Original Research Article

Prevalence and Determinants of High Blood Pressure among Adolescents: A School based Study in Rural Area of Hooghly District, West Bengal

Malay Kumar Das[1], Rabindranath Sinha[2], Aparajita Dasgupta[3], Sudipta Das[4]

[1]Demonstrator, Dept. of Community Medicine, Murshidabad Medical College,
[2] Professor, Department of M.C.H, AIIH & PH, Kolkata.
[3]Ex Prof. and Head of the Dept. of P.S.M, AIIH & PH, Kolkata.
[4]Demonstrator, Dept. of Community Medicine, Medical College, Kolkata.

Corresponding Author: Malay Kumar Das

ABSTRACT

Introduction: The World Health Organization has already warned of increasing non-communicable diseases among adolescents as a major public health problem. The importance of this age group also lies in the fact that many serious diseases in adulthood have their roots in adolescence.

Method: A pre-designed and pre-tested questionnaire was used in class-room setting to collect information from students regarding presence of risk factors of non-communicable diseases. The respondents were also subjected to anthropometric measurements and blood pressure examination using standard operating procedures.

Results: A total of 761 students of class VI-XII participated in the study of which 61.4% were boys and rests were girls. High blood pressure among boys and girls were 19.9% and 22.1% were respectively. In Bivariate analysis age > 15 years (median) (OR= 2.11), fast food intake (>3 times/week) (OR= 1.66), Alcohol consumption (OR= 2.22), less physical activity (OR=1.54), increased body mass index (OR=2.53), significantly associated with high blood pressure. In Multivariate analysis age (AOR= 2.25), fast food intake (AOR= 1.50), Alcohol consumption (OR= 2.23), less physical activity (AOR=1.71), increased body mass index (AOR=2.42) remains significant predictor.

Conclusion: Detecting the risk factors of high blood pressure prevalent in the population is of utmost importance to achieve a healthy population. Formulation and dissemination of need--based, culturally acceptable and age-appropriate scientific messages for school students should be conducted more proactively.

Key Words: Adolescents, Blood pressure, Risk factor, Rural school.

INTRODUCTION

Increasing trends of non-communicable diseases is a worldwide phenomenon. India is experiencing a rapid health transition with a rising burden of non-communicable diseases.

The World Health Organization has already warned of increasing non-communicable diseases among adolescents as a major public health problem. The importance of this age group also lies in the fact that many serious diseases in adulthood have their roots in adolescence.

Interventions must start in childhood because this is the time when the disease processes start and when life style habits are formed. India has a huge adolescent population with various social and health inequalities. To reduce the development of non-communicable diseases in adulthood, the ideal time of intervention is during adolescence because young children are amenable to correction.

The co-education higher-secondary school (class V-XII) has over thousands of students of different demographic backgrounds. This is the best way to study

prevalence and determinants of high blood pressure among adolescents. With this concept a study was conducted to assess the risk factors of non communicable diseases among school children in a rural setting of West Bengal. Since more than 71% of the India population live in the villages and many of the deadly risk factors which once belonged solely to the urban population are rapidly percolating into the rural population the prevalence of non-communicable disease is rapidly increasing by leaps and bounds in the rural population.

MATERIAL AND METHODS

Among the rural block of Hooghly district Tarakeswar was chosen due to its proximity to the megacity of Kolkata which influences the lifestyle pattern and other behavioural characteristics of the people residing in the area. Among five higher secondary co-education schools under Tarakeswar block, Ramnagar Noot Behari Pal Chowdhury High School has been selected for the study. The school caters highest number of students among the five. The present school- based cross sectional study was conducted among students of class VI-XII of academic year 2014-15 (May 2014 to April 2015). A total of 761 students in the age group of 10-18 years were participated in the study of which 61.4% were boys and rests were girls.

Ethical consideration was taken from the Institutional Ethics Committee of All India Institute of Hygiene and Public Health prior to the study. After taking permission from school authority and consent from each participant; they were explained the purpose of the study. All willing students present in the class/section on the day of questionnaire data collection were also subjected to anthropometric measurements and blood pressure examination using standard operating procedures. Information collected was recorded in a predesigned schedule. Any participant having any physical disabilities and congenital anomalies were excluded from the study.

The questionnaire was designed as a booklet in Bengali language with instructions based on WHO STEPS methodology [1] and WHO Global School-based Student Survey [2] with some modification to use in class-room setting to collect information from students regarding the presence of risk factors of non-communicable diseases. Face validity of each item and content validity of each domain was ascertained by a group of experts in AIIIH and PH, Kolkata. Prior to the study, the questionnaire was pretested on students of a different school of the same block.

Age, height and weight were recorded in year, centimetre and kilogram respectively. BMI was categorized by WHO Z score [3]. BP was categorized by National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. Guidelines for age 10-17 years [4], JNC VII for age 18 years [5] .Age was verified from school record book. Data were entered into a spread sheet and exported to Statistical Package for the Social Science® (SPSS) for Windows, version 16.0 software for analysis.

RESULTS

Table 1: Sex-wise distribution of students according to age group (n=761)

Age group (years)	Boys No (%)	Girls No (%)	Total No (%)
10-12	142(30.4)	94(32)	236(31)
13-15	215(46)	123(41.8)	338(44.4)
16-18	110(23.6)	77(26.2)	187(24.6)
Total	**467(100)**	**294(100)**	**761(100)**

Students in the age group of 10-12 years, 13-15years and 16-18 years were 31%, 44.4% and 24.6% respectively.

Table 2: Sex–wise analysis of Blood pressure (n=761)

Blood pressure(category)	Boys No (%)	Girls No (%)	Total No (%)
Normal	374(80.1)	229(77.9)	603(79.2)
Pre hypertension	67(14.3)	37(12.6)	104(13.7)
Hypertension	26(5.6)	28(9.5)	54(7.1)
Total	**467(100)**	**294(100)**	**761(100)**

*no student had history of medication/treatment for hypertension.

About one fifth of students (20.8%) were found to have high blood pressure and 7.1% of students were suffering from hypertension. High blood pressure among

boys and girls were 19.9% and 22.1% were   respectively.

Table 3: Distribution of blood pressure according to age group (n=761)

Age group (years)	Normal No (%)	Pre hypertension No (%)	Hypertension No (%)
10-12	220(93.2)	7(3)	9(3.8)
13-15	250(74)	56(16.6)	32(9.5)
16-18	133(71.1)	41(21.9)	13(7)

Age group-wise 3.8%, 9.5% and 7% students of 10-12 years, 13-15 years and 16-18 years were hypertensive.

Table 4: Distribution of risk factors for non-communicable diseases according to sex

Risk factors of non-communicable diseases	Boys (n=467) No (%)	Girls (n=294) No (%)	Total (n=761) No (%)
Fruits and vegetables < 5 times/week	92(19.7)	49(16.7)	141(18.5)
Fast food >3 times/week	164(35.1)	93(31.6)	257(33.8)
Extra salt intake in food	257(55)	159(54.1)	416(54.7)
Tobacco use in the past 30 days	106(22.7)	3(1)	109(14.3)
Alcohol consumption in the past 30 days	46(9.9)	2(0.7)	48(6.3)
Less physical activity	101(21.6)	161(54.8)	262(34.4)
Family history of non-communicable diseases	161(34.5)	102(34.7)	263(34.6)
Overweight and obesity	59(12.6)	34(11.6)	93(12.2)
Hypertension and pre hypertension	93(19.9)	65 (22.1)	158(20.8)

Most common risk factor was 'intake of extra salt with food' (54.7%), followed by fast food intake >3 times/week (33.8%).

Table 5: Correlates of high blood pressure; Bivariate and Multivariate analysis (n=761)

Variables (referent)	High blood pressure	
	O.R. (95 % C.I.)	A.O.R. (95 % C.I.)
Age (≤ 15 years)	2.11*** (1.48-3.02)	2.25*** (1.52-3.33)
Sex(Girls)	0.88 (0.61-1.25)	1 (0.66-1.51)
Fruits and vegetables (≥ 5 times/week)	0.79 (0.49-1.27)	0.74 (0.45-1.23)
Fast food(≤3 times/week)	1.66** (1.16-2.37)	1.50* (1.03-2.19)
Extra salt intake in food(No)	0.87 (0.61-1.23)	0.92 (0.64-1.33)
Tobacco use(No)	0.90 (0.54-1.50)	0.72 (0.38-1.36)
Alcohol consumption(No)	2.22* (1.20-4.13)	2.23* (1.04-4.77)
Physical activity (Active)	1.54* (1.08-2.21))	1.71* (1.13-2.58)
Family history of non-communicable diseases(No)	1.01 (0.70-1.47)	1.14 (0.77-1.68)
Increased body mass index (No)	2.53*** (1.59-4.02)	2.42*** (1.48-3.95)

$*P < 0.05; **P < 0.01; ***P < 0.001$.

In both Bivariate and Multivariate logistic regression analysis age, fast food intake, Alcohol consumption, less physical activity, increased body mass index, significantly associated with high blood pressure.

DISCUSSION

The present school-based study on risk factors of non-communicable diseases among students has documented a high risk factor profile for non-communicable diseases among students.

Table 3 found about one fifth of students (20.8%) were found to have high blood pressure and 7.1% of students were suffering from hypertension. High blood pressure among boys and girls were 19.9% and 22.1% were respectively.

In similar school based cross-sectional study Khan M I, et al.[6] (2010) 9.78 % were found to be hypertensive, Sharma, et al. [7] (2010) hypertension was identified in 5.9% children and pre hypertension in 12.3%, Kumar D. [8] (2011) the prevalence of elevated blood pressure was among students urban 25(10%) vs rural 23(9.2%), Buch N et.al. [9] (2011) total prevalence of hypertension was 6.48%, Anisa M et al. [10] (2011) hypertension with

overall prevalence of 9.4% children, Shah SS et al. [11] (2013) 20.09% were hypertensive, Sundar JS et al. [12] (2013) the prevalence of adolescent hypertension was 21.5%, Patil RR et al. [13] (2014) overall, prevalence of hypertension was 3.0%, Patel YR. [14] (2015) the overall prevalence of pre hypertension was 11.2% and that for hypertension was 7.4%, Madhavikutty Amma GD et al. [15] (2015) overall prevalence of pre hypertension and hypertension was 24.5% and 0.6% respectively.

Table 4 found ages group-wise 3.8%, 9.5% and 7% students of 10-12 years, 13-15 years and 16-18 years were hypertensive. In similar school based cross-sectional study Khan M I, et al. [6] (2010) the highest prevalence was found at 19 years of age (21.7 %), Srinivas HA et al. [14] (2014) in the study, hypertension was predominant in the age group of 13 yrs (12.2%).

Table 5 founds in Bivariate analysis age > 15 years (median) (OR= 2.11), fast food intake (>3 times/week) (OR= 1.66), Alcohol consumption (OR= 2.22), less physical activity (OR=1.54), increased body mass index (OR=2.53), significantly associated with high blood pressure. In Multivariate analysis age (AOR= 2.25), fast food intake (AOR= 1.50), Alcohol consumption (OR= 2.23), less physical activity (AOR=1.71), increased body mass index (AOR=2.42) remains significant predictor. In similar study Khan M I, et al [6] (2010) found no association between hypertension and other risk factors like added salt, junk food and the socioeconomic class, Singh A K et al. [16] (2006) found the risk factors associated with blood pressure were sex, adding extra table salt, being obese and smoking, Kumar D. [8] (2011) found overweight was a risk factor for elevated blood pressure in the study group (Odds ratio= 3.43), Shah SS et al. [11] (2013) found obesity strongly associated with hypertension in children, Sundar JS et al . [12] (2013) found there was significant (p<0.05) effect on blood pressure by gender, body mass index and decreased physical activity (OR>3), Madhavikuttyamma GD et al. [15] (2015) found male sex (AOR-1.67), overweight/obese (AOR-5.7 95), low fruit consumption (AOR-2.02) were the significant risk factors for pre hypertension and hypertension.

The cross-sectional study was conducted in a single school of Tarakeswar Block of Hooghly District. Results are not representative of the district or the block.

Quality of collected information through questionnaire on dietary behaviour of participants such as frequency of intake of fruits and vegetables, fast food intake, intake of extra salt intake with food etc. had some inherent limitation due to recall bias which is very much dependent on age of the participant, gender, intelligence, mood, attention, and consistency of eating pattern etc.

As information regarding health related practices were self-reported by the participants there is a possibility that sensitive and socially undesirable responses like smoking habit, alcohol intake etc., might have been underreported though the assurance made by the researcher regarding maintenance of anonymity and confidentiality of the data.

CONCLUSION

It is a common practice that we push in the problems of early risk factors of the children and adolescents under the carpet and we wait and watch for the emergence of diseases in the adults when it is too late for primary or even sometimes secondary prevention. Awareness level would also provide a baseline upon which, heath promotional strategies can be developed. Detecting the risk factors of high blood pressure prevalent in the population is of utmost importance to achieve a healthy population.

Screening for high blood pressure and their risk factors should be regularly conducted at school level. Students with high risk profile will need regular monitoring and counseling services. Local

Health Workers supported by trained teachers may carry out these activities as an extension of School Health Programme under National health mission (NHM).

Early detection of risk factors of high blood pressure and their monitoring / referral can be done by Health workers, ASHA and AWWs, who can be trained to measure blood pressure by using digital sphygmomanometer.

Formulation and dissemination of need--based, culturally acceptable and age appropriate scientific messages for school students should be conducted more proactively. National Program for Prevention and Control of Cancer, Diabetes, And Cardiovascular Diseases and Stoke should consider school-based interventions with due priority.

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