



Original Article

A Relationship between Body Mass Index and Blood Pressure in Medical and Paramedical Students of Government Medical College, Kozhikode

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ABSTRACT

Background: Hypertension is considered as a major contributor of premature death worldwide. Obesity has become a global epidemic and it is considered as a modifiable risk factor for hypertension

Objectives: To assess the prevalence of overweight and obesity and to evaluate relationship between BMI and Blood Pressure in medical and paramedical students of Government Medical College, Kozhikode

Materials and Methods: 200 subjects in the age group of 18-25 yrs from medical and paramedical students of Government Medical College, Kozhikode were enrolled in the study. The study duration was 6 months. Students were divided into 3 groups- underweight, normal weight and overweight after calculating their Body mass index. The systolic blood pressure and diastolic pressure were recorded. Then Mean Blood pressure was calculated. Correlation analysis was done to study the effect of Body mass index on blood pressure.

Results: The mean values of systolic BP, diastolic BP and mean BP were found to be significantly increased in the overweight group, moderate in normal weight group and decreased in underweight group.

Conclusion: Obesity is an important risk factor for hypertension. Young people should practice healthy lifestyles so as to prevent obesity and hypertension in future

Keywords: hypertension, body mass index, obesity, cardiovascular disease.

Introduction

Hypertension is a sustained elevation of the systemic arterial pressure.¹ It is reported to be the fourth contributor to premature death in developed countries.² A recent report on the global burden of hypertension indicates that nearly 1 billion adults (more than a quarter of the world's population) had hypertension in 2000, and this is predicted to increase to 1.56 billion by 2025.³ The increasing prevalence of hypertension is attributed to population growth, ageing and behavioural risk

factors, such as unhealthy diet, harmful use of alcohol, lack of physical activity, obesity and exposure to persistent stress. With rapid economic development and modernization, India has an increasing trend of hypertension especially among urban population. An increased awareness, treatment and control of high blood pressure are critical to the reduction of cardiovascular disease risk and prevention of the associated burden of illness.⁴

The knowledge of the effect of obesity on hypertension is very important as it is a modifiable risk factor. Obesity and overweight have become a global epidemic, and it is still increasing in both industrialized and developing countries.⁵ Obesity can be defined as an excess of body fat. In clinical terms, a Body Mass Index (BMI) between 25 and 29.9kg/m² is called overweight, and a BMI greater than 30kg/m² is called obesity.⁶

Childhood obesity increases the risk of obesity in adulthood and is associated with cardiovascular disease risk factors such as hypertension, diabetes mellitus and dyslipidemia.¹⁰ Significant weight loss can be achieved in many obese persons with increased physical activity. The current clinical guidelines for the treatment of obesity recommend that the first step be lifestyle modifications that include increased physical activity combined with a reduction in caloric intake. Overweight or obese individuals, of any age, can improve their prospects by bringing their weight down and keeping it down. Prevention of the onset of obesity during youth may be important in reducing the risk of coronary heart disease in later life.⁶ Although percentage of body fat can be estimated with various methods, such as measuring skin-fold thickness, bioelectrical impedance, or underwater weighing, these methods are rarely used in clinical practice, where BMI, calculated as weight in kg/height in meters squared, is most widely used to estimate the prevalence of obesity or underweight within a population. This index has been shown to be a good measure of obesity and is applicable to all populations.⁸ In Caucasian populations, a strong association has been depicted between BMI and mortality.^{9,10} Positive association of BMI and blood pressure has been reported among Asian populations^{11,12}.

Correlations between BMI and blood pressure have been observed even in very lean populations¹³. Unfortunately, only limited studies are available in India regarding the correlation between blood pressure and BMI.

The present study is therefore undertaken to examine the prevalence of overweight and obesity

among medical and paramedical students of Govt Medical College, Kozhikode and to assess the effect of BMI on systolic and diastolic blood pressures in young adults. This study may be considered as one of the initial steps to prevent cardiovascular morbidity and mortality by inculcating healthy life styles in the youth.

Materials and Methods

200 subjects in the age group of 18-25 yrs from medical and paramedical students of Government Medical College, Kozhikode were enrolled in the study. The study was approved by the Institutional Ethics Committee. The study duration was 6 months. Informed consent was taken. Weight and height of the students were measured. They were divided into 3 groups- underweight, normal weight and overweight after calculating their Body mass index. BMI = weight in kg/(height in metre)². The systolic blood pressure and diastolic blood pressure were measured with a standard mercury sphygmomanometer while the student was sitting after resting for 10 minutes and a mean of 3 readings was recorded. Then Mean Blood pressure was calculated. Correlation analysis was done to study the effect of Body mass index on systolic blood pressure, diastolic blood pressure and mean blood pressure

Observations and Results

The present study was conducted to find out the relation of Body mass index and blood pressure among medical and paramedical students of Government Medical College, Kozhikode. A total of 200 students were enrolled in the study. The study group included 116 males and 84 females. Students were divided into 3 groups- underweight, normal weight and overweight after calculating their Body mass index.. Mean values of Systolic BP, Diastolic BP and Mean BP were found. Statistical analysis was done with SPSS version 16 to compare the values in the 3 groups. (Table1, Diagrams (4,5,6). Significant statistical differences were found between the three study groups.

The correlation of Systolic, Diastolic and Mean blood pressures with BMI were studied. Pearson Correlation coefficient was found out.

Gender ratio in each study group (Diagrams 1, 2, 3)

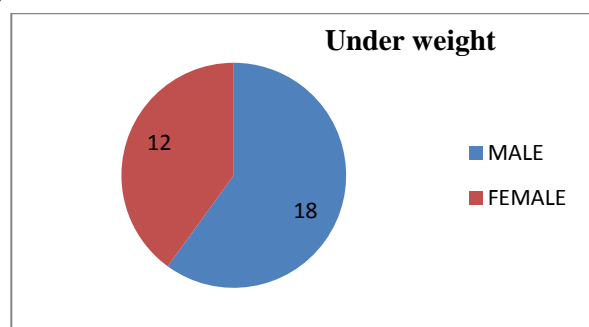


Diagram (1)

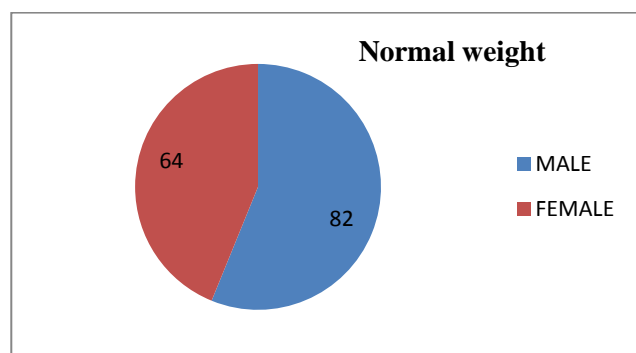


Diagram (2)

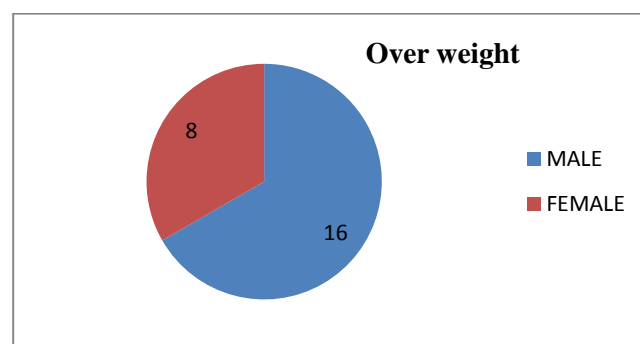


Diagram (3)

Table 1

| | Underweight | Normal weight | Over weight |
|----------------|---------------|---------------|--------------|
| No of subjects | 30 | 146 | 24 |
| Systolic BP | 100.44 ± 8.67 | 114.77 ± 9.90 | 126 ± 7.89 |
| Diastolic BP | 64.66 ± 6.78 | 72.55 ± 8.33 | 80.22 ± 6.44 |
| Mean BP | 76.25 ± 7.55 | 88.67 ± 4.78 | 95.0 ± 5.22 |

The mean values of systolic BP were found to increase with increase in BMI (Diagram 4)

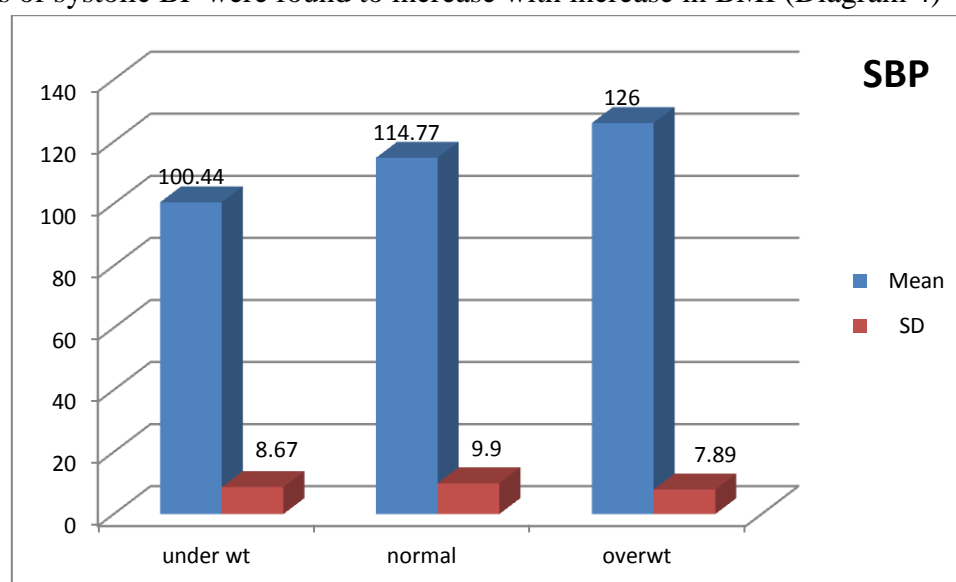


Diagram (4)

The Diastolic BP was also found to increase with increase in BMI (diagram 5)

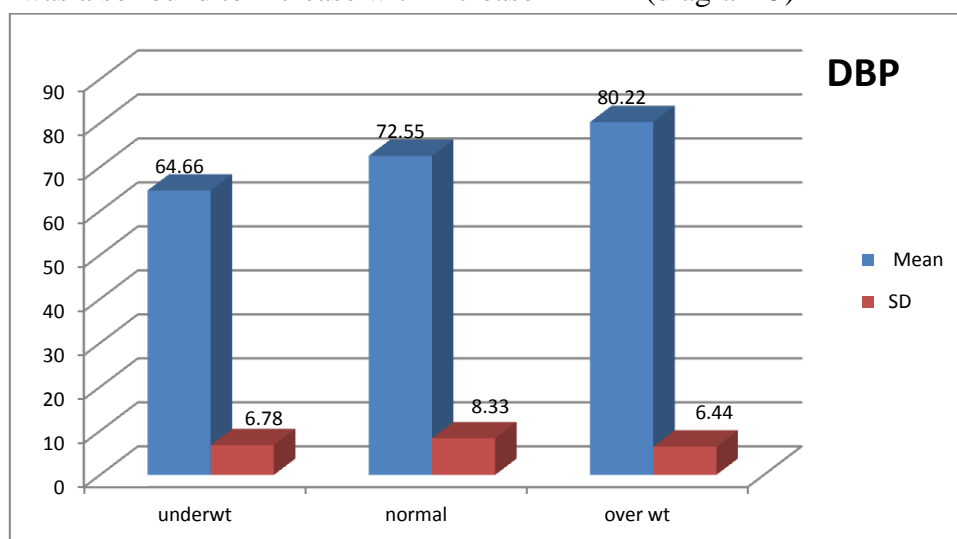


Diagram (5)

The Mean BP value was highest in overweight group, intermediate in normal weight group and lowest in underweight group (diagram 6)

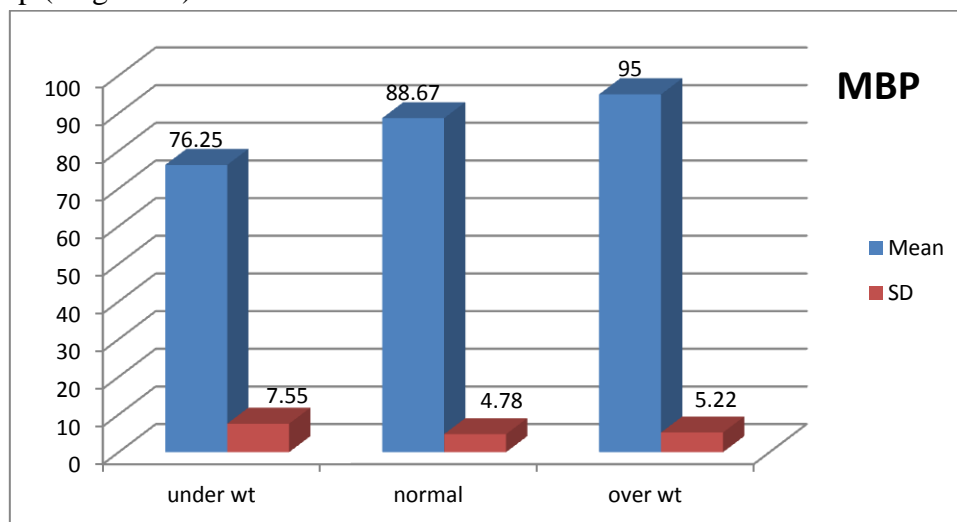


Diagram (6)

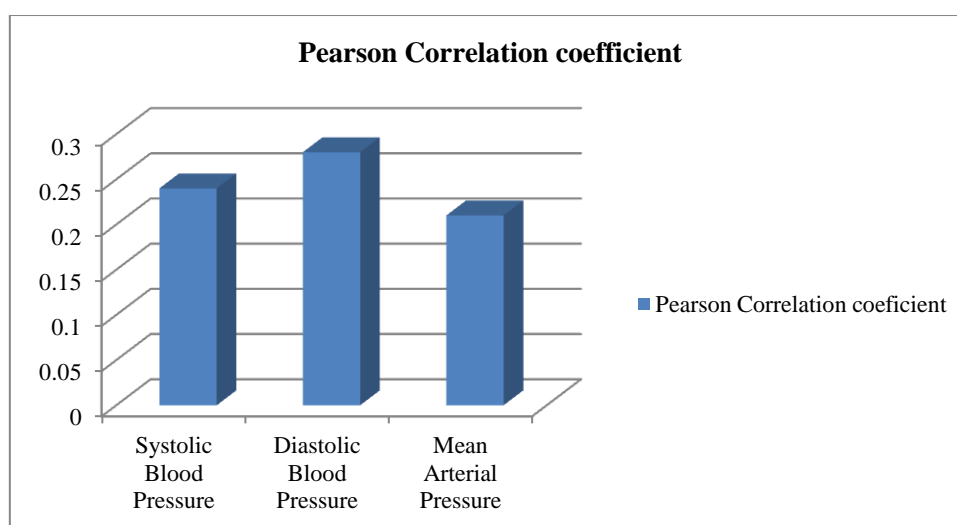


Diagram (7)

Discussion

Obesity and overweight are on the increase in our population. Many life style disorders like hypertension, diabetes and dyslipidemia are known to be associated with overweight in young adults. The present study was aimed at finding out the relationship between Body mass index and blood pressure and the prevalence of obesity and overweight in medical and paramedical students in our Medical College. The causative factors for adolescent obesity includes parental fatness, social factors, timing or rate of maturation, physical activity, dietary factors and other behavioural or psychological factors.¹⁴ Overweight and obesity are strongly associated with certain types of diets, such as those that include large amounts of fats, animal-based foods and processed foodstuffs.¹⁵ Decreased physical activity has also been implicated in childhood and adolescent obesity because it lowers resting metabolic rate and total energy expenditure.¹⁶

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The 200 students who participated in the study were divided into underweight, normal weight and overweight according to their BMI. 24 students belonged to the overweight group. Mean values of systolic, diastolic and mean blood pressures were found to increase with increase in BMI values. Systolic, diastolic and mean BP showed statistically significant difference between the BMI groups – highest in overweight, moderate in normal weight and lowest in underweight.

The differences in BP may be due to differences in total peripheral resistance, which in turn is

greatly influenced by tonic sympathetic control of resistance vessels. So the higher BP in overweight subjects is due to heightened sympathetic vascular tone.¹⁷ The chance of cardiovascular mortality and morbidity in future may be more in over weight group comparing normal weight. This study may be considered as one of the initial steps to promote cardiovascular health by inculcating healthy life styles in the youth.

Conclusion

Obesity is a global epidemic. Childhood obesity is a pre runner of adult obesity. Obesity is an important risk factor for hypertension. The BP is found to be more in overweight individuals comparing normal weight individuals. BMI is positively correlated with systolic, diastolic and mean BP. Young people should practice healthy lifestyles in order to prevent obesity and hypertension in future.

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