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Original Research Article

A study of risk factors associated with hypertension among the school going children in Puducherry

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ABSTRACT

Background: High blood pressure in childhood is a predictor of hypertension in adults and its presence is influenced by various clinical and social risk factors. The objectives of the study were to estimate the prevalence of high BP in school going children aged 10 years and above; to assess the risk factors associated with high blood pressure; to compare the prevalence of high blood pressure and associated risk factors among the government and private school going children.
Methods: A community-based, cross-sectional study was conducted during July to August 2016 by selecting two schools situated in the urban field practice areas including 423 children aged 10 to 18 years. Data was collected using a structured questionnaire in which dietary habits were assessed using a food frequency questionnaire and anthropometric measurements were made under standard WHO protocol.
Results: The overall prevalence of high blood pressure was 12.8%. Factors like age (p=0.005), family history of hypertension (p=0.01), both parents having history of hypertension (p=0.02), poor school performance (p=0.05)and obesity(p=0.001) were significantly associated with high blood pressure among the school children.
Conclusions: There were a higher proportion of male hypertensives in the private schools whereas government schools had more female hypertensives.

Keywords: High blood pressure, School-going children, Government and private schools

INTRODUCTION

Systemic hypertension or increase in blood pressure can be attributed to various causative factors like obesity, change in dietary habits, decreased physical activity and increasing stress early in life. The school going children are subject to high academic stress owing to the steep increasing educational competition and difficulty level of school curriculum. The prevalence of hypertension among children reported by various studies ranges from 5.4% to 19.4%.[1-3] A classic study, the Bogalusa Heart Study, has demonstrated that hereditary factors, overweight and low birth weight significantly influence the development of high BP levels in the adolescent age group.[4] Other possible risk factors are sedentary lifestyle, low-quality food, lack of maternal breastfeeding (MB), and the smoking habit of parents or caregivers. Factors known to affect BP among children include age, sex, body size, race/ethnicity, obesity, and socioeconomic status.[1,3,5,6] Life style changes are not only required in adults but also in children and young adults who are prone to non-communicable diseases like hypertension in later years. The prevalence of high blood pressure in children is by itself a risk factor for hypertension in older age. The risk factors associated with hypertension detected in children in early life will be useful as targeted

life style modifications can be advocated at an early age to prevent the severity of NCDs in later life. Tracking of BP is one such screening which helps in averting hypertension by close monitoring. Hence by tracking children in schools for blood pressure and associating various nutritional factors associated, primary prevention strategies can be initiated early at schools. The study aimed at elucidating a clear picture of the risk factors of hypertension including dietary habits in children belonging to this particular age group in the study area.

METHODS

A community-based, cross-sectional study was conducted during July to August 2016 by selecting two schools (one government and one private) situated in the urban field practice area of Aarupadai Veedu Medical College & Hospital, Puducherry. The study included 423 school going children aged 10 to 18 years who were studying in 7^{th} to 12^{th} standard classes in the respective schools after excluding students who were absent, not willing to consent or not well on the day of study.

Prior permission was obtained from the Institutional Ethics Committee and the head of the institution of the participating schools to conduct the study. The children selected for the study were interviewed using a semi-structured, pre-designed questionnaire. Socio-demographic variables including age, gender, family history of hypertension, parental smoking habits were recorded in a proforma. Dietary habits including consumption of junk food, fruits and daily calorie intake were assessed using a food frequency questionnaire and 24 hour recall method. Height, weight and waist circumference were measured using standardized scales and BMI was computed.

Blood pressure was measured using appropriate cuff-sized sphygmomanometer following WHO standard guidelines for measurement of blood pressure. BP was categorized as follows: "no high BP", corresponding to systolic BP (SBP) and diastolic BP (DBP) values below the 95th percentile; and "high BP", SBP and/or DBP values equal to or above the 95th percentile, considering children's sex, age and height.

Statistical analysis

Data entry and analysis was done using Microsoft excel version 10 and SPSS version 19. Data is presented as frequencies and percentages. Chi square test was used to find any significant association between qualitative variables. A p-value of 0.05 was taken as margin for establishing statistical significance.

RESULTS

The study included 423 students aged 10 years to 18 years of age studying 7^{th} standard to 12^{th} standard in the respective private (n=250, 59.1%) and government schools (n= 173, 40.9%). Males represented 57.4% of the sample, majority belonging to the 13-15 years age group. The socio-demographic profile of the study subjects is depicted in (Table 1).

Table 1: Socio-demographic and clinical profile of the study participants.

	Private school (n=250)		Government school (n=173)		Total (n=423)
	Male (n=151)	**Female (n=99)**	**Male (n=90)**	**Female (n=83)**	
Age category					
10-12 years	40 (58.8)	28 (41.2)	3(100)	0(0)	71 (16.8)*
13-15 years	72 (60.0)	48 (70)	51 (51)	49 (49.0)	220 (52.0)
16-18 years	39 (62.9)	23 (37.1)	36 (51.4)	34 (48.6)	132 (31.2)
History of HTN in family	51 (63.8)	29 (36.2)	18 (64.3)	10 (35.7)	108 (25.5)
Both parents normotensives	101 (58.7)	71 (41.4)	72 (51.4)	68 (48.6)	312 (73.8)
One parent hypertensive	44 (62.9)	26 (37.1)	18 (62.1)	11 (37.9)	99 (23.4)
Both parents hypertensives	6 (75.0)	2 (25.0)	0 (0)	4 (100)	12 (2.8)
BMI (kg/m^2)	17.7±3.3	18.7±4.1	17.1±2.3	19.8±3.8	18.25±3.2
Waist circumference (cms)	67.6±33.4	69.1±14.6	66.3±6.2	76.9±46.6	69.5±29.2
SBP (mm of Hg)	113.8±11.01	111.5±11.3	110.7±9.5	113.5±14.7	112.5±11.8
DBP (mm of Hg)	72.4±8.75	70.1±8.72	71.9±7.63	73.7±7.4	72.0±8.3
Prevalence of hypertension	22 (14.6)	11 (11.1)	6 (6.7)	15 (18.1)	54 (12.8)

Figures in ( ) indicate row percentages *indicate column percentage.

Prevalence of high blood pressure among the school children

The overall prevalence of high blood pressure among the school children in the study was 12.8% (n=54). Among the private school children, majority of those with high BP were males (67%) as compared to females (34%). This was exactly reverse in government schools as majority of those with high BP were females (71%) as compared to males (29%). This is depicted in (Figure 1).

Various socio-demographic and clinical factors associated with high BP in the children were studied and it was found that age group 16-18 years (i.e. 10th to 12th standard students), presence of family history of hypertension and smoking and poor scholastic performance had higher association with high BP (Table 2).

High BP was associated significantly with higher calorie intake (Table 3) and presence of obesity (Table 2). Frequency of consumption of non-vegetarian diet, junk food and fruits did not make significant influence on the incidence of high BP among the school children.

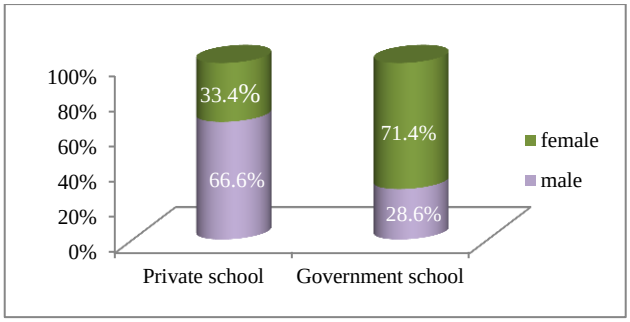

Figure 1: Prevalence of high BP among the school children.

Table 2: Factors associated with High BP among the study participants.

	High BP	No BP	P value*
Age category			
10-12 years	8 (11.3)	63 (88.7)	0.005
13-15years	19 (8.6)	201 (9.4)	
16-18years	27 (20.5)	105 (79.5)	
Gender			
Male	28 (11.6)	213 (88.4)	0.42
Female	26 (14.3)	156 (85.7)	
Type of School			
Private	33 (13.2)	217 (86.8)	0.76
Government	21 (21.1)	152 (87.9)	
Family history of hypertension	21 (19.4)	87 (80.6)	0.01
Both parents normotensives	32 (10.3)	280 (89.7)	0.02
One parent hypertensive	19 (19.2)	80 (80.0)	
Both parents hypertensives	3 (25.0)	9 (75.0)	
Family history of Smoking	8 (10.0)	72 (90.0)	0.57
School performance			
Good	31 (11.5)	238 (88.5)	0.05
Average	19 (14.0)	117 (86.0)	
Poor	3 (17.6)	14 (82.4)	
Presence of stress	28 (12.2)	203 (87.9)	0.66
Obesity	46 (86.7)**	241 (65.5) **	0.001

Figures in ( ) indicate row percentages ** indicate column percentage *chi-square test (p value<0.05 taken as significant)

Table 3: Dietary habits associated with high BP among the study participants

		High BP	No BP	P value*
Mean calorie intake (Kcal)		1529±406	1486±493	0.05
Mean protein intake (grams)		38±13	38±25	0.35
Frequency of consumption of non-vegetarian diet per week	0-2 times	41 (11.8)	305 (88.2)	0.38
	3-4 times	8 (14.8)	46 (85.2)	
	5-9 times	5 (23.8)	16 (76.2)	
	>10 times	0 (0)	2 (100)	
Frequency of consumption of junk foods per week	0-2 times	35 (12.0)	257 (88.0)	0.11
	3-5 times	10 (10.8)	83 (89.2)	
	6-9 times	5 (19.2)	21 (80.8)	
	>10 times	4 (33.3)	8 (66.7)	
Frequency of consumption of fruits per week	0-2 times	32 (12.4)	226 (87.6)	0.64
	3-5 times	13 (12.6)	90 (87.4)	
	6-9 times	6 (12.0)	44 (88.0)	
	>10 times	3 (25.0)	9 (75.0)	

Figures in ( ) indicate row percentages; *chi-square test (p value<0.05 taken as significant).

DISCUSSION

Hypertension is not a disease of sudden onset in adults but a gradual phenomenon which happens in a genetically susceptible individual due to the interaction of multiple causative factors over a period of time since a younger age. Primary prevention in hypertension starts from the school age group by searching for the high risk individuals and initiating non-pharmoco-therapeutic interventions earlier and reducing the incidence of hypertension in the community. The goal of the population approach in curbing the incidence of hypertension is to shift the community distribution of blood pressure to lower levels or 'biological normality' which can be achieved by dietary modifications and physical exercises earlier in the childhood.[12]

The present study showed that the prevalence of high blood pressure among the school children was 12.8% (n=54) (Table 1). In the study done by Buchet al at Surat, the prevalence of hypertension among the school going children aged between 6 to 18 years was 6.48%.[7] Loneet al in their study at Nagpur reported that the overall prevalence of hypertension among the school-going children aged between 12 and 16 years was found to be 11.77%.[9] Both studies reported a lower prevalence compared to the present study. This may be because the first study had a broader age spectrum which could have diluted the proportion whereas the second study did not include the 16-18 years age group. In our study, the 16-18 years age group lodged a higher proportion (n=27 (20.5%)) of hypertensives (Table 2). The prevalence of Adolescent (13-18 years) hypertension was high (21.5%) in a study by Sundar et al which proves that the prevalence of hypertension increases as the age increases.[8]

In a study done by Bagudai et al among 5155 students of 10-16 yrs of age group, the number of girls students having hypertension (4.47%) was more than boys (3.2%).[10] In our study, there was no statistically significant difference in the presence of hypertension among the males (11.6%) and females (14.3%). There was a contrasting gender difference with relation to the type of school as in 66.6% of the hypertensives in the private schools were males whereas 71.4% of the hypertensives in government schools were females. The reason for this contrasting gender difference was not evident from the study (Figure 1).

Soudarssanane et al in their study documented that age, BMI, salt intake and family history of hypertension as key predictors of high blood pressure among the 15-19 years aged adolescents in Pondicherry.[11] Our study results were also in line with the above study in reporting that the factors like age (p=0.005), family history of hypertension (p=0.01) both parents having history of hypertension (p=0.02), poor school performance (p=0.05) and obesity(p=0.001) were significantly associated with high blood pressure (Table 2).

Shah et al in their study reported that obesity was a significant risk factor for hypertension.[13] They found that 34% of the obese subjects developed hypertension. There was a significant association (p=0.001) of obesity with high blood pressure in the present study also as we found 86.7% of the children with high blood pressure were obese. This was further correlated with the calorie intake among those with high BP and a significantly higher calorie intake was documented among the hypertensive subjects (Table 3).

The study further explored if there was any association of dietary habits with hypertension. It was documented that there was no significant influence of the type of diet like non-vegetarian food intake, increased junk food consumption and reduced fruit intake on the presence of high BP. Lurb et al firmly affirmed that non-pharmacological therapy should be initiated in all children with high normal BP or hypertension.[14] Dietary management including reduced salt intake, low fat diet and increased fruit consumption is an important high risk primary prevention strategy which can go a long way in preventing future incidence of hypertension in the susceptible school children.

CONCLUSION

The study showed that the prevalence of high blood pressure was 12.8%among the school children. There were a higher proportion of male hypertensives in the private schools whereas government schools had more female hypertensives. Factors like age, family history of hypertension, poor school performance and obesity were significantly associated with high blood pressure among the school children.

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