Hypertension among School going Urban and Rural Adolescents: A Comparative Study

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Abstract

Background: In the modern society, technology has contributed to create physical comfort in the life and simultaneously, there is alteration in dietary habits of youngsters. This has affected adolescent's health significantly, leading to hypertension in both urban and rural adolescent population.

Objectives: Present study aimed to access and compares the prevalence of hypertension among urban and rural adolescent.

Methods: A community-based cross-sectional comparative study conducted on 300 healthy age matched adolescents, 10-19 years of age from each of rural and urban school of Jaipur (Rajasthan). After Institutional Ethical Committee and school administration approval, a predesigned proforma was filled having socio-demographic details, personal and family history. An average blood pressure was calculated by measuring 3 recordings with 5 minutes break through sphygmomanometer. The blood pressure was classified on percentile bases into pre-hypertension and hypertension. The data inferred by chi-square and 'p-value' less than 0.05 considered as significant.

Result: The prevalence of hypertension among urban and rural adolescent of Jaipur was 7.6% and 7%, while pre-hypertension was 32% and 28%, respectively. The prevalence of hypertension was high for systolic than diastolic blood pressure and more in late adolescent than early adolescent age group which was found significant only for systolic hypertension (p=0.003).

Conclusion: High prevalence of adolescent's hypertension is an important risk factor for future consequences of cardiovascular disease suggesting that there should be change in lifestyle. The early detection and management of it can prevent any future disability and mortality.

Keywords: Adolescents, Hypertension, Pre-hypertension

Introduction

Hypertension in adolescents is an emerging health problem in developing countries like India as well as developed countries. Pediatric hypertension that has paralleled an increasing prevalence of childhood obesity[1-5]. Elevated blood pressure during childhood and adolescence is associated with end-organ damage [6, 7], most commonly left ventricular hypertrophy, and is predictive of hypertension in early adulthood [5, 8, 9].

Some studies reported that adolescents living in urban areas are less prone to hypertension than that of rural areas because of better awareness but other studies are contrary to it, states that adolescents of rural areas are healthier, which is mainly due to healthy lifestyle [10,11] . There is also a wide variation in the prevalence of hypertension [12- 15]. Furthermore, the data related to the prevalence of hypertension among urban and rural adolescent is scanty in Rajasthan.

The present study was hypothesised to assess and compare the proportion of hypertension among urban and rural adolescents.

Methods

A community-based, cross-sectional, analytic type of observational study was conducted on 600 school children's i.e. 300 school children for each of two groups, after taking approval from the Institutional Ethical Committee and form school administration and consent from parents/ guardians. This present study was conducted to assess and compare measure the blood pressure among adolescents of the urban and rural government school of Jaipur (Rajasthan).

Total 600 healthy age matched adolescents with 10-19 years of age group were included in this study having 300 children from rural school 300 from urban school in equal number. Students suffering from any acute or chronic disease, secondary hypertension, taking any medications, not willing to participate were excluded from the study.

A pre-designed questionnaire /working proforma was asked to be filled by each participant that having information regarding demographic details (name, age, gender, address, religion, parental education, parental occupation), family history of chronic diseases (hypertension, diabetes mellitus, ischemic heart disease, cerebro-vascular accidents and any other chronic illness).

The blood pressure was measured on the left arm by using a standard mercury sphygmomanometer, after giving five minutes of rest to participants in sitting posture and taking all the necessary precautions. The appropriate sized cuff was selected with the bladder width about 40% of the arm circumference at a point mid-way between olecranon and acromion and the bladder length covering at least 80-100% circumference of the arm [16]. Three measurements of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were taken at intervals of five minutes and the average was calculated. This measured average blood pressure was converted into percentile and adolescents were classified into hypertensive, pre-hypertensive and normal categories using the below percentile chart.

The percentile charts based on gender, age and height provided by the National High Blood Pressure Educational Programme (NHBPEP): fourth report was used for the classification of blood pressure [17].

Percentile Chart	
A Systolic and/or Diastolic BP Percentile of:	Suggests that a child has:
Equal to or greater than the 95th percentile	Hypertension (HT)
90th to less than the 95th percentile	Prehypertension (pre-HT)
BP greater than 120/80 mm Hg	Prehypertension (Elevated) *

*Readings for Children with BP exceeding 120/80 mm Hg may indicate Stage 1 or Stage 2 hypertension, so putting those BP readings into the context of percentiles can help a health care provider determine an appropriate treatment

"Prehypertension" is defined as average SBP or DBP levels that are =90th percentile, but <95th percentile. Adolescents with BP levels ≥120/80 mmHg should be considered pre-hypertensive. Elevated BP constitutes both prehypertension and hypertension.

Statistics: All the Collected data were entered and compiled into excel sheet and statistical analysis were performed using statistical software primer (version-6). The qualitative data are expressed in form of percentage and proportion; the chi-square test was used to infer the significance of proportion. 'p-value' less than 0.05 considered as significant.

Results

The present study was conducted on urban and rural school-going adolescents, covering 300 urban school-going adolescents and another 300 rural school-going adolescent. When compared the prevalence of pre-hypertension and hypertension among urban and rural adolescents, it was more in urban than rural adolescent, with statically non-significant difference (Figure-1).

Although the prevalence of systolic hypertension and pre-hypertension was more in urban than rural adolescents, but this difference was not found statistically significant (Table 1). While the prevalence of diastolic pre-hypertension was more in rural than urban adolescents, but again the difference in both group was non-significant (Table 2).

Although the late adolescent group seemed more prone to systolic pre-hypertension than early adolescent group in urban population, it was without significant difference (Table 3). The high prevalence was also observed for diastolic pre-hypertension in urban late adolescent than early adolescent but the difference was again not statistically significant (Table 4).

Younger rural adolescents were having a significantly less systolic prevalence of pre-hypertension than older ones (p=0.003). While the rural young adolescent had less prevalence of diastolic pre-hypertension than older ones with a statistically non-significant difference (Table 3,4).

Table 1

Comparison of Systolic Pre-hypertension and Hypertension among Urban and Rural School going Adolescents

Classification of Hypertension	Urban frequency Number (%)	Rural frequency Number (%)	Total	Significance p value
Normal	189(63%)	205(68.33%)	394	λ^2 =2.065
Pre-Hypertension	96(32%)	84(28%)	180	df= 2
Hypertension	15(5%)	11(3.66%)	26	p=0.356
Total	300(100%)	300(100%)	600	

Table 2 Comparison of Dystolic Pre-hypertension and Hypertension among Urban and Rural School going Adolescents

Classification of Hypertension	Urban frequency Number (%)	Rural frequency Number (%)	Total	Significance p value
Normal	268(89.33%)	266(88.66)	534	χ^2 =0.571
Pre-Hypertension	17(5.66%)	21(7%)	38	df= 2
Hypertension	15(5%)	13(4.33%)	28	p=0.751
Total	300(100%)	300(100%)	600	

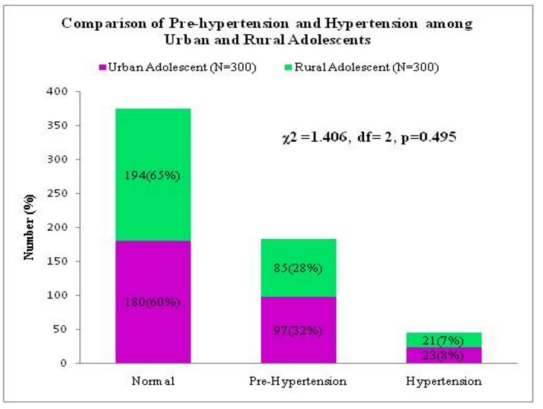
Table 3 Comparison of Systolic and Diastolic Pre-Hypertension and Hypertension among Urban Early and Late Adolescents

Classification of Hypertension	Early Adolescent Number (%)	Late Adolescent Number (%)	Total N=600	Significance p value
Status of Systolic Hypertension				
Normal	122(65.24%)	67(59.3%)	189	χ^2 =1.085
Pre-Hypertension	56(29.95%)	40(35.4%)	96	df= 2
Hypertension	9(4.81%)	6(5.3%)	15	p=0.581
Total	187(100%)	113(100%)	300	
Status of Diastolic Hypertension				χ^2 =0.734
Normal	169(90.37%)	99(87.61%)	268	df= 2
Pre-Hypertension	9(4.81%)	8(7.07%)	17	p=0.693
Hypertension	9(4.81%)	6(5.3%)	15	
Total	187(100%)	113(100%)	300	

Early adolescence (10–14 years) and **Late adolescence** (15–19 years) [18]

Table 4 Comparison of Systolic and Diastolic Pre-Hypertension and Hypertension among Rural Early and Late Adolescents

Classification of Hypertension	Early Adolescent Number (%)	Late Adolescent Number (%)	Total N=600	Significance p value
Status of Systolic Hypertension				
Normal	141(75.4%)	64(56.63%)	205	χ^2=11.507
Pre-Hypertension	41(21.93%)	43(38.05%)	84	DF 2
Hypertension	5(2.67%)	6(5.3%)	11	p=0.003
Total	187(100%)	113(100%)	300	
Status of Diastolic Hypertension				χ^2 =0.471
Normal	168(89.83%)	98(86.72%)	266	DF 2
Pre-Hypertension	11(5.89%)	10(8.85%)	21	p=0.790
Hypertension	8(4.27%)	5(4.42%)	13	
Total	187(100%)	113(100%)	300	



Discussion

In this study, high prevalence of pre-hypertension and hypertension was found, among both urban and rural adolescents. In the urban adolescent prevalence of hypertension and pre-hypertension was 8% and 32%, respectively. While in rural adolescents it was 7% and 28% for hypertension and pre-hypertension, respectively. In the rural adolescent prevalence of hypertension was comparatively lower than the urban adolescents with a non–significant difference. An increased prevalence of hypertension was found with the increase in age, mainly in rural adolescents with a statistically significant (P=0.003) difference.

In the present study, the prevalence of hypertension was 8 % and 7% in urban and rural adolescents. Almost similar prevalence was observed by Vendavathy et al [12] (7.2%) in Bangalore city, Buch N et al [19] (6.48%) at Surat and by R. Sharma et al [20] found 8.2 % in central India. Whereas the lower prevalence of hypertension among adolescents was observed by Nihaz K[15] (4.5 %) in Kerala. In comparison to present study a high prevalence of hypertension was documented in other studies, Tony L et al [14] found 21.4 % at Thiruvanthanpuam, Sunder JS et al[21] (Chennai) found 22%, prevalence of hypertension. Tony L et al[14] found the prevalence of systolic pre-hypertension 21.4 % and diastolic pre-hypertension 5.3%, while in the present study systolic and diastolic hypertension prevalence same both for urban(5%) and rural adolescents (4 % approx.). In this study, a slight high prevalence of hypertension was found in urban than rural adolescents.

High prevalence of pre-hypertension was found among urban and rural adolescent that is 32% and 28 %, respectively. The high prevalence of pre-hypertension was observed mainly for SBP (32%-urban, 28% rural) than DBP (6% urban, 7% rural). Similar to present study high prevalence of pre-hypertension (24%) was also observed in Prasad S et al [22] study conducted at Lucknow. Tanu Anand et al [23] at Delhi found pre-hypertension prevalence for SBP 4% and for DBP 26%. While in our study high prevalence of pre-hypertension was observed for SBP in both urban & rural than DBP. In contrast, to present study, other studies [12, 15, 21] were found a lower prevalence of pre-hypertension.

In present study, the high prevalence of hypertension and pre-hypertension was observed among both in urban and rural, but more in urban adolescents due to various factors. The lack of physical activity may be the main factor that contributes to hypertension. The increased stress level with rapid urbanization and changed dietary habits like more fatty and salty diet and less fruit intake also adds on rising blood pressure. The more consumption of salty diet raises the sodium, while fewer intakes of fruits decrease the potassium that contributes to a rise in blood pressure level. The increased stress level stimulates our sympathetic system, which causes vasoconstriction of blood vessels that further aggravate the blood pressure level. Thus, the change in lifestyle is the possible mechanism of a high prevalence of hypertension and pre-hypertension among urban and rural residents of Jaipur.

Limitations:

1. We were unable to collect data from private schools due to their apprehension.
2. The school children were unable to provide accurate data about their parent's monthly income.
3. Children were also not able to give exact information about their lifestyle like total sleeping hours, duration of exercise in a day, fast food intake etc.

Suggestions: In the present study, participants were from government schools and belong to lower socioeconomic status. If this study has been done to compare government verse reputed private schools, the very high prevalence of blood pressure might be found. As the private schools' adolescents are from high socioeconomic status and prone to high caloric intake and low physical activity.

Conclusion:

The present study found a high prevalence of hypertension among both urban (7.66%) and rural adolescents (7%), while the prevalence of pre-hypertension was predominantly high in urban (32%) than rural adolescents (28%) of Jaipur. Adolescents in the stage of pre-hypertension are on risk for future hypertension identified. The early detection and management reduces the possible morbidity and mortality in future and also the economic burden for family and for the country.

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