Original Research Article

An epidemiological study on prevalence of hypertension and its risk factors among school boys of Burdwan municipal area

Kaushik Nag[1], Manas Patra[2]*, Abhijit Paul[3], Indranil Saha[4], Krishnadas Bhattacharyya[5], Samir Dasgupta[6]

Department of Community Medicine, [1]Tripura Medical College and Dr. BRAM Teaching Hospital, Agartala, Tripura, [2]GITAM Institute of Medical Science and Research (GIMSR), GITAM University, Rushikonda Visakhapatnam, Andhra Pradesh, [3]Calcutta National Medical College, Gorachand Road, Kolkata, [4]IQ City Medical College; Sovapur, Birja Road, Durgapur, [5]Medical College; 88, College Street, Kolkata, [6]North Bengal Medical College, West Bengal, India

*Correspondence:
Dr. Manas Patra,
E-mail: drmanas83@yahoo.com

ABSTRACT

Background: High blood pressure in childhood and adolescence is an important part of the natural history of hypertension. The objective of the study was to determine the prevalence and risk factors of hypertension among the adolescent boys of class nine (IX) to twelve (XII).
Methods: A school based cross sectional study was undertaken among 894 adolescent boys aged 13 to 18 years from May 2013 to October 2014 of Burdwan municipal area. Schools were selected by Simple random sampling and systematic random sampling was used to include sample students from each school. Statistical tests like chi-square test were applied for categorical variables and p<0.05 taken as statistical significance.
Results: The prevalence of hypertension was found to be 5.7%. The study revealed highest prevalence of hypertension in the age group of 13-14 and 17-18 years (6.5%), Muslim religion (17%), General caste (8.4%), and upper socio-economic status (9.3%) among which religion and caste showed significant association with hypertension (P<0.05). Students taking non-vegeterian items ≥5 days a week, chewing tobacco users, obese and having family history were more hypertensive which was statistically significant (p<0.05).
Conclusions: The association of hypertension with food habit, tobacco chewing, obesity & family history of hypertension was found to be statistically significant.

Keywords: Prevalence, Hypertension, Risk factors, Adolescents, Burdwan

INTRODUCTION

Hypertension is one of the major health problems of 21st century, with increasing cardiovascular morbidity and mortality day by day. Hypertension is an "ice berg" disease and also known as silent killer. Naturally the submerged portion of iceberg is much more in a developing country like India, with poor literacy, awareness, and less developed medical services where it is emerging as major public health problem.

Evan and Rose in 1971 defined it as "the operational definition of hypertension is the level at which the benefits of action exceed those of inaction".[1] Again, W.H.O defines hypertension as that level of blood pressure at which detection and treatment do more good than harm.[2]

Adolescence is the period of life between ages of 10-19 years.[3] The period of transition from childhood to adulthood is hazardous for adolescent health, because

they often develop behavioural problems and unhealthy lifestyles which have its reflection in the form of various diseases in later life. One such disorder is essential hypertension, the risk factors of which have its initiation during childhood and adolescence. If blood pressure levels of individuals were followed from early childhood into adult life, low blood pressure levels tend to remain low, and high levels tend to become higher as individuals grow older. This phenomenon of persistence of rank order of blood pressure has been described as "tracking".[4]

In this context, it is important to identify children and adolescents "at risk" of developing hypertension, so as to reduce the incidence and complications of hypertension in adolescents and adults. The study was conducted with the objective of determining the prevalence of hypertension among the adolescent boys of class nine (IX) to twelve (XII) and to find out association of hypertension with socio-demographic and behavioural risk factors, if any.

METHODS

A school based cross sectional study was undertaken among adolescent boys of Burdwan municipal area from May 2013 to October 2014. Out of eleven (11) boys higher secondary (H.S) schools, four (4) H.S schools were selected by simple random sampling. Total boys students from class nine (IX) to twelve (XII) of selected four schools were 1450. Considering the prevalence of hypertension among adolescent boys as 9.78% in a previous study, the estimated sample size was worked out to be 975.[5] Then the required number of students was selected by systematic random sampling technique from each school. Finally 894 students were included in the study, with a response rate of 91.7%. A student who was ill or absent at the time of interview, unwilling to participate was excluded from the study.

Data management and analysis

Collected data was checked for quality after each day's data collection and entered in Statistical Package for Social Science software for computer (SPSS version 20.0). Statistical tests like chi-square test were applied for categorical variables. P value 0.05 or less was considered as statistically significant.

Ethical consideration

Data collection was initiated only after receiving the ethical clearance certificate. Informed written consent was taken from every interviewee.

Definition of hypertension

It can be defined as average systolic and / or diastolic blood pressure equal to or greater than the 95th percentile for age on at least three occasions.[4,6]

Classification of hypertension

In adolescence (10-18 years) by age group was adapted from task force on blood pressure control in children, 1987.[6]

RESULTS

Total 894 school boys were included in the present study (response rate of 91.7%), revealed that majority i.e. 60.7% belonged to the age group of 16–18 years, and rest i.e. 39.3% belonged to age group 13–15 years. The highest number of study subjects belong to Hindu (93.4%) followed by Muslim (5.9%) and Christian (0.7%) respectively. Among school boys, class nine comprised of 24.4%, class ten 23.8%, class eleven 24.8% and class twelve 27%. Among the school boys, majority i.e. 48.2% and 36.3% comprise of general caste and schedule caste respectively. Other backward caste and schedule tribe caste contribute 10.3% and 5.5% respectively. Most of the study subjects (44.9%) belonged to upper lower socio-economic status and 15.3% belonged to lower middle socio economic status according to modified B.G. Prasad scale (2013).

Table 1: Distribution of study subjects according to status of blood pressure (n=894).

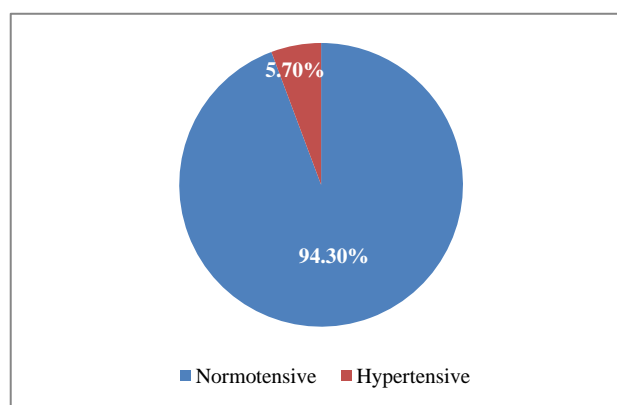| Blood pressure grading	Frequency n (%)
Normotensive	727 (81.3)
High to normal	116 (13.0)
Significant hypertension	38 (4.3)
Severe hypertensive	13 (1.4)
Total	894 (100.0)

Figure 1: Pie diagram showing proportion of hypertensive among the study subjects (n=894).

Figure 1 showed that 5.7% of total students were hypertensive. Table 1 showed that most of the students (81.3%) were normotensive followed by 13% in the range of high to normal, 4.3% belonged to significant hypertension and 1.4% belonged to severe hypertension.

Table 2: Distribution of normotensive and hypertensive study subjects according to Socio- demographic characteristics (n=894).

Socio-demographic characteristics	Normotensive No. (%)	Hypertensive No. (%)	Chi Square Test χ^2 (P value)
Age (years)			
13 – 15	327 (93.2)	24 (6.8)	1.379
16-18	516 (95.0)	27 (5.0)	(0.24)
Religion			
Hindu	793 (95.0)	42 (5.0)	10.70
Muslim	44 (83.0)	9 (17.0)	(0.001)
Christian	6 (100.0)	0 (0.0)	
Caste			
General	395 (91.6)	36 (8.4)	
OBC	89 (96.7)	3 (3.3)	11.946
SC	310 (96.3)	12 (3.7)	(0.008)
ST	49 (100.0)	0 (0.0)	
Socio-economic status			
Upper	78 (90.7)	8 (9.3)	
Upper Middle	98 (99.0)	1 (1.0)	
Lower Middle	130 (94.9)	7 (5.1)	6.76
Upper Lower	378 (94.3)	23 (5.7)	(0.149)
Lower	159 (93.0)	12 (7.0)	
Class / Standard			
Class IX	207 (94.9)	11 (5.1)	
Class X	199 (93.4)	14 (6.6)	0.516
Class XI	210 (94.5)	12 (5.5)	(0.915)
Class XII	227 (94.1)	14 (5.9)	
Total	843 (94.3)	51 (**5.7**)	

Table 3: Distribution of normotensive and hypertensive study subjects according to behavioural and other risk factors (n=894).

Behavioural and other risk factors	Normotensive No. (%)	Hypertensive No. (%)	Chi Square Test χ^2 (P Value)
Ghee/butter intake (≥5 days/wk)			
Yes	119 (96.0)	5 (4.0)	0.749
No	724 (94.0)	46 (6.0)	(0.387)
Non-vegetarian food intake (≥5 days/wk)			
Yes	609 (95.9)	26 (4.1)	10.565
No	234 (90.3)	25 (9.7)	(0.001)
Additional salt intake (≥5 days/wk)			
Yes	475 (94.1)	30 (5.9)	0.12
No	368 (94.6)	21 (5.4)	(0.729)
Physical activity (≥5 days/wk)			
Yes	748 (94.6)	43 (5.4)	0.920
No	95 (92.2)	8 (7.8)	(0.337)
Smoking			
Users	107 (95.5)	5 (4.5)	0.366
Non-users	736 (94.1)	46 (5.9)	(0.545)
Tobacco chewing			
Users	49 (75.4)	16 (24.6)	46.60
Non-users	794 (95.8)	35 (4.2)	(0.000)
Obesity (BMI>85th percentile)			
Over-weight	105 (70.9)	43 (29.1)	179.75
Normal weight	738 (98.9)	8 (1.1)	(0.000)

Family history of hypertension**			
Present			
Paternal	122 (98.4)	2 (1.6)	
Maternal	107 (97.0)	16 (13.0)	29.395 (0.000)
Both	2 (50)	2 (50)	
Total	231(92.0)	20 (8.0)	
Absent	568 (94.8)	31(5.2)	

Family history of hypertension (n=850**, ** 44 study subjects did not know about Family history of hypertension)

The prevalence of hypertension was highest (6.5%) in the age group of 13-14 and 17-18 years, followed by 5.1% in the age group of 15-16 years. The highest number of hypertensive subjects belonged to age group 15-16 years (55.1%), followed by 24.2% in the age group of 17-18 years and 20.7% in the age group of 13-14 years (p>0.05). The study revealed highest prevalence of hypertension in the Muslim region (17%) (p<0.05), General caste (8.4%) (p<0.05), and upper socio-economic status (9.3%) (p>0.05). 5.1% of class nine, 6.6% of class ten, 5.5% of class eleven and 5.9% of class twelve were hypertensive. This distribution of hypertensive according to class was found to be statistically not significant (Table 2).

Table 3 showed that students taking non-vegeterian items ≥5 days a week, chewing tobacco users, obese and having family history were more hypertensive which was statistically significant (p<0.05).

DISCUSSION

The prevalence of hypertension among school boys in the present study was 5.7%. Similar prevalence of hypertension was noted by Taksande (5.75% in the age group of 6-17 years in Wardha city), Buch (6.74% in boys of 6-18 years age group in Surat city), Kumar et al (7.34% in boys of 10-16 years age group in selected schools of villages of Sonepat district of Haryana) and Nur et al (5.4% of male of 14-18 years age group were hypertensive in a study done in Turkey).[7-10]

In contrast, lower prevalence was noted by Chirag (3.22% in boys of 5-15 years of age from Ahmedabad, Gujarat), Patil (2.8% in boys of 6-16 years age group in Wardha city) and Rahman (3% in Pakistan).[11-13] However higher prevalence of hypertension was seen by Soudarssannane (9.4% in boys of 15-19 years age group in an urban area of Pondicherry), Khan (9.78% in boys of 12-19 years age group in Ahmedabad city), Sundar (21.5% in 13-17 year age group in Chennai) and Moura (9.5% in males of 7 to 17 years from the city of Maceió, Brazil).[5,14-16] The diversity in prevalence is due to varying age groups taken for different studies, different criteria and methodologies adopted for defining hypertension, difference between racial subgroups related to geographic, dietary and cultural factors.

Association of blood pressure with several variables/characteristics (Table 2)

It is a known fact that diet rich in saturated fat is risk factor for hypertension, however reverse observation was seen in this study. The association between ghee or butter intake with food and hypertension was found to be statistically not significant. The prevalence of hypertension was seen in 4.1% of non-vegetarian students where as it was 9.7% among students who were vegetarian. The association between non-vegetarian food intake and hypertension was found to be statistically significant. Kaplan found that vegetarian population had lower BP than their counterpart in adult population.[17] Hence this merits further study to find out association of hypertension with dietary habits in this subset of population. Sundar in his study in Chennai, found no significant relationship between hypertension and food habit.[15]

Hypertension was seen in 5.9% of students who used to take extra salt where as it was 5.4% among students who did not take extra salt regularly. The association between extra salt intake and hypertension was found to be statistically not significant. Odds ratio suggests that, extra salt intake was positively related to hypertension. Soudarssanane et al in his study among adolescents and young adults in Puducherry found that, dietary salt significantly affects mean DBP but not mean SBP at young age.[14] However, Kumar in a study in Patna found 24.4% boys were taking extra salts.[18] The prevalence of hypertension was higher among students (7.8%), who did not take part in any physical activity where as it was 5.4% among students who took part in physical activity regularly. Soudarssanane et al in his study found no significant association of blood pressure and physical activity.[14] The association between smoking habit and hypertension was found to be statistically not significant (p>0.05). This observation could be due to the fact that cumulative effect of exposure (smoking) was short considering the age group (13-18) of the study subjects. But it is an established fact that smoking increases blood pressure through increased activity of sympathetic nervous system with advancing age.[19] However, the association between tobacco chewing and hypertension was found to be statistically significant (p<0.05). Odds ratios suggest prevalence of hypertension was more prevalent in students who used to tobacco chewing.

The prevalence of hypertension was highest (29.1%) among the overweight study subjects. compared to those who had normal weight (1.1%). This association of hypertension with overweight was found to be statistically significant (p<0.001). Odds ratio 37.78 suggests that overweight was positively related to hypertension. This observation agreed with the finding of Simsolo et al and Muratova et al that overweight positively related with hypertension.[20,21] Sundar et al found, an overwhelming evidence in his study that the prevalence of hypertension was high among obese individuals (p=0.000), which was highly significant. Similar observation was seen by Buch et al.[8,15]

The prevalence of hypertension was much higher among those students (8%) with positive family history, compared to 5.2%, where family history of hypertension was absent, which was statistically significant (p<0.05). Similar observation was also noted by Wang et al in a rural Chinese community.[22] Sundar et al found increase in prevalence of hypertension among adolescents was highly significant among parents with hypertension.[15] In contrast, Buch et al, did not find any significant relationship of hypertension with positive family history of hypertension.[8]

CONCLUSION

The association of hypertension with food habit, tobacco chewing, obesity & family history of hypertension was found to be statistically significant. Early detection of hypertension and lifestyle modification among adolescents will be helpful in reducing the burden of hypertension among them.

REFERENCES

1. Evans VG, Rose GA. Hypertension. British Medical Bulletin, 1971,27:32-42.
2. Hypertension control: report of a WHO expert committee. World Health Organization W.H.O Technical Report Series. 1996;862:1-83.
3. Nutritional anaemia: Report of a WHO Scientific group. WHO Technical Report series. No.405.1968.
4. Technical Expert Committee. Blood pressure studies in children. WHO. Technical Report Series. 1985;715:15-24.
5. Khan M I, Lala MK, Patil R, Mathur HN. A Study Of The Risk factors And The Prevalence Of Hypertension In The Adolescent School Boys of Ahmedabad City. J Clin Diagnos Res. 2010;4:3348-54.
6. Task Force on Blood Pressure Control in Children. Report of the Second Task Force on Blood Pressure Control in Children. Pediatrics, 1987:79:1-25.
7. Taksande A, Chaturvedi P, Vilhekar K, Jain M. Distribution of blood pressure in school going children in rural area of Wardha district, Maharashatra, India. Ann Pediatr Card. 2008;1(2):101-6.
8. Buch N, Goyal JP, Kumar N, Parmar I, Shah VB, Charan J. Prevalence of hypertension in school going children of Surat city, Western India. J Cardiovasc Dis Res. 2011;2:228-32.
9. Kumar H, Priyanka, Yadav A, Arora T, Attri SK, Khandelwal A. Prevalence of hypertension in high school students of a rural area- a pilot study. IJRRMS. 2015;5(1):13-8.
10. Nur N, Çetinkaya S, Yilmaz A, Ayvaz A, Bulut MO, Sümer H. Prevalence of Hypertension among High School Students in a Middle Anatolian Province of Turkey. J Health Popul Nutr. 2008;26(1):88-94.
11. Chirag AB, Chavda J, Kakkad KM, Damor P. A Study of Prevalence of Hypertension in School Children. Guj Med Journ. 2013;68(2):79-81.
12. Patil RR, Garg BS. Prevalence of hypertension and variation in blood pressure among school children in rural area of Wardha. Indian J Public Health. 2014;58:78-83.
13. Rahman AJ, Qamar FN, Ashraf S, Khowaja ZA, Tariq SB, Naeem H. Prevalence of Hypertension in Healthy School Children in Pakistan and Its Relationship with Body Mass Index, Proteinuria and Hematuria. Saudi J Kidney Dis Transpl. 2013;24(2):408-12.
14. Soudarssanane MB, 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;33:107-12.
15. Sundar JS, Adaikalam JMS, Parameswari S, Valarmarthi S, Kalpana S. Prevalence and Determinants of Hypertension among Urban School Children in the Age Group of 13- 17 Years in Chennai, Tamilnadu. Epidemiol. 2013;3:130.
16. Moura AA, Silva MAM, Ferraz MRM, Rivera IR. Prevalence of high blood pressure in children and adolescents from the city of Maceió, Brazil. J de Pediatria. 2004;80(1):35-40.
17. Kaplan N. Blood Pressure, ways to keep it under control. Ed by Barone D, Grandinetti D, Holman M, Jacobs L, Lergo W, Lin J, tkac D. In Doctor's book of home remedies. Rajendra Publishing House Pvt Ltd.; 1995: 74-81.
18. Kumar P, Kumar D, Ranjan A, Singh CM, Pandey S, Agarwal N. Prevalence of Hypertension and its Risk Factors Among School Going Adolescents of Patna, India. J Clin Diagnos Res. 2017;11(1):1-4.
19. Williams GH. Hypertensive vascular disease, Ed by Fauci AS, Braunwald E, Kasper, Hauser, Longo, Jameson in: Harrison's principles of Internal Medicine. 15th ed. Vol 1, Mc Graw Hill: 1414-30.
20. Simsolo RB, Romo MM, Rabinovich L. Family history of essential hypertension versus obesity as

risk factors for hypertension in adolescents. Am. J. Hypertens Mar. 1999;12(3):262-3.

21. Muratova VN, Demerath EW, Spangler E, Ogershok P, Elliott E, Minor VE, et al. The relation of obesity to cardiovascular risk factors among children: the Cardiac project. West Virginia Med J. 2002;98(6):263-7.

22. Wang X, Wang B, Chen C, Yang J Fang Z, Zuckerman B, Xu X. Familial aggregation of Blood Pressure in a Rural Chinese Community. Am J Epidemiol. 1999;149(5):412-20.

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