. Patients with uncontrolled hypertension with or without anti-hypertensive treatment were excluded. Patients Blood Pressure was measured with a Mercury Sphygmomanometer. Participants with SBP > 160 mm of Hg and DBP >100 mm of Hg were classified as being hypertensive[13].

Instrumentation

1. Height: A vertical wooden bar calibrated in centimeters (0-200) with movable horizontal bar which could be adjusted to touch the vertex of the patients head was used to measure the height of the patient.
2. Weighing Scale: Electronically calibrated scale from 0-120 Kg was used to measure body weight.
3. Sphygmomanometer: Amercury sphygmo manometer calibratedin millimeters of mercury (mm of Hg) from 0-300 was used to measure the blood pressure (BP) of the patient with the aid of Littman Stethoscope.

The participant's weight in kgs and height in cms were measured and used to calculate the BMI. Blood pressure measurement by the auscultatory method was done after 5 min. of allowing the participant to remain in the sitting position in a chair. Three more readings, separated by 2 min. were then averaged. (Table 1-3)

Results

The findings obtained from data for all the patients having hypertension were compared with BMI. It was evident that the `P` values are significant in preobese class patients than normal class and is more highly significant in obese class patients than preobese class. The relation of normal BMI class with hypertension is not much significant but with overweight, it is significant while that of obese is more significant indicating a strong relationship of hypertension with BMI. The study also demonstrates that mean blood pressure levels also increase with increasing BMI.

BODY MASS CLASSES	NUMBER OF PATIENTS
Underweight	_
Normal	16
Overweight (Pre-Obese)	38
Obese	06
Obesity	_

Table 2. Standard Deviation of BMI Classes

BODY MASS CLASSES	MEAN± SD
Normal	12.95 ± 1.86
Overweight (Pre-Obese)	27.13 ± 1.39
Obese	32.47 ±1.07

Table 3. Mean Values of Blood Pressure

PARAMETERS	MEAN± SD
SBP* (mm of Hg)	121.37 ± 15.35
DBP** (mm of Hg)	83.56 ± 9.15

* SBP = Systolic Blood Pressure
**DBP = Diastolic Blood Pressure

Discussion

The results indicate that there is a strong association of hypertension to BMI. Hypertension is directly related with BMI and it shows that with the increase in the BMI the trend of hypertension rises in both males and females. Hypertension is more common in overweight and obese class of patients.

Risk of hypertension is higher in overweight and obese patients who are due to the greater fat stores and its associated direct metabolic consequences. A number of metabolic consequences of obesity have been proposed as the blood pressure elevating mechanisms[14]. Increasing weight has also been shown to increase salt retention[15] and insulin resistance is proposed by some to be a cause of hypertension. BMI has also been suggested to be a better indicator of cardiovascular risk, as it is less dependent on body size and height[16].

Furthermore, the measurements used for obesity assessment in this study are Body Mass Index correlated significantly with systolic and diastolic blood pressures. In addition the results of this study showed that an increase in BMI >25 kg/m2 correlates with hypertensive patients.

The purpose of BMI cut-off points is to identify the proportion of people with a high risk of undesirable health policies. The purpose of anthropometric cut-off points is to identify independent and risks of adverse health outcomes associated with different body compositions, so as to inform government policy or facilitate to change the prevention programmes.

The current study did not include the effect of weight change on hypertension. However, also age disparity in relation to hypertension was not taken into consideration.

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