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Research Article

PREVALENCE OF HYPERTENSION IN ADOLESCENTS OF PRIVATE SCHOOLS, HAYATABAD PESHAWAR

Muhammad Abdur Rauf ¹, Rizwana ², Tauseef Aman ³, Mahe Noe ⁴, Munayal Roghani ⁵,
Nida Mehmood ⁶

¹ Assistant Professor Cardiology Kuwait Teaching Hospital/Peshawar Medical College Peshawar

² PG Trainee surgical B ward Khyber Teaching Hospital Peshawar

³ Associate Professor Community Medicine Khyber Girls Medical College Peshawar

⁴ PG Trainee surgical A ward Hayatabad Medical Complex Peshawar

⁵ PG Trainee surgical B ward Hayatabad Medical Complex Peshawar

⁶ M.Phil Trainee Khyber Girls Medical College Peshawar

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Abstract:

Objectives: To determine the prevalence of hypertension among adolescents aged 13-18 years, and association of Body Mass Index (BMI) with hypertension.

Methodology: It was a cross sectional study, carried out from April 2017 to May 2018 in two private schools of Hayatabad Peshawar. The study population included adolescents aged 13 to 18 years. Interviewer filled questionnaire included weight, height, blood pressure, family history, physical activity amongst other questions. Convenience sampling technique was used. Height was measured with measuring tape; weight with a portable weighing machine and blood pressure was measured by the auscultatory method.

Results: The study included 372 children, having 53.8% males. Majority of the students were normotensive (BP < 90th percentile). Pre-hypertension was seen in 4.57% and hypertension in 36.83% of children. Total prevalence of hypertension was 41.4%, overweight 10.43% and obesity was observed in 3.48%.

Conclusion: There is significant high prevalence of hypertension in adolescent population in Peshawar and there is significant association of BMI with hypertension.

Key words: Hypertension, Adolescence, BMI, risk factors

Corresponding author:

Dr Muhammad Abdur Rauf,

MBBS, FCPS, FACC, FESC, MEAPCI

Assistant Professor of Cardiology Peshawar Medical College Peshawar

Consultant Cardiologist Kuwait Teaching Hospital Peshawar

0092-343-9440544, dr.raufkhan@yahoo.com

QR code



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INTRODUCTION:

Hypertension is a chronic diseased condition in which blood pressure levels remain high as compared to the standard values for a certain age, for a certain period of time. It may compromise the functions of the heart, brain, kidneys, and blood vessels¹. Hypertension is the leading cause of premature death among adults throughout the world. Environmental, genetic, and behavioral factors play an important role in the emergence of essential hypertension. Because of its hereditary component, hypertension is considered to have its origin in the early ages of life. Changes in health-related behaviors in a population indicate an increase in the rates of hypertension in the young. It is now established that increased blood pressure is detectable in children and adolescents and is not uncommon.²

As hypertension is influenced by racial, geographic, cultural and dietary patterns, therefore its prevalence is different in different parts of the world³. In the European countries and the United States definite hypertension is prevalent in 15-18% of the adult population. Hypertension has also got high prevalence in Asian countries. According to community surveys hypertension is a major health problem in Pakistan⁴, with the prevalence of 18% in adults⁶. In Peshawar, hypertension has been reported as the commonest cardiovascular problem in a hospital population⁴, but significant data is not available on its prevalence in adolescents of Peshawar.

At any age, in either sex, elevated blood pressure (systolic or diastolic) is a contributor for all forms of cardiovascular disease³. Increased prevalence of hypertension among adolescents is associated with inadequate nutrition, physical inactivity and overweight. Early diagnosis is difficult because of its asymptomatic nature. However, its detection, treatment and control can help to prevent and reduce the cardiovascular events¹. Changes in teenage

lifestyle, such as physical inactivity, consumption of fast food and culture of videogames and computer games as a leisure time activity are considered to be the cause of increased trend in BMI⁵. This study was conducted to observe the prevalence and risk factors for hypertension in healthy school adolescents of Peshawar and its association with BMI.

METHODOLOGY:

Two private schools of Hayatabad Peshawar (Frontier Children's Academy for boys and Frontier Youth Academy for girls) were selected for this Cross-sectional study conducted from April 2017 to May 2018. Sample size was calculated using WHO calculator and 374 children were enrolled. Among them were 201 males and 173 females aged 13 to 18 years. Convenient Sampling technique was used. Those students who were above 13 years of age and below 18 years, having no previous comorbidities or hypertension, present on the day of collection of data were included and those who were below 13 years of age and above 18 years, with any previous comorbidities and are unwilling to participate were excluded from this study. Study was approved from ethical committee of KGMC (no.674/C-Med/KGMC, dated: 03-05-2017)

A semi-structured questionnaire was filled by the authors after asking and explaining the questions to the students. Trained investigators recorded the anthropometric measurements. Using measuring rod (fixed on the wall) and digital balance, height and weight were measured, with sensitivity of 0.1 cm and 0.1 kg, respectively. The student stood straight with heels, buttocks and back touching the wall and stretching upwards to the fullest extent with arms hanging on the side. Height and weight were measured without any footwear. BMI was calculated for every student using formula $\text{weight}/\text{height}^2$. Students were classified as obese healthy, overweight or underweight according to WHO classification as under;

BMI	Nutritional Status
Below 18.5	Under Weight
18.5 to 24.9	Normal Weight
25 to 29.9	Overweight
30 and above	Obese

Children made comfortable and explained about procedure to alleviate anxiety. BP was recorded by aneroid sphygmomanometer (with adult size cuff) using standardized method. The systolic blood pressure was determined by the onset of the “tapping” Korotkoff-1 sound and the diastolic at its disappearance (Korotkoff-5). The children were considered hypertensive if the systolic or diastolic blood pressure or both were equal to or more than the 95th percentile for height, age and gender³. Students found to have high systolic and diastolic values, were made further comfortable and relaxed and their blood pressure was measured 3 times after every 5 minutes. After that they were considered as hypertensive. Blood pressure measurements were made by a single observer. Students were classified as normotensive or hypertensive as per ACC (American College of Cardiology) guidelines (2017);

Stages of Hypertension	Blood Pressure Values
Normal	<120/<80 mm of Hg
Elevated/Pre Hypertension	120 to 129/<80 mm of Hg
Stage 1 Hypertension	130 to 139/80 to 89 mm of Hg
Stage 2 Hypertension	≥140/≥90 mm of Hg

The data was analyzed using SPSS version 20.0. Descriptive statistics were calculated as the mean and standard deviation for continuous variables and proportions for categorical variables. Chi square tests were performed to determine the factors independently associated with hypertension. Statistical significance was accepted at $P < 0.05$. All the highly significant values of < 0.001 are rounded off to 0.001.

RESULTS:

Study included 372 children with 200 males (53.8%) and the rest were females. The majority (58.60%) of the children were found to be normotensive (BP <90th percentile). Total prevalence of hypertension was 41.4% **Figure 1**. Over-weight was observed in 10.43% of the children and obesity in 3.48%. We observed significant high prevalence of hypertension in obese children or in other words half of obese in our study were hypertensive **Table 2**. There was strong association between hypertension and BMI ($P = 0.001$). The association of diastolic and systolic blood pressure of adolescents with male gender was found to be highly significant at p values (0.009 and 0.001) respectively **Table 3**, **Table 4**.

Table 1: Mean age, BMI, SBP and DBP

	Mean	Number	Standard deviation
Age	14.79	372	1.367
BMI	20.8268	372	4.09893
Systolic	122.26	372	15.433
Diastolic	73.68	372	10.941

Figure 1: Total prevalence of hypertension

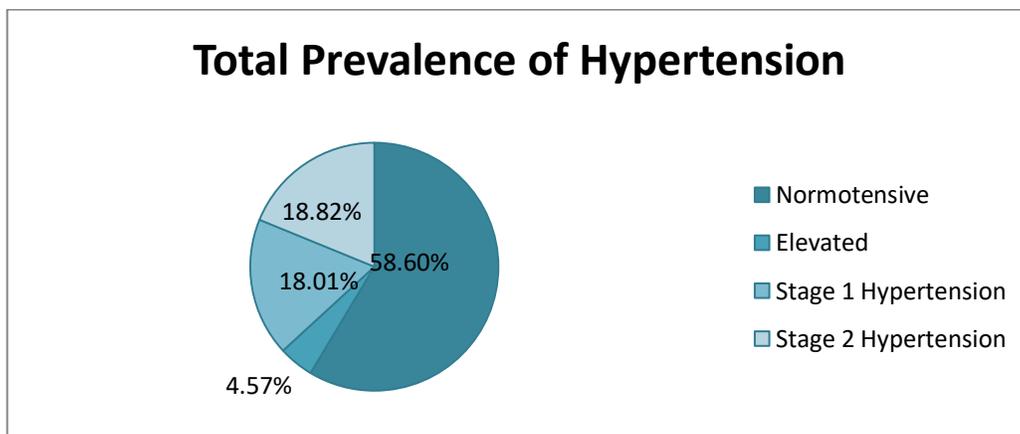


Table 2: Association of Hypertension with BMI

		Normotensive	Elevated	Stage 1 hypertension	Stage 2 hypertension	Total	P value
BMI groups	Underweight	91	5	14	5	115	P = 0.001
	Normal	110	10	41	45	206	
	Overweight	12	2	11	14	39	
	Obese	5	0	1	6	12	
Total		218	17	67	70	372	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	47.093 ^a	9	.000
Likelihood Ratio	50.637	9	.000
Linear-by-Linear Association	39.692	1	.000
N of Valid Cases	372		

a. 4 cells (25.0%) have expected count less than 5. The minimum expected count is .55.

Table 3: Association of hypertension (systolic) with gender

			Systolic Group		Total	P Value
			Normotensive	Hypertensive		
Gender	Male	Count	95	104	199	P = 0.001
		% within gender	47.7%	52.3%	100.0%	
	Female	Count	123	49	172	
		% within gender	71.1%	28.9%	100.0%	
Total		Count	218	154	372	
		% within gender	58.6%	41.4%	100.0%	

Table 4: Association of hypertension (diastolic) with gender

			Diastolic group		Total	P Value
			Normotensive	Hypertensive		
Gender	Male	Count	167	33	200	P = 0.009
		% within gender	83.5%	16.5%	100.0%	
	Female	Count	159	13	172	
		% within gender	92.4%	7.6%	100.0%	
Total		Count	326	46	372	
		% within gender	87.6%	12.4%	100.0%	

DISCUSSION:

Our results report total prevalence of hypertension among the adolescents to be 41.4%, which is similar to what others have found¹⁰, which refutes the null hypothesis. While pre-hypertension and hypertension is reported as 4.57% and 36.83% prevalent respectively which is similar to some of the studies^{8, 10} and in contrast to what others have found.^{5, 7, 9} Such

variation in observations might be attributed to the difference in sample sizes, in the socioeconomic statuses of the subjects in the respective studies and also, to some extent, to the difference in the skill set of the recording personnel. Also, the recording protocol differed in that they recorded 3 measurements of blood pressure for each student and used their average for analysis. The most important

factor was the cutoff value for hypertension which was 120/80 in our study (according to ACC guidelines). While those studies which uses cutoff value of 130/80 (according to ISH) or 140/90 shows less prevalence.

The increase in Blood pressure over the past decade is partially attributable to an increased prevalence of overweight¹⁵. In this study obese adolescents among the hypertensive were 5.1% against normotensive 2.2 % which is similar to what others have reported¹².our results shows strong correlation between obesity and hypertension with P value=0.001. Among the overweight students 64%, while 58% of the overweight students turned out to be hypertensive. This association between the prevalence of obesity and hypertension can be attributed to the increased ingestion of fast food and sedentary life style highly prevalent among the adolescents. Similar correlation has been demonstrated by many other studies.^{7,9,11,13,14}

The study was limited by the shortage of time as the BP values were measured only once for each participant except for those who had systolic BP higher than normal. Also, the study could not cover all socio-economic sectors and most of the participants were from middle class working families.

CONCLUSION:

There is high prevalence of hypertension in adolescent population in Peshawar, Which is significantly associated with BMI. Future investigations need to standardize techniques and references, besides analyzing important factors for this population such as age, nutritional status, adolescence and stages of sexual maturity, to mitigate the high heterogeneity.

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