

The Relationship of Body Mass Index and Hypertension

¹Jannathul Feridoz.K, ²Dr.Mervin.K.Soman

Students of saveetha dental college
Department of General Medicine

ABSTRACT:

Aim : The aim of the study is to calculate the BMI in hypertension patients

Objective : To calculate the BMI in hypertension patients and to correlate the values of BMI in hypertension and diabetes patients.

Background:

BMI is a measure of body fat based on height and weight that applies to adult and children. Body mass index (BMI) (weight (kg)/height (m)²) is positively and independently associated with morbidity and mortality from hypertension, cardiovascular disease, type II diabetes mellitus, and other chronic diseases. Blood pressure is expressed by two measurements, the **systolic** and **diastolic** pressures, which are the maximum and minimum pressures, respectively. Normal blood pressure at rest is within the range of 100–140 **millimeters mercury** (mmHg) systolic and 60–90 mmHg diastolic. High blood pressure is present if the resting blood pressure is persistently at or above 140/90 mmHg for most adults.

Reason : To know how thyroid level affects BMI in hypertension patients

Keywords: Body Mass Index, hypertension, metabolic diseases .

Introduction :

Despite a growing burden of obesity and hypertension in developing countries, there is limited information on the contribution of body mass index (BMI) to blood pressure (BP) in these populations. Developing countries are increasingly faced with the double burden of hypertension and other cardiovascular diseases, along with infection and malnutrition.^{2,3} Hypertension places an excessive financial burden on populations and health systems, consuming scarce resources.⁴ Population-based preventive approaches are, thus, central for the management of elevated BP in developing countries, where clinic-based care for complications is not a feasible option.⁽¹⁻⁴⁾

Body mass index (BMI) is positively and independently associated with morbidity and mortality from hypertension, cardiovascular disease, type II diabetes mellitus and other chronic diseases. This study examines the association between BMI and BP

Blood pressure is the pressure of circulating blood in the walls of blood vessels .Blood pressure usually refers to the arterial pressure in the systemic circulation. It is expressed in terms of the systolic circulation (maximum during one heart beat) pressure over diastolic (minimum in between two heart beats) pressure and is measured in millimetres of mercury. Hypertension is the condition in which the force of the blood against the artery walls is too high.⁽⁵⁻⁷⁾

Obesity has a strong relationship with cardiovascular diseases like hypertension, coronary artery disease, Diabetes Mellitus etc. Cardiovascular diseases are one of the leading causes of death in both men and women in most of the countries]. The systolic and diastolic blood pressure increases at an average of 20/10 mm of Hg, cause severe cardiovascular diseases .

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-of 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).⁽⁸⁻⁹⁾

Body Mass Index (BMI) has been identified by the World Health Organization (WHO) as the most useful epidemiological measure of obesity . This study was designed to assess the BMI in hypertensive patients in rural population.

Methods and Materials:

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 50 hypertensive patients. The measurements taken include Systolic blood pressure, Diastolic blood pressure, Body weight and Height. Information was obtained about lifestyle and occupation.

- 1.) Height: A vertical wooden scale in centimeters (200) with movable horizontal bar to measure the height of the patient
2. Weighing Scale: Electronically calibrated weight machine was used to measure body weight.
3. Sphygmomanometer: Mercury sphygmomanometer calibrated in millimeters of mercury (mm of Hg) from was used to measure the blood pressure (BP) of the patient with the Stethoscope.

Results :

As the results show , both had similar distributions of BMI with standard deviation of 25.8kg/m for SHIELD and 25.9 kg/m for NHANES . The estimated prevalence of hypertension within each BMI category was similar in SHIELD and NHANES. Both surveys showed that an increase in BMI is generally associated with a significant increase in prevalence of hypertension . However, these metabolic diseases were present at all levels of BMI. The prevalence of diabetes mellitus and hypertension

increased in an observable, linear fashion as BMI levels increased. The majority of adults with diabetes mellitus were obese (BMI ≥ 30 kg/m²; 59% for SHIELD and 51% for NHANES).

Discussion :

After comparing the data with both SHIELD and NHANES , it was shown that patients with higher BMI are at a higher risk of developing hypertension . It also gives a positive indication that those with this metabolic disease are normally obese or overweight , showing a relationship between BMI and hypertension (10)

The distributions in SHIELD and NHANES were remarkably similar in prevalence of hypertension with increasing BMI with reported percentage rates across various BMI ranges .

With regard to the analysis of the patient report based on the surveys collected , 73% of the candidates with metabolic diseases like diabetic mellitus , hypertension and dyslipidemia were overweight or obese , while the rest were not.(11-12)

Positive caloric balance is most likely to result in metabolic disease when accompanied by: (i) impaired adipogenesis, which limits energy storage potential, resulting in excessive adipocyte hypertrophy which adversely affects adipocyte/adipose tissue dysfunction; (ii) accumulation and hypertrophy of visceral fat, hypertrophy of peripheral fat and increases in intra-organ fat (such as in the liver, muscle or pancreas), which result in adverse metabolic and immunologic consequences (iii) impaired nutrient metabolism such as a net increase in free fatty acids, which is lipotoxic to body organs such as muscle, liver and pancreas;(13-14) (iv) adipocyte and adipose tissue dysfunction which results in adverse metabolic consequences, because adipose tissue is an active endocrine organ (v) adipocyte and adipose tissue dysfunction which results in adverse immunological consequences, because adipose tissue is an active immune organ, and (vi) disruption of optimal interorgan 'cross-talk' of adipose tissue with other body organs, because metabolic diseases associated with positive caloric balance are most often caused by a pathologic partnership between the dysfunction and/or limitations of adipose tissue and the dysfunction and/or limitations of other body organs(15). Adiposopathy is a term used to describe pathogenic adipose tissue whose adverse clinical consequences may be promoted and exacerbated by adipocyte hypertrophy, visceral adipose tissue accumulation, and sedentary lifestyle in genetically and environmentally susceptible patients, and which represents an underlying, root physiological process leading to metabolic diseases such as type 2 diabetes mellitus, hypertension and dyslipidaemia(16).With increase , in BMI , the hazard ratios also continue to increase for both men and women .Women are at a greater risk for developing cardiovascular disease,hypertension ,cerebrovascular disease ,ocular and lower extremity complications .Hypertensive patients are also prone to many oral manifestations like periodontal problems and can also affect the salivary flow. periodontal disease can affect the salivary flow ,which may be a cause for dental caries.Since saliva forms a protective layer around the teeth which destroy the bacteria causing dental caries, less saliva flow also interrupts in oral health like caries.Diabetic patients and hypertensive patient with high carbohydrate diet tend to have a higher incidence of dental caries when compared to non diabetic patients with the same diet . This could be due to already increased amounts of glucose present in the body and the high carbohydrate diet adds to the increased amounts.Both hypertension disease and hypertensive drugs affect the condition of the patients' oral cavity. The disorders most frequently found in the masticatory organ of patients with hypertension include: xerostomia, changes in salivary glands, gum hypertrophy, lichenoid lesions, taste disorders, and paraesthesias. (17)

To help prevent the complications of hypertension , weight loss seems to be an important strategy .Individuals with a higher BMI or who are obese are at a greater risk of developing the complications irrespective of the gender . Weight loss is also important for those overweight persons with pre-diabetes, as it may delay the progression to diabetes mellitus .

The results of this survey study demonstrate that while generally and directly associated with one another, the relationship between BMI and hypertension .This is important because population assessments of the associations of obesity with metabolic diseases such as diabetes mellitus, hypertension and dyslipidaemia have great epidemiological value

Conclusion:

The high prevalence of undiagnosed or untreated hypertension, and the possible association with adult malnutrition necessitates that these countries should put more efforts towards the prevention of hypertension in populations, along with early detection and treatment of individuals at high overall risk of cardiovascular disease (CVD).

Until such time that regular screening for common CVD risk factors become feasible in developing countries (opportunistic) screening for hypertension should be promoted at every contact with healthcare providers. Efforts are needed to reverse the prevail- ing notion that hypertension is the problem of rich countries or obese people only.(18)

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