

# Prevalence of obesity in school going adolescents and its association with Hypertension

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## ABSTRACT

**Background:** Obesity is prevalent and is increasing globally in adolescents, particularly in developed countries. However, its incidence is not lower in developing and third world countries also.

**Objective:** To determine prevalence of obesity and association of obesity with hypertension, mean arterial pressure and family history of hypertension

**Methods:** This cross-sectional study was conducted at ShaikhKhalifa Bin Zayed Al-Nahyan Medical and Dental College Lahore over a period of 2 months from January, 2017 to February, 2017. The study sample was taken from a trust-funded private school. There were 197 apparently healthy participants (age range 10-16 years) included in the study. Their demographic details, blood pressure (BP) and body mass index (BMI) were calculated. All data was analyzed by SPSS version 20.

**Results:** A total of 197 students were included in this study. The mean age was found to be  $13.81 \pm 1.58$  years. Hypertension was found in 24 of 197 patients (13.7%) in this study and obesity was found in 36 of 197 participants (18.2%). Association of obesity with hypertension and mean arterial pressure was determined and it was found to be significantly associated ( $P=0.00$ ). Also family history of hypertension was stratified for obesity in adolescents; however, it was not significant.

**Conclusion:** Obesity and hypertension are quite prevalent in our society among adolescents and are strongly associated to each other. So we need to take special care on this issue and need to educate our adolescents as well as parents.

**Keywords:** Obesity; Hypertension; Adolescents; Pakistan

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## INTRODUCTION

Blood pressure (BP) is the pressure of circulating blood flow on the arterial wall. This major vital sign primarily tells us about the pumping action of heart. Both hypertension and hypotension are indicators of various abnormal medical conditions. Even moderate elevation of arterial blood pressure is associated with a shortened life expectancy. Prevalence of hypertension is on rise all over the globe. Also it is estimated that about two third of hypertensive patients belong to developing countries<sup>(1, 2)</sup>. Previously it was thought that hypertension is a disease of old age; however, now this concept has been changed as a large population in adolescence and those in 3<sup>rd</sup> decade of their lives are suffering from this disease. In a National Health survey of Pakistan (NHSP), it was found that 18% of adolescents above age of 15 years are suffering from hypertension. Also it was estimated that about 70% of Pakistanis who are hypertensive, are not aware of their problem<sup>3</sup>.

Body-Mass Index (BMI) measures human body shape according to the weight and height ratio. It is a tool that estimates body fat, and shows whether an

individual is at a healthy or unhealthy weight i.e. obese or underweight. Obesity has been correlated with high risk for coronary disease (CAD), type 2 diabetes, hyperlipidemia and mortality<sup>4,5</sup>. BMI among adolescents is on rise and obesity is becoming a common condition<sup>6</sup>. In many studies, BMI and hypertension have been related and obesity is considered as a strong risk factor for hypertension<sup>7</sup>. However, among adolescents it is still a gapping area, particularly from third world countries. So we planned this study with the objective to determine prevalence of obesity in adolescents and to find association of Obesity with hypertension, mean arterial pressure and family history of hypertension.

## MATERIALS AND METHODS

This cross-sectional study was conducted at ShaikhKhalifa Bin Zayed Al-Nahyan Medical and Dental College Lahore. After approval from ethical board, this study was conducted over a period of 2 months from January, 2017 to February, 2017. The study sample was taken from a trust-funded private school. There were 197 apparently healthy participants (age range 10-16 years) included in the study. Written informed consent for inclusion into study was obtained from parents of the participants.

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Blood pressure was measured by sphygmomanometer, weight was recorded up to nearest 0.5 kg and height was measured up to the nearest centimeter. Their BMI was calculated and BMI value of above 25 kg/m<sup>2</sup> and Systolic BP value of above 120 mm Hg were used as standard to label obesity and hypertension respectively. Family history of hypertension was also asked. Data was analyzed using SPSS version 20. Chi square test was used to check the significance of association of BMI with Systolic BP and with family history of hypertension of the students. Students' T-test was used to assess the relationship of BMI with mean arterial pressure. P <0.05 was considered as significant.

**RESULTS**

A total of 197 students were included in this study. The mean age was found to be 13.81±1.58 years (range being 10-16 years). Among these 197 participants, 103 were male (52.2%) while remaining 94 participants (47.8%) were female. Regarding their systolic BP, it was found that majority of the participants had the systolic BP in the range of 100-120mmHg (Fig. 1). Hypertension was found in 24 of 197 patients (13.7%) in this study. Also majority of the participants had the BMI in the range of 17.5-22.5 kg/m<sup>2</sup> and they were not obese (Fig. 2). Obesity was found in 36 of 197 participants (18.2%).

Association of obesity with hypertension was determined and it was found to be significantly associated. Obesity was stratified for mean arterial pressure and P-value was significant (P=0.00). Also family history of hypertension was stratified for obesity in adolescents; however, it was not significant (Table 1).

Fig.1: Distribution of participants according to Systolic BP

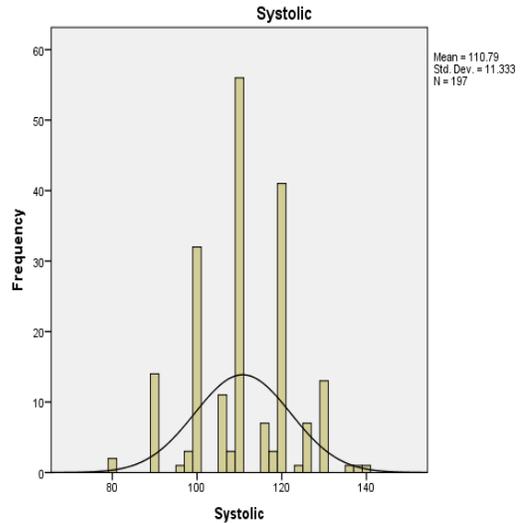


Fig. 1: Distribution of participants according to BMI

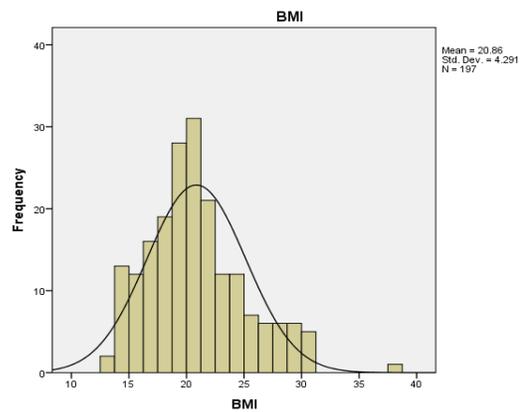


Table 1: Association of obesity with hypertension, mean arterial pressure and family history of hypertension

	Obesity		P-Value
	Yes	No	
<b>Hypertension</b>			
Yes	150	23	0.000
No	11	13	
<b>Mean Arterial Pressure</b>			
mmHg	87.25 ± 8.43	80.14 ± 9.35	0.000
<b>Family History of hypertension</b>			
Yes	28	123	0.860
No	8	38	

**DISCUSSION**

The relationship of hypertension and BMI is well established. A linear rise in systolic blood pressure between ages of 30-80 years and a concurrently early increase in diastolic blood pressure until the age of 50-60 years is shown in various epidemiological studies<sup>8</sup>. It has also been ascertained that life style changes, particularly diet and physical activity, play role in reducing BMI to

control BP in adults who have more prevalence of hypertension along with other cardiovascular and systemic complications, which might be directly or indirectly linked to their high BP<sup>9</sup>.

A major concern is prevalence of hypertension, and more importantly pre-hypertension, in adolescents and children. Pre-hypertension is slightly elevated blood pressure that can turn into full-blown hypertension if lifestyle changes are not made. Kilcoyne et al concluded in a study including more than 3500 high school students that development of hypertension may begin early in adolescence<sup>10</sup>. According to another study, 15.3% of 12-14 years old and 26.3% of 15-17 years old had pre-hypertension at index visit<sup>11</sup>. An investigation in 9-10 years old Icelandic school children showed that 2.5% sustained hypertension with a significant correlation of hypertension and BMI<sup>12</sup>.

Similarly surveys in India have found significant prevalence of hypertension in younger age groups<sup>13,14</sup>. In Pakistan, a comprehensive survey of 661 public schools observed pre-hypertension in 15% and hypertension in 3% of children<sup>(15)</sup>. All of these research projects showed a significant positive relationship between BMI and hypertension.<sup>(16)</sup> In our study, 13.7% of students had high Systolic BP and 18.2% of them were obese. It showed the same correlation with a very high significance. A larger study sample may be required to comment on family history of hypertension. In the present study it had no effect on high systolic BP.

## CONCLUSION

We conclude that obesity and hypertension are quite prevalent among adolescents and they are significantly associated with each other. Awareness of high blood pressure should be emphasized at this age, particularly with respect to increased BMI because this is one of the main risk factors which can be easily controlled with life style changes.

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