

TO EVALUATE THE ASSOCIATION BETWEEN OBESITY AND HYPERTENSION IN SCHOOL GOING CHILDREN OF GWALIOR REGION (URBAN)

Authors:

¹Dr. Gaurav Bhatnagar, ²Dr. Anita Pal, ³Dr. Vikas Jain^{1,2,3}Department of physiology GRMC Gwalior

Corresponding Author: Dr. Gaurav Bhatnagar, Department of physiology GRMC Gwalior

Article Received: 28-08-2022**Revised:** 17-09-2022**Accepted:** 07-10-2022**ABSTRACT:**

Obesity is a global health issue, with morbid obesity increasing at an alarming rate. Obesity is linked to an earlier onset of cardiovascular diseases and a higher incidence of cardiovascular morbidities and mortalities in children and adults. Increasing trend of hypertension is a world wide phenomenon among adults as well as children and adolescents. The evidence on persistent hypertension in school attending youngsters is scarce in India. Obesity and its association to hypertension in children between the ages of 10 and 14 years was the major focus of this study. The survey technique was adopted by us, we surveyed 40 children from JAH normal pediatric OPD. SPSS 22 software was used to examine the data. The study's findings showed a strong link between obesity and hypertension as well as an association between obesity and hypertension.

Keywords: Obesity, Hypertension, Children, Weight**INTRODUCTION:**

Adolescence is a stage of rapid growth and development, as well as changes in the body's physiology and behaviour.¹ With the rapid paced life of today the lifestyle of children and adolescents has changed, exposing them to lifestyle diseases. Hypertension in children usually results from an underlying medical problem, such as renal, cardiac, or endocrine dysfunction. Although young children with obesity and overweight both have grown over the past few decades, so too has the incidence of primary hypertension.² Hypertension in school-aged children is poorly understood in India.³ A sizable percentage of India's population in the twenty-first century is made up of young people. (66% of total population is below the age of 35 years).⁴ Health of this young India depends on the health status of the children at an early age. It is predicted that by the year 2050, 60% of men and 50% of women in India would be overweight due to existing rates of obesity. Research suggests that an alarming 80 percent of children who are fat by the age of 10 are also likely to be obese as adults. The number of obese children in India is expected to reach 27 million by 2030.⁵ Obesity has a complicated genetic, hormonal, and environmental interaction that

contributes to its varied and multiple aetiology.⁶ Childhood obesity has two main risk factors that are inactive lifestyle and an energy-dense food in diet. The rapid spread of urbanization is one of the most fundamental reason for over consumption of such excess caloric and low fibre food, so many people in India are overweight today. Physical inactivity and a diet rich in fats, sugar, and salt have become the norm.⁷ This tendency is leading to an increase in ischemic heart disease, obesity, dyslipidemia, hypertension, and diabetes mellitus like diseases. It is plausible to see obesity as the beginning of the **New World Syndrome**, it is a group of non-communicable diseases. These are posing a serious socioeconomic and public health burden on developing nations. At this time, India is experiencing an alarming rise in the percentage of children and teenagers who are fat/obese. These obesity related problems starts early in childhood and adolescence period but goes undiagnosed at that time. So our main focus in this study was to identify the association between overweight/obesity and high blood pressure in the children of an early age group so that early interventions can be done regarding their weight control and lifestyle modifications so that the burden

of this epidemic disease from our society can be reduced. Preventative measures, early identification, and risk factor reduction can assist these children avoid problems and consequently lower mortality and morbidity.⁸

MATERIAL AND METHODOLOGY:

Study design: Cross sectional observational survey based

Sample size: 40 (Male children)

Area of the study: JAH group of hospital (Gwalior)

Inclusion criteria: Healthy children from age 10-14 years

Exclusion criteria: Children with any fever, muscular weakness, neurological illness, significant malnutrition or any pathological condition

This cross sectional study was carried out among 40 healthy children of the age group 10-14 years from routine pediatric OPD at JAH hospital Gwalior. All children and their parents were thoroughly informed and written consent were taken from the parents. The age of the participants were rounded off to the nearest whole number in completed years. BMI more than 1 SD above the median is classified as overweight, and BMI more than 2 SD is classified as obese according to WHO growth reference charts.⁹ While conducting our study, we used IAP charts for body weight, height,

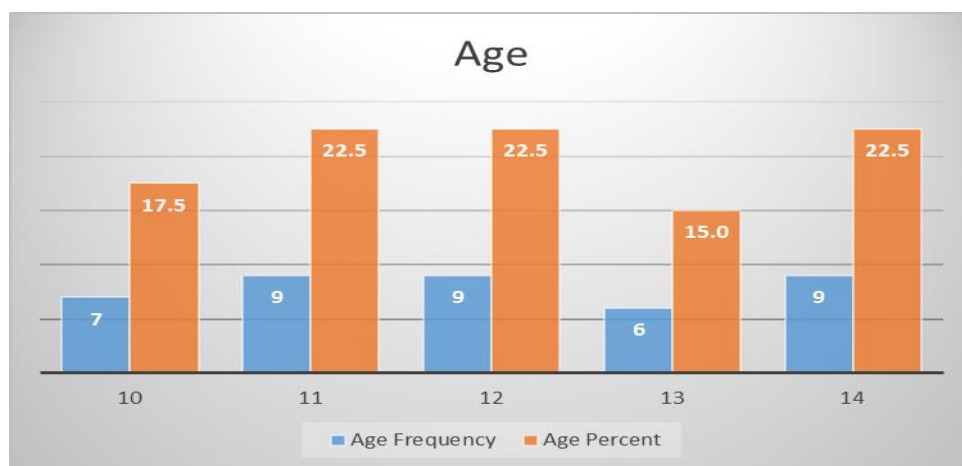
and BMI, (reproduced with permission from an Indian academy of pediatrics 2015), where the 23rd AE equates to an adult BMI of 23 (overweight), and the 27th AE to an adult BMI of 27(obesity) respectively. Measurements of blood pressure was done using aneroid devices . A portable stadiometer was used to measure height in a standing stance with the feet together. A calibrated scale was used to measure weight. Average, standard deviation, and total number were derived in descriptive statistics. One-way analysis of variance was used to make comparisons between the independent and dependent variables, and post hoc testing was used to make any necessary adjustments. We utilised SPSS 22.0 for the statistical analysis, and we regarded a probability of less than.05 to be statistically significant. We also calculated a confidence interval of 95% in our study.

RESULTS:

In this study 40 children participated (10-14 years). Table-1 shows the age wise distribution of children. Participants of 10 years age were 7 and of age 11 years were 9. Participants whose age was 12 years were 9 in number, participants whose age was 13 years were 6 and participants whose age was 14 years were 9 in number.

Table1: Age wise distribution of participants

Age in completed years	N	Percent (%)
10	7	17.5
11	9	22.5
12	9	22.5
13	6	15.0
14	9	22.5
Total	40	100.0

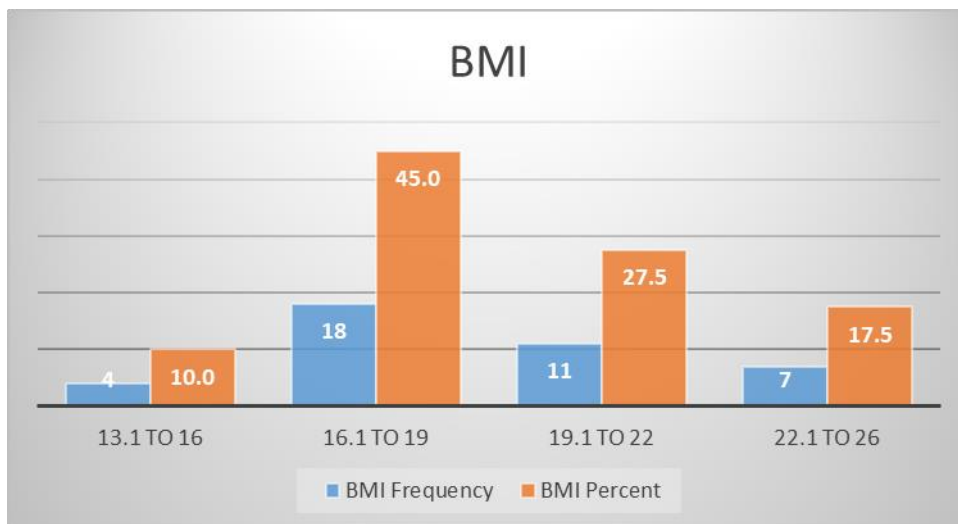


Graph 1: Graphical representation of age wise distribution of participants

Table- 2 discusses BMI of participants. In 13.1 to 16, frequency (N) is 4 and percentage is 10%. In 16.1 to 19, frequency is 18 and percentage is 45%. In 19.1 to 22, frequency is 11 and percentage is 27.5%. In 22.1 to 26, frequency is 7 and percentage is 17.5%.

Table2: Distribution of participants according to BMI

BMI (Kg/m ²)	N	Percent (%)
13.1 to 16	4	10.0
16.1 to 19	18	45.0
19.1 to 22	11	27.5
22.1 to 26	7	17.5
Total	40	100.0



Graph 2: Graphical representation of distribution of participants according to BMI

Table 3: Age wise distribution of participants on the basis of BMI

Age in completed years	10	11	12	13	14	Total
Normal	5	4	6	5	6	26
overweight	1	3	2	1	2	9
Obese	1	2	1		1	5

In table-3 among 10 years-old children we found 1 obese, 1 overweight, and 5 normal weight. 3 overweight and 2 obese children in age group 11 years. 1 obese and 2 overweight in the age group 12. 1 overweight at age 13 years and 1 obese and 2 overweight in age group 14 years out of a total of 40.

Table 4: Distribution of participants on the basis of blood pressure

Blood Pressure	Frequency	Percent (%)

(mmHg)		
108/60 to 115/70	6	15
116/70 to 120/70	22	55
121/80 to 130/90	11	27.5
131/90 to 140/100	1	2.5
Total	40	100

In table-4 we distributed participants on the basis of blood pressure as per percentile chart of Indian pediatrics and were classified into normotensive, pre-hypertensive, hypertensive as per American academy of pediatrics¹⁰. 28 out of 40 were normotensive (70%). 8 were having elevated BP, pre-hypertensive (20%). 4 were having hypertension (10%).

Table 5: Anthropometric parameters of participants

	Normal (n= 26)	Overweight (n= 9)	Obese (n= 5)
Age	12.2 ± 1.41	12 ± 1.33	11.6 ± 1.51
weight (kg)	37.86 ± 6.81	48.57 ± 11.52	56.76 ± 9.49
height (cm.)	145.37 ± 6.91	151.88 ± 10.59	154.92 ± 8.50
waist circumference (cm)	62.80 ± 4.05	71.97 ± 5.17	76.32 ± 2.81
Hip circumference (cm)	74.73 ± 4.04	80.75 ± 4.03	82 ± 1.96
waist to Hip ratio	0.83 ± 0.02	0.89 ± 0.027	0.93 ± 0.01
BMI	17.74 ± 1.81	20.56 ± 2.29	23.5 ± 1.93
BP(systolic)	118.4 ± 3.91	118.88 ± 4.72	126.8 ± 4.14
BP (Diastolic)	68.32 ± 3.35	69.11 ± 3.54	75.6 ± 3.57

In table-5 we evaluate the anthropometric data of the participants, the mean and standard deviation of the individuals varied from normal to overweight to obese in weight, waist circumference, hip circumference also in waist to hip ratio. In table- 6 weight was correlated with systolic blood pressure and a significant correlation was found as P value after applying t test came less than 0.05 and t value of -0.305

Table 6: Correlation of weight and systolic blood pressure

"Paired Samples Correlations"				
		N	Correlation	Sig.
Pair 1	Weight(kg) & Blood pressure (systolic)	40	.552	.000

Table 7: Anova

		"Paired Differences"					t	df
		"Mean"	"Std. Deviation"	"Std. Error Mean"	"95% Confidence Interval of the Difference"			
					Lower	Upper		
Pair 1	Blood pressure (systolic) - Weight(kg)	.05000	1.03651	.16389	-.28149	.38149	.305	39

		“Sum of Squares”	“df”	“Mean Square”	“F”	“Sig.”
SBP	Between Groups	326.711	2	163.356	10.113	.000
	Within Groups	597.689	37	16.154		
	Total	924.400	39			
DBP	Between Groups	223.973	2	111.986	9.555	.000
	Within Groups	433.627	37	11.720		
	Total	657.600	39			

In table-7 Anova test was done, systolic and diastolic blood pressure were compared among normal, overweight and obese group and were found to be significant as significance value was .000 in both the comparative groups, after this post hoc analysis was done.

In table-8 we discovered a significant correlation between systolic blood pressure with normal and obese children and between overweight and obese children, as well as in the diastolic blood pressure also, we discovered a similar association between obese and overweight individuals.

Table 8: post hoc analysis

	(I) VAR00001	(J) VAR00001	Mean Difference (I-J)	Std. Error	Sig.
SBP	“Normal”	“Overweight”	-.88889	1.55440	.836
		“Obese”	-8.80000*	1.96266	.000
	“Overweight”	“Normal”	.88889	1.55440	.836
		“Obese”	-7.91111*	2.24179	.003
	“Obese”	“Normal”	8.80000*	1.96266	.000
		“Overweight”	7.91111*	2.24179	.003
DBP	“Normal”	“Overweight”	-.80342	1.32399	.817
		“Obese”	-7.29231*	1.67173	.000
	“Overweight”	“Normal”	.80342	1.32399	.817
		“Obese”	-6.48889*	1.90948	.005
	“Obese”	“Normal”	7.29231*	1.67173	.000
		“Overweight”	6.48889*	1.90948	.005

DISCUSSION:

Hypertension in children is a serious condition that can persist into adulthood. Our study found that 10% of people participated in hypertension, and that hypertensive children had a higher body mass index than pre-hypertensive and normal-weight children. 70% of the kids had normal blood pressure, 20% had pre-hypertension, and 10% had hypertension. Overall, the rate of hypertension incidence was greater than that

seen in a study done by Hamidreza Badeli et al 2013-15¹² and also higher than study conducted by Wang et al 2007 - 2011¹¹. Research of Kumar 2011 showed that 6.6% of boys and 7.8% of girls were hypertensive, accounting for 7.2% of all youngsters.¹³ However, study of Hung reported that in the study's population of youngsters, 10.3% were hypertensive.¹⁴ In our study, the prevalence of overweight and obesity among youngsters was 22.5% and 12.5%, respectively. Study conducted by Lua et al 2013 on Chinese children

showed 11.3% and 12.5%, respectively, are the incidence rates of overweight among school-aged children. Their reported obesity percentage was greater, though, at 13.53 percent and 15.7 percent, respectively.¹⁴ In addition, it was found that 30.8% of Spanish and 25.6% of American school-aged children were overweight or obese, respectively.¹⁵ These different findings may be the consequence of dietary and lifestyle differences amongst groups. In our research, we found that obese and overweight children had greater incidences of hypertension and pre-hypertension. Wang et al 2007–2011 found similar findings. Overweight children (50.1% of the sample) and obese children (70% of the sample) had a higher prevalence of hypertension than their normal-weight counterparts.¹² in their 4-year longitudinal study.¹¹ Furthermore, Flores et al. 2009¹⁶ suggested that being overweight or obese may contribute to the development of chronic disorders like hypertension. In contrast to the research of Hamidreza Badeli et al 2013-15 which found hypertension in 16.7% and pre-hypertension in 12.4% of normal-weight children, our study demonstrated no hypertension in children of normal weight.

CONCLUSIONS:

Our research demonstrated that hypertension is common among overweight and obese school-aged children of Gwalior region. Our results showed that hypertensive children were heavier than the pre-hypertensive and normal weight children in the study. There are some caveats to our study. To begin, the cross-sectional approach did not investigate any potential causal link between obesity and hypertension. Second, a single reading of blood pressure (BP) on the day of the test is not enough to diagnose hypertension; further readings must be taken at least twice to confirm the diagnosis. In the third place, instead of the traditional mercury sphygmomanometer, we utilised a professional blood pressure monitor from Omron HBP-1300. Variations in BP measurement and small research population are likely account for some of the discrepancies in results.

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