



TO STUDY THE CORRELETAION OF HYPERTENSION IN STUDENTS WITH BMI ABOVE 24.9

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ABSTRACT

Objective: To study the correlation of hypertension in students with BMI above 24.9.

Method: To start the survey Subjects will be selected according to inclusion criteria and Exclusion criteria. Anthropometric measurements (weight and height) will be taken using the weighing scale and stadiometer, respectively according to need for study BMI will be calculated $BMI = \text{weight}/\text{height}^2$ and their hypertension is studied if present. BP was recorded using digital sphygmomanometer.

Result: In this study significant association was seen between normal SBP and the subjects with BMI more than 24.9 with P value 0.02.

Conclusion: this study shows thst there is no significant association of BMI with both hypertensive Systolic and Diastolic BP. Moreover, the results also indicated that there was strong correlation between BMI and Normal systolic blood pressure (SBP).

Keywords: BMI, blood pressure, systolic bp, diastolic bp, obese, overweight.

INTRODUCTION

Obesity specifically the excessive visceral fat distribution is accompanied by several alterations at hormonal, inflammatory and endothelial level. These changes set off a stimulation of numerous different mechanisms that make a contribution to the hypertensive state and on the other side to increase the cardiovascular morbidity.

Hypertension is a common condition in which the force of the blood against walls of the arteries is high enough that it may eventually cause health problems, such as heart disease, etc. The more blood your heart pumps and the narrower your arteries are, the higher is your blood pressure. Blood pressure is given in millimeters of mercury (mm Hg).^{1,2}

Hypertension in overweight and obese medical students are emerging as newer health problems in developing countries like India. Hypertension is one of the major risk factors that leads to myocardial infarction, stroke, renal failure, and death. The risk of morbidity from hypertension, diabetes, coronary heart disease (CHD), stroke and heart failure is raised by obesity.^{1,2}

Hypertension is calculated using sphygmomanometer. It has two measures-

1. systolic pressure normal value (120mmHg)
2. diastolic pressure (80mmHg)^{1,2}

Types of hypertension:

1. Grade 1 = systolic BP ≥ 140 and ≤ 159 diastolic BP ≥ 90 and ≤ 99
2. Grade 2 = ≥ 160 and ≤ 179 Diastolic BP ≥ 100 and ≤ 109
3. Grade 3 = Systolic BP ≥ 180 diastolic BP ≥ 110 ³

Causes of hypertension in medical student are Smoking, Being overweight or obese, Lack of physical activity, Too much salt in the diet, alcohol consumption, Stress, Genetics, Family history of high blood pressure, Chronic kidney disease, Adrenal and thyroid disorders, Sleep apnea.⁴

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. Causes of obesity are nutrition imbalance, junk food, Genetic Susceptibility, physical inactivity, steroids and other medication, etc.

Obesity can be measured by calculating BMI (Body Mass Index). Body mass index (BMI) is a measure of the human body weight in relation to the height, calculated by dividing the weight of a person in Kg by the square of the height in meters.⁵

According to WHO ⁶, BMI is classified as:

1. Normal (18.5–25 kg/m²)
2. Overweight (26–30 kg/m²)
3. Obese (>30 kg/m²).

The relationship between obesity and hypertension is seen and well established in children and adults. The exact mechanism by which obesity directly causes hypertension is still under study and research. Activation of the sympathetic nervous system (SNS) causes sodium retention leading to increase in renal re-absorption, and the renin-angiotensin system, which are considered to have important role in obesity-related hypertension.

In Urban areas sustained hypertension is on the rise even in younger age groups. Some studies state that blood pressure might be frequently elevated in overweight and obese individuals as compared to that of the leans. Altered eating habits, increased fat content of diet, sedentary lifestyle, and decreased physical activities might be some of the possible reasons for such

condition.

Aim

To study the correlation of hypertension in students with BMI above 24.9

Objective

1. To study the existence of Hypertension in obese and overweight college students.
2. To evaluate the correlation between obesity and overweight with hypertension in college students.

HYPOTHESIS

- **YPOTHESIS** : there will be correlation between hypertension in students with BMI above 24.9 in college going medical students
- **NULL HYPOTHESIS:** there will be no correlation between hypertension in students with BMI above 24.9 in college going medical students

Need for study

Nowadays the percentage of overweight/obese individuals is increasing in the young adults. This may be due to there lifestyle changes, eating habits, stress, behavioral changes, hormonal changes and loss/reduced physical activities.

Some studies state that hypertension is more prevalent in overweight/obese individuals. Due to all these bodily changes it might become difficult for these individuals to focus on there studies and cope up with the stressful situations they face in there day to day life. Hence, the early diagnosis can help to prevent complications related to obesity and

hypertension.

It is necessary for every individual to be aware about their health status, the treatment and adequacy of control of hypertension and other related complications.

This study might help to bring awareness of increasing cases of hypertension due to obesity, so that obesity and hypertension in college going students can be prevented.

REVIEW OF LITERATURE

1. Ravikumar V. Baradol, S.V. Patil, Anand Ranagol International Journal of Medicine and Public Health,2014,4,3,260-264 conducted a study entitled “ Prevalence of overweight, obesity and hypertension amongst school children and adolescents in North arnataka: A cross sectional study.” Total 2800 children in age group from 10-16 years from 3 schools of Urban and rural region of Bijapur district were screened. Weight, height, BMI and Blood pressure were recorded. These values were compared with WHO child growth standards. Children then classified as overweight (OW) and obesity (OB). This study concluded that prevalence of hypertension was significantly higher in overweight and obese compared to children with Normal BMI. Also the prevalence of overweight and obesity is more in urban school children than rural children population.

2. Chun-Yan Luo et al (2013) conducted a study entitled “Prevalence of hypertension in overweight and obese children from a large school-based population in Shanghai, China.” A school-based cross-sectional study was conducted during February to December 2009 in Shanghai, China, including total 78,114 children and adolescents. Body weight, height, waist circumference (WC) and blood pressure (BP) were measured. Overweight and obesity were defined according to sex- and age- specific Chinese reference data. This study concluded that on large school-based population in Shanghai, China, BMI and WC are positively correlated with SBP and DBP. Being overweight or obese greatly increased the risk of hypertension in Chinese children and adolescents, in which WC is considered as a more sensitive indicator than BMI.

3. Gupta S, Kapoor S. Sex differences in blood pressure levels and its association with obesity indices: who is at greater risk. Ethn Dis. 2010 Autumn;20(4):370-5. PMID: 21305824 conducted a study entitled “Sex differences in blood pressure levels and its association with obesity indices: who is at greater risk.” A cross-sectional survey was carried out on an endogamous group of 577 adults (307 females and 270 males) aged 25–60 years in Delhi, India. Data were collected for weight, height, waist circumference and blood pressure using standardized procedure. Body mass index (BMI), waist to hip ratio (WHR), waist to height ratio (WHtR) and grand mean thickness (GMT) were calculated to assess obesity. Also, the sex-specific prevalence estimates for various BP categories was calculated. Correlation was calculated between systolic and diastolic BP and various indices of obesity. This study concluded obesity was found to be higher among females, males were found to be at higher risk of hypertension. Those who are at-risk of becoming hypertensive and thus are at the greater risk of developing cardiovascular diseases.

4. Ali Arazeem Abdullahi, Jimoh Amzat Journal of Public Health and Epidemiology Vol. 3(5), pp. 204-209, May 2011 conducted a study entitled

“Knowledge of hypertension among the staff of University of Ibadan, Nigeria” Questionnaire instrument was used to collect data from a randomly selected 556 subjects selected across faculties, departments and sectional units of the University. The descriptive statistics showed that some members of staff demonstrated a relatively high level of knowledge about the complications associated with hypertension but knowledge about the risk factors and attitude towards the illness was still low. This study concluded the risk factors and complications associated with hypertension at the University of Ibadan.

5. Abdel-Megeid, Fadia & Abdelkarem, Hala & El-Fetouh, Aisha. (2011). Unhealthy Nutritional Habits in University Students Are Risk Factor for Cardiovascular Diseases. Saudi medical journal. 32. 621-7. conducted a study entitled “Unhealthy nutritional habits in university students are a risk factor for cardiovascular diseases” Three hundred and twelve students (180 females and 132 males; mean age 21.1 ± 2.8 years) attending King Saud University, Riyadh, KSA were randomly selected from the university register and invited to participate in the study during 2008-2009. Students who consented to participate completed a self-reported questionnaire including: nutritional screen, health habits, and lifestyle practice. Daily food consumption was recorded, and nutritional analysis was performed. Blood pressure (BP) was also measured. This study concluded that lifestyle modification is important especially in young age groups. The preventive interventions should focus not only on obesity, but also on related diseases. There is a need for strategies and coordinated efforts to reduce the tendency of overweight and obesity among college students.

6. Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH. Predicting obesity in young adulthood from childhood and parental obesity. N Engl J Med. 1997 Sep 25;337(13):869-73. conducted a study entitled " Height and weight measurements were abstracted from the records of 854 subjects born at a health maintenance organization in Washington State between 1965 and 1971. Their parents' medical records were also reviewed. Childhood obesity was defined as a body-mass index at or above the 85th percentile for age and sex, and obesity in adulthood as a mean body-mass index at or above 27.8 for men and 27.3 for women. This study concluded that Obese children under three years of age without obese parents are at low risk for obesity in adulthood, but among older children, obesity is an increasingly important predictor of adult obesity, regardless of whether the parents are obese. Parental obesity more than doubles the risk of adult obesity among both obese and non-obese children under 10 years of age.”

Material and Methodology

Material:

- Sphygmomanometer
- Digital Weighing machine
- Measuring tape
- Pen

Paper Methodology:

1) **Sample size:** 113 (formula used : $n = z^2 pq / e^2$)

2) **Study design-** Observational study

3) **Method of sampling** – purposive sampling

4) **Place of study-** college institute.

5) **Study Duration-** 6 months

6) **Study population-** College students.

7) **Selection Criteria** 1. **Inclusion criteria-**

- Both male and female gender.
- Students between age 18-25 years.
- Students with BMI above 24.9.
- Subject with informed consent.

2. **Exclusion criteria-**

Subjects with –

- BMI below 24.9.
- Other comorbidities (type-2 DM).
- Any chronic illness.
- Age below 18yrs and above 25yrs

PROCEDURE

To conduct the following study permission will be taken from ethical committee of the institution. To start the survey Subjects will be selected according to inclusion criteria and Exclusion criteria. The procedure will be explained and Proper consent form will be filled by concerned patient those signed the form will be included in the study. Anthropometric measurements (weight and height) will be taken using the weighing scale and stadiometer, respectively according to need for study BMI will be

STATISTICAL ANALYSIS

The data was analysed using Spss software to compute descriptive analysis such as means and frequencies. Chi-square test was used to determine the association between variables such as BMI and BP. Correlation analysis was used to determine the strength of the association between BMI and BP. BMI ranging 25.0-29.9 were considered overweight and 30.0-34.9 were considered obese. Blood pressure higher than 140 mm Hg was considered hypertensive and below than 140 mm Hg was considered normal.

Table no. 1 and Graph no. 1 shows the age group distribution of the subjects included in the study.

TABLE NO.1

Variable	Gropus	Frequency	Percentage
Age	18-19	4	3.54
	20-21	29	25.66
	22-23	23	20.35
	24-25	57	50.44

GRAPH NO. 1

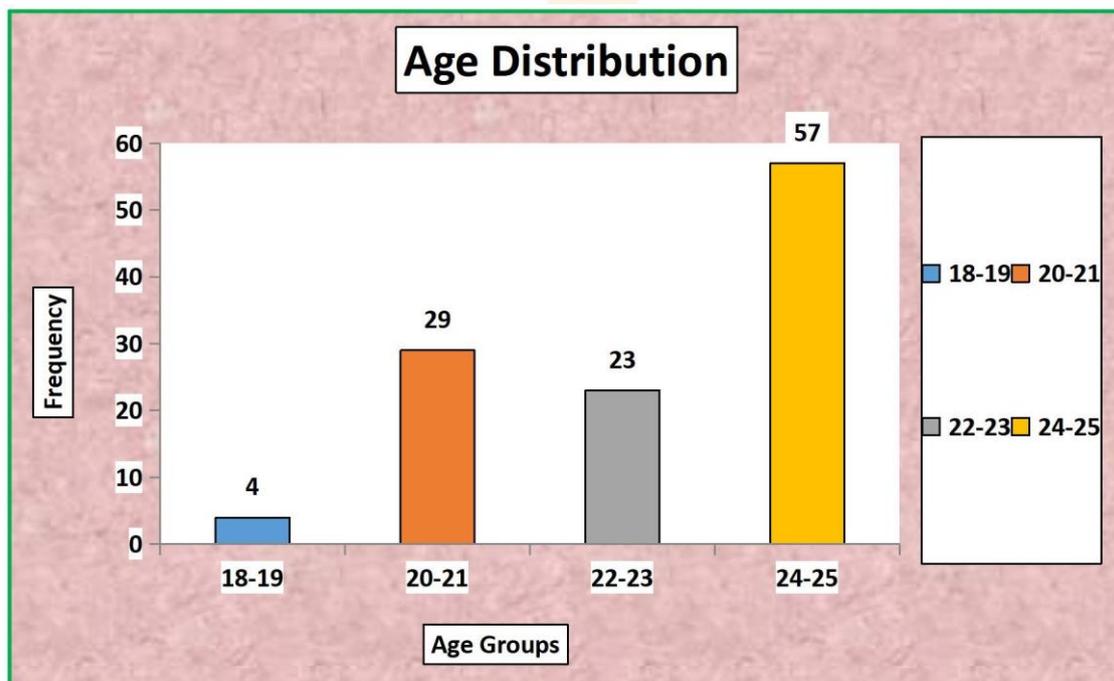


Table no. 2 and Graph no. 2 shows that male subjects included in this study were 51.33% and female subjects were 48.67%

BLE NO. 2

Variable	Gropus	Frequency	Percentage
Gender	Male	58	51.33
	Female	55	48.67

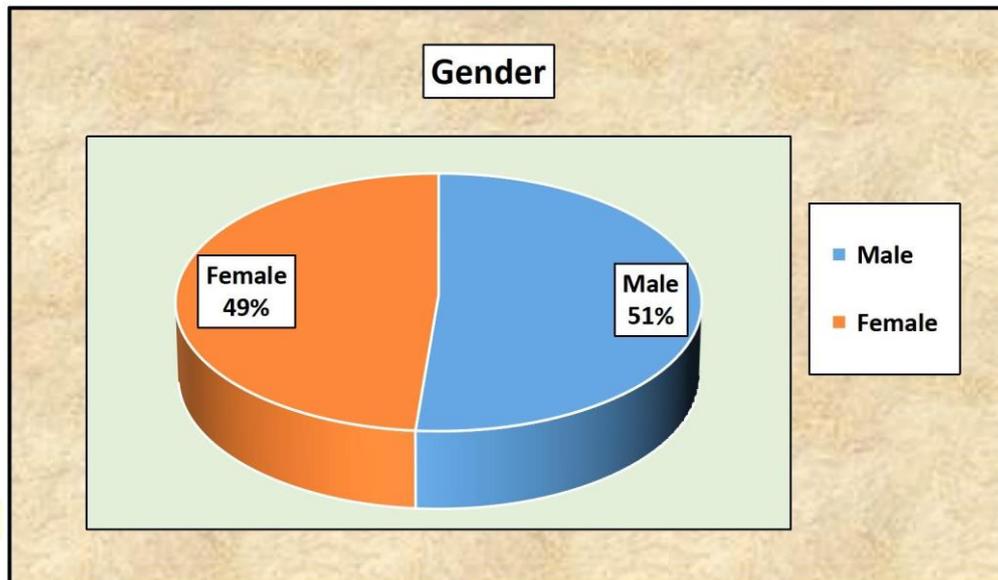
GRAPH NO. 2

Table no. 3 and graph no. 3 shows the distribution of BMI among the subjects included in the study. 72.57 % were overweight and 27.43 % were obese.

Table no. 3

Variable	Groups	Frequency	Percentage
BMI	Overweight	82	72.57
	Obese	31	27.43

Graph no. 3

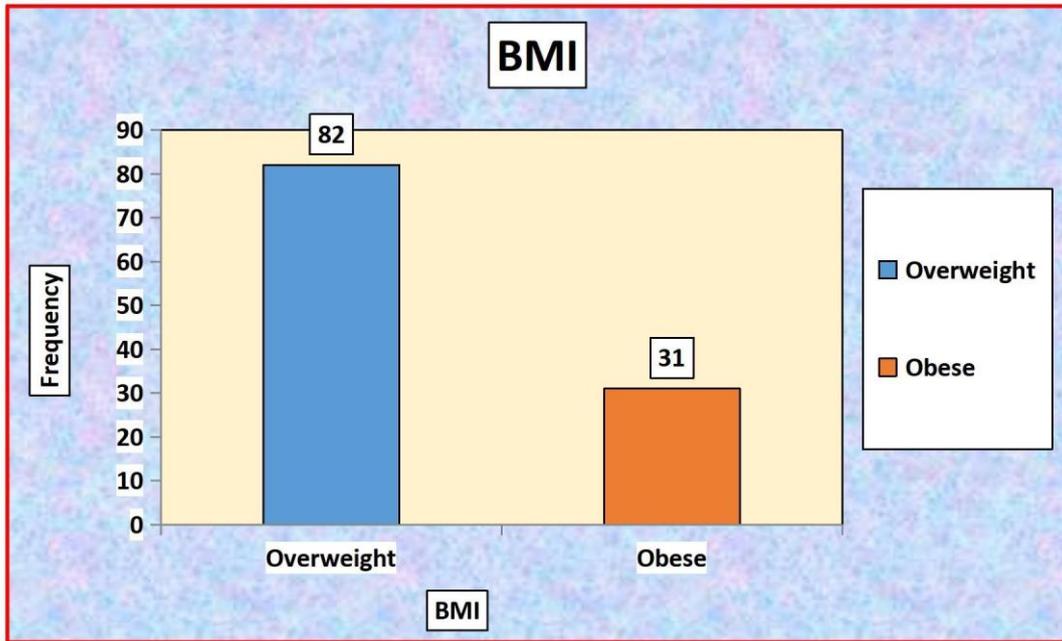


Table no. 4 and Graph no.4 shows the mean systolic blood pressure(SBP) in overweight (118.57 mm Hg) and Obese(112.50 mm Hg). There is no significant association between the subjects(overweight and obese) and SBP with P value 0.08. (p value below 0.05 is considered significant).

Table no. 4

Group	Mean	S.D.	t value	P value
Overweight	118.57	7.98	1.8	0.080
Obese	122.50	11.3		

Graph No. 4

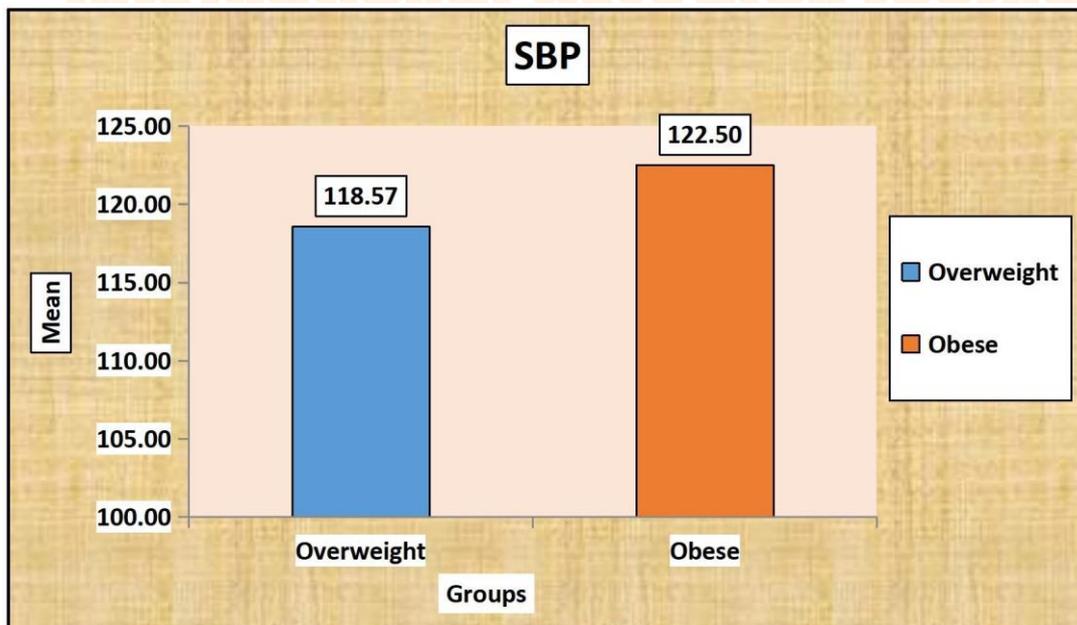


Table no. 5 and Graph no. 5 shows the mean diastolic blood pressure(DBP) in overweight (80.76 mm Hg) and Obese(83.13 mm Hg). There is no significant association between the subjects(overweight and obese) and DBP with P value 0.132 .

ble No. 5

Group	Mean	S.D.	t value	P value
Overweight	80.76	7.34	1.53	0.132
Obese	83.13	7.36		

Graph no. 5

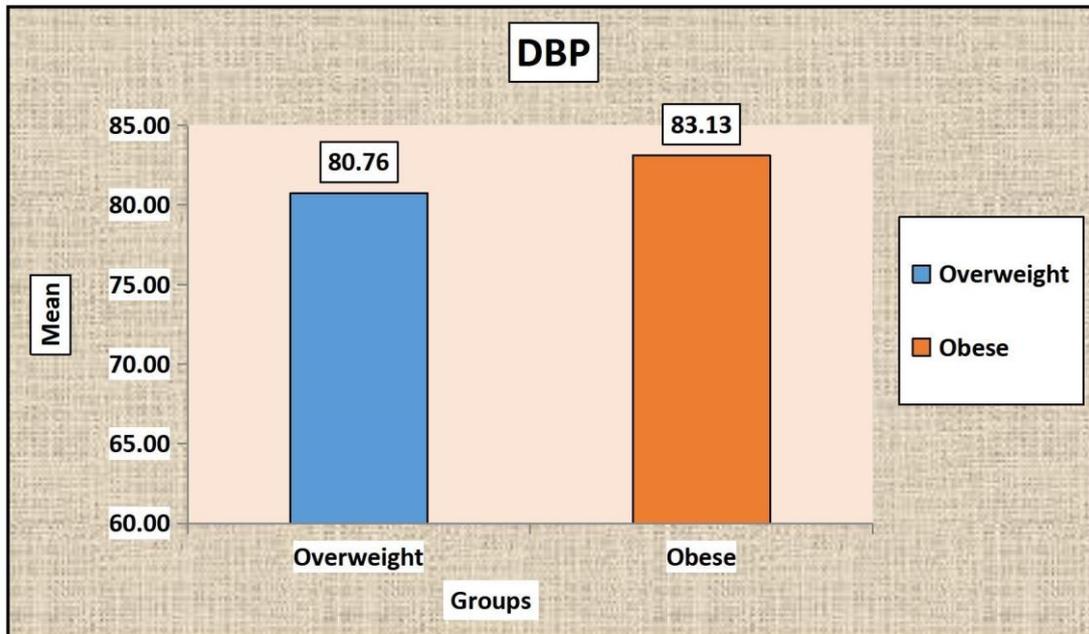


Table no. 6 shows the correlation between BMI(more than 24.9) and SBP. In this study significant association was seen between normal SBP and the subjects with BMI more than 24.9 with P value 0.02.

Table no. 6

Variable	Groups	SBP		Chi Square	p Value
		High	Normal		
BMI	Overweight	0	82	5.39	0.02
	Obese	2	29		

Table No. 7 shows positive association Between BMI and SBP with r value 0.23 (r value greater than 0 is considered to show positive correlation)

Table no. 7

BMI vs SBP	
r value	0.23
p value	0.02

RESULT

Table no. 1 and Graph no. 1 shows the age group distribution of the subjects included in the study. Most of the subjects(50.44%) were from age group 24-25 yrs,followed by 29% belonging to age group 20-21yrs. The least percentage(3.54%) subjects were from age group 18-19yrs.

Male subjects included in this study were 51.33% and female subjects were 48.67%. among the subjects included in the study. 72.57 % were overweight and 27.43 % were obese. Table no. 4 and Graph no.4 shows that there is no significant association between the subjects(overweight and obese) and SBP with P value 0.08. (p value below 0.05 is considered significant). Table no. 5 and Graph no. 5 shows the mean diastolic blood pressure(DBP) in overweight (80.76 mm Hg) and Obese(83.13 mm Hg). There is no significant association between the subjects(overweight and obese) and DBP with P value 0.132 .

Table no. 6 shows the correlation between BMI(more than 24.9) and SBP. In this study significant association was seen between normal SBP and the subjects with BMI more than 24.9 with P value 0.02.

DISCUSSION

ypertension (HTN) is a medical condition in which the blood pressure is chronically elevated.⁷ It is usually found incidentally by healthcare professionals measuring blood pressure during a routine checkup.⁸ In isolation, it usually produces no symptoms although some people do report symptoms during onset or before hypertension is diagnosed.⁹ There may be no specific medical cause that can be determined in hypertension but it may be due to several contributing factors like renin homeostasis, insuline resistance, obesity, genetics and age. It is also strongly correlated with BMI.¹⁰ The risk of hypertension is five times higher in the obese as compared to those of normal weight. Obesity is defined as an unnecessary accumulation of fat in the body resulting in increase in weight beyond that considered desirable with regard to age, height and weight. This deposition of fat could be generalized or may occur preferentially in different adipose tissue compartments.¹⁰ Evidence has shown that approximately 30% - 60% of hypertensive patients are at risk of obesity in males below the age of 45 years and gaining weight itself is a risk factor of hypertension.¹⁰ Compared to the developed countries, the developing countries are at higher risk of the disease related to overweight, and cardiovascular diseases have grown to be the major cause of morbidity and mortality in developing world.¹¹ Obesity and hypertension are not only common health problems in adults but also in children and young individuals. A study in china shows strong positive association between BMI and BP in 12 year old individuals.¹² Studies from different countries have also shown that obesity is associated with high blood

pressure in children as well as adults, those who are obese are at more risk of hypertension as compared to thin lean people.¹³

This study involved selection of students based on inclusion and exclusion criteria. The Demographic findings of this study indicate that most of the subjects(50.44%) were from age group 24-25 yrs,followed by 29% belonging to age group 20-21yrs. The least percentage(3.54%) subjects were from age group 18-19yrs. Male subjects included in this study were 51.33% and female subjects were 48.67%. Among all the subjects included in the study i.e 113, 72.57 % were overweight and 27.43 % were obese.

The results of this study indicate that there is no significant association between the subjects' BMI and Systolic Blood Pressure (SBP) with P value 0.08. This study also indicated that there is no significant association between the subjects(overweight and obese) and DBP with P value 0.132 with mean diastolic blood pressure(DBP) in overweight being 80.76 mm Hg and Obese being 83.13 mm Hg. Similarly, a study conducted by Tesfaye et. al.(2006) indicated that SBP and DBP were positively correlated with age while BMI was not or was negatively correlated in some cases.¹⁴ In this study, there was significant association was seen between Normal SBP and the subjects with BMI more than 24.9 with P value 0.02. The result of this study is in contradiction with the study conducted by Summaya Saeed et. al. , Aun Ali et. al. 2013 where the results indicated that there was strong association Between obese and with the mean value of Hypertensive Blood Pressure to be 150 mm Hg. Moreover, a study conducted by Faran khalid and Abubakkar Siddhique et. al. (2020) concluded that the BMI of the patients a significantly weak correlation with the Blood pressure in males; however no significant correlation was found in females.¹⁵ The results of the present study may be susceptible to the Age of the Selected subjects, their lifestyle, eating habits, percentage of males and females, hormonal changes and the amount of physical activities they are involved in.

BMI and Hypertension may be or may not be significantly associated but the need to frequently evaluate the BMI, Hypertension and other related complications is increasing, specially among young adults due to their eating habits and lifestyle changes to prevent further complications leading to unhealthy life.

CONCLUSION

In this study, there was no significant association of BMI with both hypertensive Systolic and Diastolic BP. Moreover, the results also indicated that there was strong correlation between BMI and Normal systolic blood pressure (SBP). Therefore we can accept the null hypothesis and conclude that there is no significant correlation between BMI above 24.9 and Hypertension in the college going medical students.

SUGGESTIONS

- ◆ Sample size could be taken more
- ◆ Study can be done in various age groups

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