



## EFFECT OF BMI ON BLOOD PRESSURE IN YOUNG HEALTHY ADULTS

## Health Science

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## ABSTRACT

**INTRODUCTION:** BMI which is known as body mass index gives accurate reflection of body fat percentage in majority of adult population. Increase BMI leads to many chronic diseases including hypertension. This study is conducted to screen out obesity and hypertension, and if there is any association between BMI and BP among the student.

**MATERIALS AND METHOD:** A cross sectional study was conducted among 100 subjects, of which 50 male and 50 female were participated. The age, blood pressure of the subject and anthropometric parameters e.g height, weight was assessed.

**RESULTS:** The results of our study show that the male subjects were significantly taller, heavier than that of female subjects. The mean BMI was similar between males and females. The SBP and DBP were more amongst the male subjects. There was significant positive correlation between BMI and SBP among male and between BMI and DBP among female subjects.

## KEYWORDS

## INTRODUCTION

BMI is known as body mass index. It is calculated by weight in Kilogram divided by height in meters squared ( $\text{kg}/\text{m}^2$ ). BMI help us to determine whether the person is underweight, normal weight, overweight and obesity for their height. It is easy to obtained, and in majority of the adult population BMI gives accurate reflection of body fat percentage<sup>1</sup>. Obesity and overweight has increased risk of mortality, reduced quality of life due to non-communicable diseases (NCD) like hypertension (HTN), type 2 Diabetes Mellitus, cardiovascular diseases and other chronic diseases<sup>2</sup>. In developing countries overweight related diseases are more common<sup>3</sup>.

Hypertension is considered when the systolic blood pressure (SBP) and diastolic blood pressure (DBP) is  $\geq 140/90$  mmHg according to JNC 7<sup>4</sup>. In the whole world, about 1 billion individuals are affected by hypertension and about 7.1 million deaths per year may be due to hypertension. According to WHO reports 62% and 49% of cerebrovascular accident (CVA) and ischemic heart disease (IHD) respectively are due to suboptimal BP ( $\geq 115$  mmHg SBP)<sup>4</sup>. Several studies has reported a positive association of BMI and BP (SBP & DBP)<sup>(5,6&7)</sup>.

Obesity which is one of the contributory factors of hypertension and many other chronic diseases places a huge financial burden on population and health system. Clinic based care for BP management is not a readily available option, so, population based preventive management for increased BP should be done in developing countries like India. The present study is carried out to screen out obesity and hypertension, and association between BMI and BP among the student. Comparison of sex differences.

## MATERIALS AND METHOD

This is a cross-sectional type of study conducted in the department of Physiology, Silchar Medical College, Silchar from July to December 2015. A total of 100 normal and healthy students both from MBBS and PG of Silchar Medical College participate in the study. The student of both sexes (50 each from male & female) in the age group of 18- 35 years were included in this study. Any students not willing to participates, sports person, hypertension and students on treatment of any ailment were excluded from the study. Ethical clearance was obtained from the institution.

The aims and objectives of the study were explained and then informed consent was obtained from each student. The age and sex of the participants were noted, the weight, height and BP were measured after taking history. The weight was measured (to the nearest 0.05 kg) in kilogram by using weighing machine (CROWN- ISO: 9001) with the subject wearing light clothes, no shoes and standing motionless. The height was measures (to the nearest 0.05 cm) in centimeters by using

vertical scale of stadiometer with the subject standing in an erect posture and no shoes. While measuring the height, the subjects face away from the stadiometer with heel of the foot, buttocks and head touching the vertical scale of stadiometer. BMI was calculated as weight in kg divided by height in meter squared. WHO cut off points were applied to classify the study population into underweight (BMI <  $18.5 \text{ kg}/\text{m}^2$ ), normal weight ( $18.5$ - $24.9 \text{ kg}/\text{m}^2$ ), overweight ( $\geq 25$ - $29.9 \text{ kg}/\text{m}^2$ ), and obesity ( $\geq 30 \text{ kg}/\text{m}^2$ )<sup>2</sup>.

BP was measured by using standardized mercury Sphygmomanometer (PIONEER- IS: 3390) and stethoscope (PIONEER). The subjects were made to sit quietly and comfortably on a chair with arm rest for 5 minutes before BP was measured. By using an appropriate cuff size BP was measured in the right arm for three times with 2 minutes interval and then SBP and DBP was calculated by taking average of the three readings. Blood pressure was classified based on JNC VII criteria<sup>4</sup>.

Statistical analysis: the data were analyzed by using Microsoft excel and SPSS version 16.0. Student's t test (unpaired) which is two tailed was used for comparison. P-value < 0.05 was considered statistically significant.

## RESULTS:

A total of 100 subjects, of which 50 male and 50 female were participated in our study.

**Table 1: Comparison of anthropometric parameters between males and females**

Parameters	Male Mean $\pm$ SD	Female Mean $\pm$ SD	p-value
Age	29.5 $\pm$ 6.36	25 $\pm$ 2.82	0.0
Height	162 $\pm$ 7.07	158.5 $\pm$ 0.70	0.000003
Weight	63.5 $\pm$ 4.95	61.5 $\pm$ 6.36	0.0001

**Table 2: Comparison of BMI and BP in between males and females**

Parameters	Male Mean $\pm$ SD	Female Mean $\pm$ SD	p-value
BMI	24.4 $\pm$ 3.99	24.54 $\pm$ 2.33	0.66
SBP	132 $\pm$ 2.83	104 $\pm$ 5.65	0.0
DBP	78 $\pm$ 2.82	72 $\pm$ 2.82	0.0

**Table 3: Correlation between BMI and Blood Pressure**

Correlation between parameters	Gender	r value	p value
BMI & SBP	Male	0.5	0.0002
	Female	0.214	0.135
BMI & DBP	Male	0.304	0.0318
	Female	0.353	0.011

## Significant at 0.01 level (2-tailed)

In this study, the mean age of males (29.5 $\pm$ 6.36) is more than that of

females ( $25\pm 2.82$ ) and is statistically significant  $p < 0.00$ . The mean height of males ( $162\pm 7.07$ ) was statistically more than that of females ( $158.5\pm 0.70$ ). The weight of males was also statistically greater than that of females ( $p < 0.0001$ ) as shown in table 1.

The mean BMI was similar between males and females ( $24.4\pm 3.99$  and  $24.54\pm 2.33$ ). The mean SBP was more in males  $132\pm 2.83$  than in females  $104\pm 5.65$  and the difference is statistically significant  $p < 0.00$ . The DBP was significantly more in males than that of females ( $p < 0.00$ ) as shown in table 2.

Table 3 shows that there is significant correlation between BMI and SBP among males ( $r = 0.5; p = 0.0002$ ) and between BMI and DBP among females ( $r = 0.353; p = 0.011$ )

#### DISCUSSION:

The present study shows that BMI was same in both the sexes. This is in contrast to other findings. Prema et al, found that females have higher BMI than that of males subjects<sup>8</sup>.

The SBP and DBP were significantly higher among males subjects when compared to females. Similar studies was found by A Varsishta<sup>9</sup>, Norfazilah et al<sup>7</sup> dua Suman et al<sup>10</sup>, Prema et al also found SBP more in males<sup>8</sup>. The higher blood pressure among males subject may be due to more mean age in comparison to females and the hormone estrogen in females has lowering effect till menopause<sup>11</sup>.

A study done in Nigeria<sup>12</sup> found that there was significant positive correlation between BMI and SBP or DBP, which was similar to our study where we got significant positive correlation between BMI and SBP among males subjects and positive correlation between BMI and DBP among females subjects. A study conducted by A Varsishta<sup>9</sup> among College students, also found similar correlation. Norfazilah et al<sup>7</sup> also found that DBP correlates with BMI. Similarly, Mungreiphy et al<sup>5</sup> in their study found that there was significant positive correlation between BMI and BP. Whereas, in contrast to our study though weak but negative correlation between BMI and SBP was found by Frederick vuvor<sup>13</sup>.

#### CONCLUSION:

1. BMI was found to be similar and within normal range in both sexes but it was towards the higher side.
2. Significant positive correlation was found between BMI & BP.
3. Due to sedentary life style, poor nutrition and lots of stress in this modern society, it is necessary to make awareness among the students about the causes, consequences, control and prevention of obesity and that of hypertension.

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