

A Cross Sectional Study on Correlation of Body Mass Index with Level of Blood Pressure in Healthy Young Adults

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Date of Submission: 24-02-2023

Date of Acceptance: 06-03-2023

I. INTRODUCTION

Over the years there is increase in rate of overweight and obesity which has really been surprising which is a great threat to the health of the citizens in developing countries like India. The reason or the cause behind this havoc probably because of standard of living of the people are rising particularly in developing countries because of industrialization and urbanization.

Due to mechanical lifestyle and competitive living style people are running out of time, so shortage of time leads to adaptation of eating rich calorie junk or fast food. People tend to adapt quick and easy life style, a sedentary life style decreasing physical activity promoting weight gain and obesity.⁸

BMI is a good indicator of obesity measurement. The association between body mass index and health condition is one of the important issues in public health.⁷

The BMI ranges are as follows:

BMI	kg/m ²	WEIGHT STATUS
Below 18.5		underweight
18.5-24.9		Healthy weight
25.0-29.9		overweight
30 and above		obese

Being overweight is associated with two to six fold increase in the risk of developing hypertension. Various clinical and animal studies have confirmed a strong relationship between obesity and hypertension. An increase in 2-3 mmHg in systole and 1-3 mmHg in diastolic blood pressure has been shown for each 10 kg increase in western population.⁶ Obesity associated hypertension is mainly due to excessive stimulation of sympathetic nervous system.⁵

BMI calculated as weight in kg / height in meter squared is most widely used to estimate the prevalence of obesity or underweight within a population.

The rationale for the use of BMI to identify individuals who are at increased risk of being affected by obesity related health problem is the demonstrated strong relationship to risk of diabetes, hyperlipidemia and the subject matter of this study that is increased blood pressure.⁴

Considering all these aspects and understanding the need for such study where adults are increasingly adopting the urban life. This study was undertaken with the following aim & objective:

To analyze the correlation of the degree of BMI with level of blood pressure

II. MATERIALS AND METHODS

The Study was conducted on 384 subjects, both males and females among the age group 18-35 years. The subjects were selected randomly from MBBS students, post graduate students, paramedical students and staffs of GMCH and were explained about the purpose of the study and the attitudes and co-operation of the subjects were carefully assessed. History of each subject was taken and was clinically examined as per the proforma. The experimental protocol was explained to all the subjects and written informed consent was obtained from them. The study has got ethical clearance from institutional ethical committee.

STUDY DESIGN : cross sectional study by simple random sampling.

Considering p =50%,

$z = 1.96$ the confidence level is 95%

$d = 5\%$

Using the formula $n = Z^2 pq/d^2$

Where n = sample size,

z = z score,

p = expected proportion of population,

$q = 1 - p$,

d = absolute precision

Sample size = 384

SELECTION CRITERIA:

Inclusion Criteria

1. Age group 18-35yrs.
2. Both males and females
3. Physically and mentally fit.
4. Not suffering from any systemic disease
5. Not suffering from hypertension.
6. Non-Smoker and non alcoholics
7. Co-operative and capable of understanding the procedure.

Exclusion criteria

1. Age group less than 18 years and more than 35years
2. Smokers and alcoholics
3. Hypertensive subjects
4. Subjects with history of any acute or chronic systemic illness.
5. Un co-operative subjects.
6. Subjects taking any medicines for any illness.

WEIGHT:(kg)

Weight was measured using a weighing machine The machine was placed on a flat surface and before each measurement the pointer was corrected to zero mark. The subjects were wearing the minimal necessary light clothing and were on bare feet while taking the reading. The subjects looked straight ahead horizontally without looking down while their weight was recorded in kilograms.

HEIGHT (CM):

Height was recorded using the measuring tape that consisted of a foldable graduated markings 150cm on one side and 60 inch on the other side. The subjects stood erect against a wall on which a measuring tape was placed with bare feet on a flat floor with feet parallel and with heels, buttocks, shoulders and occiput touching the wall. The head was held erect with eyes aligned horizontally and ears vertically without any tilt. The height was then measured from the markings of the tape. It was measured in centimeters.

BLOOD PRESSURE

The instruments used for blood pressure measurement are Sphygmomanometer and stethoscope.

Sphygmomanometer: The blood pressure was measured by using mercury sphygmomanometer which comprised of the following parts: rubber bag, rubber tube and mercury manometer. The inflatable rubber bag is covered by non-distensible envelope of cotton fabric called the cuff. The bladder of the cuff covered the full circumference of the arm and 2.5 cm away from the antecubital fossa.

The rubber bag is connected to the mercury manometer which determines the pressure on the bag and a hand pump through rubber tubes. The mercury reservoir was kept full and the meniscus was at zero level when no pressure was applied to prevent unwanted errors. The mercury moves freely when the pressure was applied by means of the hand pump.

Stethoscope:

The instrument comprises of ear piece, head frame, flexible tube, and chest piece. There are two types of stethoscopes, the bell type and the diaphragm type. Modern stethoscopes are a combination of both the bell type and diaphragm type. The bell type transmits low pitched sounds and the diaphragm transmits high frequency sounds. For recording blood pressure the diaphragm type of chest piece is used. The diaphragm is placed at the antecubital fossa of the subject to measure the brachial artery blood pressure.

STATISTICAL ANALYSIS: The data so collected on various aspects of the study were compiled, tabulated and subjected to statistical analysis. Graphical and diagrammatic representations were made wherever necessary.

All data were analysed using Microsoft Excel, Graph Pad Prism and IBM SPSS V21. Tables and scatter diagrams were used to show descriptive statistics. Chi square and Fisher's exact test are used to evaluate association between categorical variables. Data were checked for normality using Kolmogorov-Smirnov and Shapiro-Wilk test. Pearson correlation is used to show correlation between variables and scatter plot is plotted for correlation. All data were analysed using SPSS version 21. A p value less than 0.05 is considered as statistically significant at 5% level of significance.

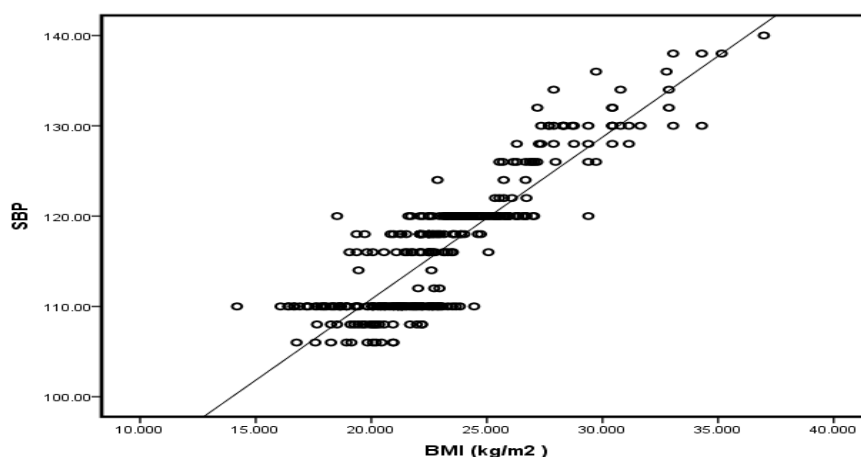
III. RESULT

Table showing correlation of BMI and BP of the entire 384 subjects.

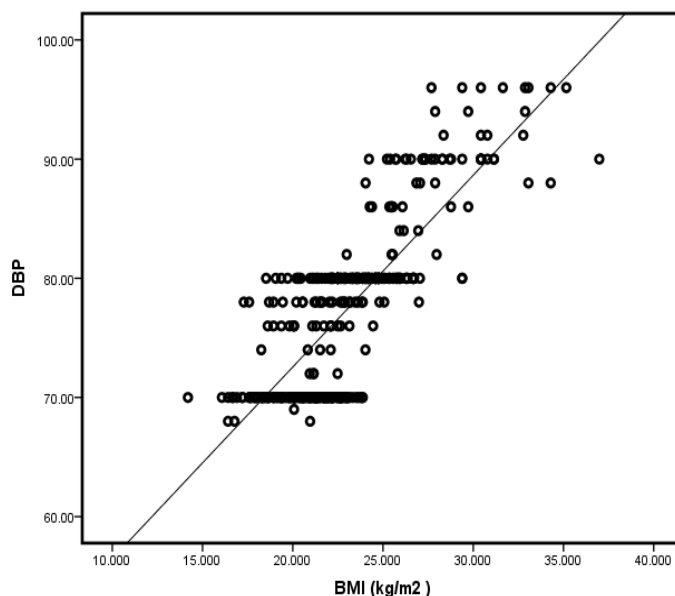
Parameters	R	p value
SBP	0.871	<0.001
DBP	0.789	<0.001

Interpretation: In the entire 384 subjects, BMI is positively correlated to BP (DBP & SBP) which is statistically significant ($p < 0.05$).

- Below Scattered diagram showing correlation of BMI and SBP of the entire 384 subjects



- Below Scattered diagram showing correlation of BMI and DBP of the entire 384 subjects.



IV. DISCUSSION

BMI CATEGORIES OF THE STUDY POPULATION:

Analysis of the study population revealed that 6.77% of subjects belong to underweight weight category. The percentage of normal weight subjects is 69.79%. The percentage of over weight subjects is 18.23%. The percentage of obese subject is 5.21%

CORRELATION BETWEEN BMI AND BP (SBP AND DBP) IN ENTIRE 384 SUBJECTS:

In the present study in entire 384 subjects the correlation coefficient between BMI and SBP is found to be $r = 0.871$, ($p < 0.05$), the correlation coefficient between BMI and DBP is found to be $r = 0.789$ ($p < 0.05$) which implies there is a positive correlation between the two variables.

Similar findings were also observed by the researchers in their study.

Bhattacharya J et al found in their study that there is a significant correlations between BMI and SBP. They also found that there is more correlation between BMI and DBP more than SBP. Their study concluded that the prevalence of prehypertension is 68.38% among healthy medical students of Jorhat medical College.³

Kaushik D et al did a research on correlation between blood pressure and body mass index . The study was conducted on 100 respondents for 50 male and 50 female with 18-25 group selected randomly. In the study a strong significant relationship was found between SBP and DBP . It was concluded that there was a positive significant relationship between blood pressure and BMI with p value less than 0.05 . Obese and overweight subjects were found to have high blood pressure and most of normal BMI subjects were having normal BMI.²

Adhikary G et al did a research on association between body mass index(BMI)and hypertension in south Asian population, evidenced from nationally representative surveys and came to the conclusion that the association of BMI with increased BP is higher even at low cut off point for overweight and obesity. There is positive and robust association of BMI with increased BP across various subgroup of population defined by socioeconomic groups. There would have larger effects on the reduction of burden of high BP in south Asia if public health intervention are targeted to reduced BMI at grass root level.¹

V. CONCLUSION

From the findings it is observed that there is a positive correlation between BMI and BP with a statistical significance of ($P < 0.05$). From this study we can come to the conclusion that increase in BMI affects the levels of blood pressure.

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Dr. Nilakhi Malakar, et. al. "A Cross Sectional Study on Correlation of Body Mass Index with Level of Blood Pressure in Healthy Young Adults." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(3), 2023, pp. 60-63.