pISSN 2394-6032 | eISSN 2394-6040

# **Research Article**

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20161473

# A cross sectional study of hypertension in adolescent girls of district Moradabad, Uttar Pradesh, India

## Rakesh Kumar\*, Mukesh Sharma, Anurag Srivastava

Department of Community Medicine, Teerthanker Mahaveer Medical College and Research Center, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India

Received: 06 May 2016 Accepted: 14 May 2016

## \*Correspondence: Dr. Rakesh Kumar,

E-mail: drrakeshk23@gmail.com

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

#### **ABSTRACT**

**Background:** In Indian adolescent school children, there is a high prevalence of obesity and hypertension. The present study was undertaken in the in the urban slums of Moradabad district of Uttar Pradesh, India with the broad aim of assessing the prevalence of hypertension & associated factors among adolescent girls.

**Methods:** This cross-sectional study was conducted among 405 adolescent girls. Simple random sampling was used to select the individuals from each slum. Blood pressure was classified as per Joint National Committee [JNC]-7 criteria. A pre-tested and pre-designed schedule was used to collect the information. Chi-square test was applied to analyse data using SPSS software.

**Results:** Nearly 15.8% adolescents were found pre-hypertensive, 1.5% were having stage I hypertensive and 0.7% of the girls were stage II hypertensive. About 15.6% were underweight and 3.5% were overweight. Pre-hypertensive/hypertensive was higher among those aged between 17-19 years (20.02%), belonging to upper socioeconomic class (23.0%) and those belonging to nuclear family (18.6%). Higher proportions of those consuming non-vegetarian food (21.4%), saturated fat (19.3%) and iodized salt (17.7%) were found hypertensive/pre-hypertensive.

**Conclusions:** The prevalence of hypertension among the adolescent age group was alarmingly high. There is a need to create awareness among school students particularly in adolescent age group regarding hypertension and its complications.

Key words: Hypertension, Adolescents, Girls, Slum, Blood pressure

## INTRODUCTION

Adolescence is an important stage of growth and development in the lifespan and is a crucial period of transition from child-hood to adulthood in the life of human beings. WHO identifies adolescence as the period of age between 10-19 years. They are no longer children but are not considered adults yet. Adolescence in girls has been recognized as a special period which signifies the transition from girlhood to womanhood. Globally, adolescent girls constitute about 1/5<sup>th</sup> of total female population. While in India, adolescent girls account for a

little more than one-fifth of the population (21.4%).<sup>2</sup> hypertension is a common disease associated with high morbidity and mortality. The disease is a silent threat to the health of people all over the world. It is suggested that hypertension has its origin in childhood but goes undetected unless specifically looked for during this period. Thus, early detection of hypertension and its precipitating or aggravating factors are important if one is to evolve measures so that complications of hypertension can be prevented.<sup>3</sup> in Indian adolescent school children; there is a high prevalence of obesity, hypertension, and hypercholesterolemia. Studies from Boston and

Pennsylvania have reported that the role of hypertension as a risk factor is clear and familial aggregation of blood pressure and tracking phenomenon support the concept that children with hypertension are likely to be hypertensive as adults and will be at risk for early coronary heart disease. In the prevailing era of adult hypertension, limited data are available regarding the profile of adolescents. Therefore this study was undertaken with the objective of assessing the prevalence of hypertension, overweight and obesity among adolescent girls in district Moradabad, Uttar Pradesh, India.

#### **METHODS**

This cross sectional study was conducted in the Department of Community Medicine, for a period of one year from June 2013 to May 2014. The study was carried out in the in the urban slums of Moradabad district, Uttar Pradesh, India with the broad aim of assessing the prevalence of hypertension and associated factors among adolescent girls. Among all the slums, 8 highly populous slums were selected by random sampling. Simple random sampling was used to select the individuals from each slum.

The first household was selected at random by lottery method. Thereafter, the other subjects were interviewed in sequence till the desired sample size was achieved. Considering the prior prevalence rate of undernutrition in adolescent girls as 58.5% 3, with 5% error, the estimated sample size was 373. About 9 % drop out rate and non-response rate was added.

Adolescent girls were interviewed in privacy and desired information was collected on a pilot-tested, structured and predesigned schedule through oral questionnaire method. Finally a total of 405 adolescent girls were interviewed. The data was statistically analysed utilizing SPSS (version 17.0) for Windows. Anthropometric measurements (height and weight) were recorded. Height was taken with the help of measuring tape to the nearest 0.1 cm. The weight was recorded to the nearest 0.5 kg using portable weighing machine and wearing minimum clothing. Body mass index (BMI) was computed by using the standard equation BMI= weight (in kg)/height (in meters).<sup>5</sup>

Table 1: JNC - 7 classification of hypertension (2003).

Category	Systolic BP in mm Hg	Diastolic BP in mm Hg
Normal	<120	<80
Pre-hypertension	120-139	80-89
Grade-1 Hypertension	140-159	90-99
Grade-2 Hypertension	160 and above	100 and above

The blood pressure of the subjects was taken with the help of mercury Sphygmomanometer. While taking B.P. clothing from arm were removed and cuff was encircled around arm and Korotkoff's sounds were auscultated in the antecubital fossa. Blood pressure was classified as per Joint National Committee [JNC]-7 criteria.<sup>6</sup>

## **RESULTS**

In the present study maximum girls were in age group of 14-16 years (41.5%), Majority were from nuclear family (69.1%) and were educated between primary to middle school (59.0 %). According to modified Prasad's classification maximum number of the adolescent girls (54.3%) belonged to class IV (Table 2).

Table 2: Distribution of the adolescents according to bio-social factors.

Variable	Total (n=405)				
Variable	N	%			
Age group					
10-13	153	37.8			
14-16	168	41.5			
17-19	84	20.7			
Type of family					
Nuclear	280	69.1			
Joint	125	30.9			
Education					
Primary or below	20	4.9			
Above primary to middle	239	59.0			
High school-intermediate	142	35.1			
Above Intermediate	4	1.0			
Socioeconomic status					
Ι	13	3.2			
II	52	12.8			
III	85	21.0			
IV	220	54.3			
V	35	8.6			

In present study, 82.0% adolescents were normotensive, 15.8% adolescents were found pre-hypertensive, 1.5% were having stage I hypertensive and 0.7% of the girls were stage II hypertensive (Table 3).

Table 3: Distribution of adolescent girls according to their blood pressures (measured as per JNC-VII criteria).

Blood pressure	Total	%	
Normal	332	82.0	
Pre-hypertensive	64	15.8	
Stage I hypertensive	6	1.5	
Stage II hypertensive	3	0.7	
Total	405	100.0	

Out of 405 adolescent girls, 63 (15.6%) were underweight, only 14 (3.5%) were overweight while 328 (81.0%) adolescent girls were normal (Table 4).

Table 4: Distribution of the adolescent girls according to their BMI.

BMI	Total (n=405)	%
Underweight	63	15.6
Normal	328	81.0
Overweight	14	3.5
Obese	0	0.0

Nearly one fifth of adolescents girls aged between 17-19 years were found pre-hypertensive/hypertensive. A higher proportion (23.0%) of adolescents girls belonging to upper socioeconomic class were found Prehypertensive/hypertensive while a higher proportion (18.6%) of adolescents girls belonging to nuclear family were Pre-hypertensive/hypertensive (Table 5). Out of 103 (21.4%) vegetarians, 22 were found hypertensive/pre-hypertensives. Among 202 adolescents 39 consuming saturated fat, (19.3%)were hypertensive/pre-hypertensives. Out of 367 girls consuming iodized salt, 65 (17.7%)hypertensive/pre-hypertensives (Table 6).

Table 5: Hypertension/pre-hypertension in relation to socio-demographic characteristics of the adolescent girls.

Casia damagraphia	Total (n=405)					
Socio demographic characteristics	No. Studied	No. of Pre-hypertensive /hypertensive		Chi-Square (df)	P-Value	
Age group (years)						
1. 10-13	153	23	15.0			
2. 14-16	168	33	19.6	1.05 (2)	0.590	
3. 17-19	84	17	20.2			
A. Socio-economic clas	s (Modified Prasa	d's classification)				
I	13	3	23.0		0.948	
II	52	11	21.1			
III	85	17	20.0	0.723 (4)		
IV	220	39	17.7			
V	35	5	14.3	-		
B. Type of family						
1. Nuclear	280	52	18.6	0.129 (1)	0.720	
2. Joint	125	21	16.8	0.128 (1)	0.720	

Table 6: Hypertension/pre-hypertension in relation to dietary habits.

Dietary Characteristics		No. Studied	Hyperte	ensives/ Pre-hypertensives	Chi Sa (df) n voluo	
		No. Studied	N	%	Chi Sq (df), p-value	
Dietary habits						
Vegetarian		302	51	16.9	0.700 (1) 0.400	
Non Vegetarian		103	22	21.4	0.709 (1), 0.400	
Type of cooking oil used						
Saturated fat		202	39	19.3		
Unsaturated fat	MUFA	4	1	25.0	0.438 (2), 0.803	
	PUFA	199	33	16.6		
Type of salt						
Iodized		367	65	17.7	0 177 (1) 0 674	
Non iodised		38	8	21.0	0.177 (1), 0.674	

## **DISCUSSION**

Out of 405 adolescent girls surveyed, majority were aged between 14-16 years (41.5%) and were from nuclear families (69.1%). A very large number of the adolescent girls, 385 (95.06%) were educated above primary school level. Majority belonged to socioeconomic class IV (54.3%) as per Modified Prasad's classification.

As per survey conducted by state planning institute, UP about 14.17% adolescents are aged between 10-14 years and 9.84% adolescents are aged between 15-19 years in district Moradabad. As per census 2011 the literacy rate of urban slums was 84.5% (79.7% among the females and 89.0% among the males).

In present study, 82.0% adolescents were normotensive, 15.8% adolescents were found pre-hypertensive, 1.5% were having stage I hypertensive and 0.7% of the girls were stage II hypertensive.

It has been varying widely in different Indian studies; from 0.46% to 11.9% In a study conducted among school students of Adolescent age group in Mysore, the prevalence was 6.1%. In another study done in Shimla, the prevalence was 20%.

In the present study 15.6% adolescent were undernourished (thinness) while 3.5% adolescents were overweight.

A meta-analysis of nine studies showed 12.6 per cent of children to be overweight and 3.3 per cent to be obese indicating the seriousness of the situation. A review of a few select studies during 2001 to 2012 showed a prevalence of overweight among children aged 10-19 years to be 9.9 to 19.9 per cent; high in both boys (3 to 15.1%) than in girls (5.3 to 13.3%) indicating early onset of obesity affecting more of urban school adolescents (3.4 to 6.5%) as compared to 0.6 per cent among the rural adolescents with significant gender variations. <sup>11-19</sup>

Vohra R et al in Lucknow found the prevalence of overweight and obesity was 17% and 0.73% respectively among school-going children. The strong relationship between hypertension and diet habits has been well proved through various studies. Still the current study does not show a statistically significant relationship between food habits and Hypertension. This may be because only qualitative assessment of food consumption was done. Anyhow non-significant relationship between diet and hypertension has also been arrived in another study conducted by Savitha MR et al. in Mysore. 21

## **CONCLUSION**

The prevalence of hypertension among the adolescent age group was alarmingly high. There is a need to create awareness among school students particularly in adolescent age group regarding hypertension and its complications. School authorities should organize screening programmes in school particularly for hypertension. Tracking of blood pressure should be done, which will help in identifying the at risk group of adolescents, who can develop hypertension in future period.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

## **REFERENCES**

1. Dey I, Biswas R, Ray K, Bhattacherjee S, Chakraborty M, Pal PP. Nutritional status of school

- going adolescents in a rural block of Darjeeling, West Bengal, India. The Health. 2011;2(3):75-7.
- Jogdand K, Yerpude P. A community based study on menstrual hygiene among adolescent girls. Ind J Mat Ch Health. 2011;13(3):2-6.
- Sundar JS, Adaikalam JMS, Parameswari S, Valarmarthi S, Kalpana S, Shantharam D. Prevalence and Determinants of Hypertension among Urban School Children in the Age Group of 13-17 Years in, Chennai, Tamilnadu. Epidemiol. 2013;3(3):130.
- Soudarssanane M, Mathanraj S, Sumanth M, Sahai A, Karthigeyan M. Tracking of blood pressure among adolescents and young adults in an urban slum of Puducherry. Indian J Community Med. 2008.33:107-112.
- World Health Organization. Physical Status: The Use and Interpretation of Anthropometry. Technical Report Series No. 854. Geneva: WHO, 1995. Available at: http://whqlibdoc.who.int/trs/ WHO\_TRS\_854.pdf. Accessed on 20 April 2016.
- 6. The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. U.S. department of health and human services. 2003. Available from: http://www.nhlbi.nih.gov/ guidelines/ hypertension/phycard.pdf. Accessed on 20 April 2016.
- 7. Census 2011. Available at: www.census 2011.co.in. Accessed on 08 May 2013.
- 8. Gupta R. Trends in hypertension epidemiology in India. J Hum Hypertens. 2004;18:73-8.
- 9. Sharma A, Grover N, Kaushik S, Bhardwaj R, Sankhyan N. Prevalence of hypertension among schoolchildren in Shimla. Indian Pediatr. 2010;47:873-6.
- Mondal N, Sen J, Banerjee S, Dias A, Shinkre R, Patel V. Prevalence of stunting and thinness among rural adolescents of Darjeeling District, West Bengal, India. Italian J Pub Health. 2010;7(1):54-61.
- 11. Goyal JP, Kumar N, Parmar I, Shah VB, Patel B. Determinants of overweight and obesity in affluent adolescent in Surat city, South Gujarat region, India. Indian J Community Med. 2011;36(4):296-300.
- 12. Kotian MS, Kumar SG, Kotian SS. Prevalence and determinants of overweight and obesity among adolescent school children of South Karnataka, India. Indian J Comm Med. 2010;35(1):176-8.
- 13. Aggarwal T, Bhatia R, Singh D, Sobti PC. Prevalence of obesity and overweight in affluent adolescents from Ludhiana, Punjab. Indian Pediatr. 2008;45(6):500-2.
- 14. Laxmaiah A, Nagalla B, Vijayaraghavan K, Nair M. Factors affecting prevalence of overweight among 12- to 17-year-old urban adolescents in Hyderabad, India. Obesity. 2007;15(6):1384-90.
- 15. Mehta M, Bhasin SK, Agrawal K, Dwivedi S. Obesity amongst affluent adolescent girls. Indian J Pediatr. 2007;74(7):619-22.
- 16. Kumar RS, Mahabalaraju DK, Anuroopa MS. Prevalence of obesity and its influencing factor

- among affluent school children of Davangere city. Indian J Community Med. 2007;32(1):15-7.
- 17. Cherian AT, Cherian SS, Subbiah S. Prevalence of obesity and overweight in urban school children in Kerala, India. Indian Pediatr. 2012;49:475-7.
- 18. Jeemon P, Prabhakaran D, Mohan V, Thankappan KR, Joshi PP, Ahmed F, SSIP Investigators, et al. Double burden of underweight and overweight among children (10-19 years of age) of employees working in Indian industrial units. Natl Med J India. 2009;22(4):172-6.
- Srihari G, Eilander A, Muthayya S, Kurpad AV, Seshadri S. Nutritional status of affluent Indian school children: what and how much do we know? Indian Pediatr. 2007;44:204-13.

- Vohra R, Bhardwaj P, Srivastava JP, Srivastava S, Vohra A. Overweight and obesity among schoolgoing children of Lucknow city. J Fam Comm Med. 2011;18(2):59-62.
- 21. Savitha MR, Krishnamurthy B, Fatthepur SS, Yashwanth Kumar AM, Khan MA. Essential hypertension in early and mid-adolescence. Indian J Pediatr. 2007;74:1007-11.

Cite this article as: Kumar R, Sharma M, Srivastava A. A cross sectional study of hypertension in adolescent girls of district Moradabad, Uttar Pradesh, India. Int J Community Med Public Health 2016;3: 1388-92.