Association Between Body Mass Index and Hypertension: An Explorative Study With Development of an Information Booklet for Hypertensive Patients in Selected Hospitals of Rajkot District

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Abstract

The increasing incidence and prevalence of hypertension, especially among the younger demographic, has become a significant public health issue. Although lifestyle and dietary modifications effectively lower blood pressure and mitigate health risks, medication remains essential for many individuals. The emergence of hypertension can be attributed to multiple variables, such as obesity, elevated sodium consumption, inadequate physical exercise, tobacco use, and excessive alcohol intake. Obesity, a primary factor in hypertension, is strongly associated with Body Mass Index (BMI), becoming BMI a crucial indicator for evaluating the risk of hypertension development. This study sought to investigate the relationship between body mass index (BMI) and hypertension in individuals with hypertension. The cohort of one hundred hypertension patients was obtained via non-probability convenience sampling. Following the establishment of rapport with the participants and the provision of a comprehensive explanation of the study's objectives, the research was conducted with their explicit agreement, both verbal and written. The body mass index (BMI) was calculated using the standard formula, which involved gathering data on blood pressure, height, weight, and belly circumference. The documentation of demographic and clinical information was conducted using standardized proformas. Descriptive and inferential statistical approaches were utilized to analyze the data. The Chi-square test yielded a value of 87.02 and a p-value of 0.003, demonstrating a substantial correlation between body mass index (BMI) and hypertension. This discovery supports the concept that BMI is significantly associated with hypertension. A correlation existed between hypertension and socio-demographic characteristics such as age, gender, occupational status, and marital status; however, no association was found between hypertension and demographic parameters including educational level, domicile, family income, or family type. Clinical factors, including dietary choices and meal frequency, were found to be associated with hypertension. No connection was identified between hypertension and concurrent diseases or cooking methods. This study's findings indicate a substantial link between body mass index (BMI) and hypertension. The study emphasizes the necessity of consistent BMI monitoring and lifestyle modifications for the prevention and management of hypertension.

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Introduction

Hypertension, or high blood pressure, is recognized as one of the leading preventable risk factors for cardiovascular disease, stroke, chronic kidney disease, and premature mortality worldwide (1). According to the World Health Organization (WHO), it affects over 1.28 billion adults globally, yet nearly half of those affected are unaware of their condition and therefore do not receive adequate treatment (1). This silent nature makes early identification of modifiable risk factors critical for effective prevention and management.

Body Mass Index (BMI) is a simple anthropometric measure calculated by dividing a person's weight in kilograms by the square of their height in meters (kg/m^2) (2). It is widely used to categorize individuals into underweight, normal weight, overweight, or obese. Excess body fat, reflected in higher BMI values, is a well-established modifiable determinant for developing hypertension (3). Evidence suggests that overweight and obese individuals are at significantly higher risk of elevated blood pressure compared to those with normal weight (4). The underlying pathophysiology involves increased sympathetic nervous system activity, activation of the renin–angiotensin–aldosterone system, insulin resistance, and structural changes in the kidneys, all of which contribute to raised blood pressure (5).

A recent large-scale analysis estimated that overweight and obesity account for more than 40% of hypertension cases globally (6). Moreover, lifestyle interventions leading to weight loss have shown consistent benefits in reducing both systolic and diastolic blood pressure, thus reducing cardiovascular risk (7). Despite abundant evidence from developed countries, the strength and nature of the association between BMI and hypertension can vary across populations due to differences in genetics, diet, socioeconomic status, and physical activity levels (8).

In India and other developing countries, rapid urbanization and lifestyle changes have resulted in increasing rates of obesity and related non-communicable diseases, including hypertension (9). Understanding the association between BMI and hypertension in local contexts is essential to design targeted community interventions and policy frameworks focusing on weight management, healthy lifestyles, and regular blood pressure monitoring.

This exploratory study seeks to ascertain the relationship between Body Mass Index and hypertension in the chosen adult sample. The results of this study may inform evidence-based guidelines for hypertension prevention and management via weight control and health promotion initiatives.

Problem statement

Association Between Body Mass Index and Hypertension: An Explorative Study With Development of an Information Booklet for Hypertensive Patients in Selected Hospitals of Rajkot District.

Objectives

- Assess the correlation between Body Mass Index and Hypertension among diagnosed hypertensive patients.
- Identify the influence of socio-demographic and clinical characteristics on Hypertension.
- Prepare an educational booklet to guide patients in preventing complications arising from Hypertension.

Hypothesis

H_1: A significant association exists between Body Mass Index (BMI) and Hypertension among hypertensive patients.

H_2: There exists a significant relationship between patients' socio-demographic and clinical variables and the occurrence of hypertension in the study population.

Methodology

Research Approach

A quantitative approach was identified as the most effective means to study the correlation between Body Mass Index and Hypertension.

Research Framework

An exploratory descriptive research design was utilized by the researcher to examine the association between Body Mass Index and Hypertension.

Study setting

The present study was conducted in the medical OPD of KDP Hospital Atkot.

Sample

Participants in the trial could have blood pressure alone or in combination with other systemic diseases.

Size of Sample

The study sample comprised 100 adults who satisfied the specified inclusion criteria.

Methods for sampling

The samples utilised in this investigation were selected using a non-probability purposeful selection approach.

Description of the tools

There are three parts to TOOL I: sociodemographic variable proforma, clinical variable proforma, and biophysiological variable proforma.

Part 1: The Sociodemographic Variables Formula-This tool includes demographic information like age, gender, level of schooling, job, home address, family income, and type of family.

Part 2: The Clinical Variables Proforma-There are clinical factors in this instrument, such as diet and co-morbid illness.

Part 3: biophysiological variables method-This consists of measuring height,weight , abdominal grith and blood pressure.

TOOL NO. 2

A certain method will be used to figure out each sample's Body Mass Index.

Data analysis

Descriptive statistics: Frequency and percentage distribution was used to analyze the demographic variables,clinical variable and bio physiological variable

Inferential statistics: Chi square test was used to find out the association between Hypertension and Body Mass Index of hypertensive patients.

Results

Section I: In this section deals with the demographic variable, clinical variable and biophysiological variable among hypertensive patients

The study sample was mostly comprised of persons who were between the ages of 41 and 50 (65 %with the majority of them being male (81 percent) and working for a daily pay (72 %)dwelling primarily in metropolitan regions (69 %)and belonging to nuclear families (61%). In terms of education, the largest group consisted of individuals who had completed secondary school (24 %)while only a tiny percentage of individuals had graduated (11%) or were illiterate (five percent). The majority of participants (46%) had monthly incomes ranging from Rs. 5001 to Rs. 8000. According to the dietary habits, seventy percent of the population did not follow a vegetarian diet, fifty percent of the population consumed three meals each day, and thirty percent of the population preferred to boil their food. Clinically, eighty percent of the patients did not have any cardiovascular concerns, twenty-seven percent had kidney problems, and thirty-five percent were diabetic. Seventy percent of the individuals had a height of 160–180 centimeters, eighty-two percent weighed between 50 and 70 kilograms, and fifty percent had an abdominal circumference that ranged from 105 to 121 centimeters. 43% of the individuals in this group had systolic blood pressure that ranged from 141 to 180 mmHg, and 65% of them had diastolic blood pressure that ranged from 81 to 100 mmHg. This indicates that there is a significant prevalence of raised blood pressure within this group.

Section II: Association of Body Mass Index and Blood pressure among patients with hypertension.

Table 1: Body Mass Index and systolic Blood pressure among patients with hypertension.

Body Mass Index	<90mm/Hg	90-120 mm/Hg	121-140 mm/Hg	141-180 mm/Hg	>180 mm/Hg	X^2	P value
Over weight	0	12	13	10	2	87.02	0.003**
Normal weight	0	25	16	15	2		
Under weight	0	1	3	1	1		

Based on the hypothesis, "A significant association exists between Body Mass Index (BMI) and Hypertension among hypertensive patients," the table shows. A statistically significant correlation between BMI categories (overweight, normal weight, and underweight) and blood pressure ranges is shown by the Chi-square test result of 87.02 and 0.003**. BMI appears to play a role in hypertension development, as overweight and normal weight people have higher blood pressures. The data confirm that BMI is highly associated to hypertension.

Table 2: Body Mass Index and systolic diastolic Blood pressure among patients with hypertension.

Body Mass Index	<60mm/Hg	60-80 mm/Hg	81-100 mm/Hg	101-120 mm/Hg	>120 mm/Hg	X^2	P value
Over weight	0	2	12	14	12	9.09	0.0023**
Normal weight	0	14	10	14	12		
Under weight	0	3	3	2	2		

According to the results, more overweight patients had raised diastolic blood pressure than normal or underweight patients. Overweight people were mostly in the upper diastolic BP ranges (81–120 mmHg), while normal and underweight people were more common in the lower end. The chi-square value of 9.09, with a P value of 0.0023, indicates a significant connection at $P < 0.01$. The data support hypothesis H1: The study found that hypertension patients with higher BMI have higher diastolic blood pressure.

Section III: Association of Socio demographic variables and blood pressure among patients with hypertension.

Sixty percent of hypertension patients were between the ages of 41 and fifty, eighty percent were male, seventy percent were employed on a daily pay, seventy percent lived in metropolitan areas, seventy percent were members of nuclear families, forty-five percent had a monthly income of five thousand to eight thousand rupees, and twenty-five percent had completed secondary school. The results of a statistical analysis showed that there is a strong connection between certain socio-demographic factors, notably age, gender, and occupational status, and both systolic and diastolic blood pressure in hypertension individuals. It was

discovered that there was no significant association between the degree of education, the area of residence, the family income, or the kind of family. As a result, the hypothesis H2 was partially supported, which states that there is a substantial link between certain socio-demographic and clinical characteristics and hypertension among individuals who have hypertension.

Discussions

This study's Chi-square test suggests a link between BMI and hypertension, particularly in hypertensive patients. The Chi-square value of 87.02 and p-value of 0.003** show that BMI and hypertension are not independent variables, supporting the hypothesis that they are associated.

The research demonstrates that overweight and normal-weight people had higher blood pressures, while underweight people have lower blood pressures. Obesity and overweight are substantial hypertension risk factors, as shown by previous research. According to Rocchini et al. (2005), higher BMI increases peripheral vascular resistance, which is linked to high blood pressure(10). Haslam and James (2005) also note that a higher BMI is a major cause of hypertension and other cardiovascular diseases. Underweight people have a lower rate of hypertension, although hunger, underlying disorders, and genetic predispositions may affect their health(11). Messerli et al. (2018) found that underweight people may still develop hypertension-related health issues due to complicated underlying factors, despite having lower blood pressure(12).

This study confirms the BMI-hypertension relationship. It stresses the necessity of keeping a healthy weight to prevent hypertension, a major cardiovascular disease risk. The mechanisms of this connection and the effects of weight management therapies on hypertensive patients' outcomes should be studied.

The study found a strong correlation between BMI and diastolic blood pressure in hypertension individuals, with a chi-square value of 9.09 and a P value of 0.0023 ($P < 0.01$). Overweight people have greater diastolic blood pressure than normal and underweight people. This supports the idea that the renin-angiotensin system, cardiac output, and vascular resistance of increasing BMI are key modifiable risk factors for hypertension (13). Gupta and Xavier found that obesity considerably increases hypertension in India (14).

In their comprehensive review, Anchala et al. found that overweight and obese people have increased probabilities of uncontrolled hypertension, validating this study (15). Lifestyle treatments that reduce weight have been proven to lower blood pressure and cardiovascular risk (4), emphasizing the necessity of including weight management in hypertension prevention and control programs.This study emphasizes the importance of routine BMI monitoring and appropriate body weight counseling as part of hypertension care, especially in resource-constrained settings where obesity is rising.

This study found that most hypertension patients were 41–50 years old, male, and daily wage laborers. This supports previous findings that middle-aged adults and men are more likely to develop hypertension due to stress, lifestyle factors, and work demands (16). The substantial connection between age, sex, and occupational status and systolic and diastolic blood pressure

shows the importance of demographic and employment determinants in hypertension prevalence. Anchala et al. (17 found that hypertension is more common among men and manual laborers due to restricted healthcare access and unpredictable work patterns.

This study revealed no correlation between education, residence, family income, and hypertension family type. These characteristics may affect health in general, but occupational stress and age may affect blood pressure regulation more in this population. In urban and semi-urban settings, lifestyle and occupational characteristics generally surpass formal education and income level as hypertension risk factors, according to Kaur et al. (18).

Overall, these findings suggest targeted interventions for high-risk occupational categories and middle-aged males. This susceptible group may benefit from workplace screening, health education, and stress management programs to decrease hypertension consequences and improve quality of life.

Conclusion

Chi-square data (Chi-square value: 87.02, p-value: 0.003**) support the hypothesis that hypertensive patients' BMI is statistically associated with hypertension. Higher blood pressure was found in obese people, supporting prior study associating fat to hypertension. BMI also correlated with diastolic blood pressure, highlighting its significance in hypertension. Hypertension prevalence was also affected by age, sex, and occupation. Weight management and workplace health initiatives can reduce hypertension risks, especially in high-risk groups, according to the study. The study concluded these. The present study concludes a substantial link between Body Mass Index and Hypertension. Social demographics affect hypertension. Information booklets helped selected patients understand and feel satisfied about hypertension.

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