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Research Article

A STUDY ON HIGH BLOOD PRESSURE READINGS AMONGST SECONDARY SCHOOL CHILDREN

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ABSTRACT

Globally, Non-communicable diseases (NCDs) are increasingly recognized as a major cause of morbidity and mortality. NCDs are linked to a cluster of major risk factors such as tobacco use, alcohol, unhealthy diets, physical inactivity, stress, obesity, high blood pressure, cholesterol, and glucose levels, these risk factors are measurable and largely modifiable. The objective behind the study was to find out the proportion of study subjects with high blood pressure readings to evaluate family history of hypertension among the study subjects. This study was conducted among the selected schools of Bangalore city. Study population consisted of 8 standard, 9 standard and 10 standard students of the selected schools. This study was done for a period of 6 months, 1203 students were interviewed of which 600 students were from government schools another 603 were from private schools. A total of 1203 students were interviewed of which 600 were from Government schools, 603 were from private schools. Males constituted 648(53.9%) and females 555(46.1%). The age of the study subjects ranged from 11 to 18 years, maximum numbers of students were in the age group of 14 years 390 (32.3%). Family history of Hypertension was reported among 380(31.5%) study subjects, 193 (16 %) had history among single parent followed by 160 (13.3 %) among single grandparent. The different ranges of high blood pressure reading among the study subjects are as follows. The readings corresponding to significant hypertension was recorded among 51(4.2%) and severe hypertension among 8(0.7%) of the study subjects. 15(5.9%) of the study subjects showed increase in blood pressure readings among government schools and 44(4.6) % in private schools, however the difference observed is not statistically significant (P = 0.3). There is evidence of family history of hypertension and elevated levels of blood pressure amongst the school students. Hypertension directly increases the risk of coronary heart disease (heart attack) and stroke (brain attack). Therefore preventive strategies have to be implemented among the school children so as to modify the risk factor or to completely avoid the risk factors before they set in.

Key Words: *Hypertension, School Children, Tracking, Non Communicable Disease, Risk Factor*

INTRODUCTION

Globally, Non-communicable diseases (NCDs) are increasingly recognized as a major cause of morbidity and mortality. NCDs are linked to a cluster of major risk factors such as tobacco use, alcohol, unhealthy diets, physical inactivity, stress, obesity, high blood pressure, cholesterol and glucose levels, these risk factors are measurable and largely modifiable. Many of the cardiovascular risk factors have their origin in childhood. On both pathological and behavioral grounds, prevention should start in child hood, this is the time when the atherosclerotic and hypertensive disease processes start and it is also when life style habits are formed (For e.g. .smoking, eating, physical exercise). Thus preventive efforts should be directed towards discouraging children from adopting harmful life styles than to attempt to reverse the situation and decrease the resulting risk of atherosclerosis in adulthood (WHO, 1986). WHO's Global School Health Initiative seeks to mobilize and strengthen health promotion and education activities at the local, national, regional and global levels (WHO, 2005).

Studies of young adults with high blood pressure found that many had high blood pressure as a child. By their 20s, studies show that children and adolescents with high blood pressure will exhibit harmful effects

on the heart and blood vessels even with mild hypertension. Factors that seem to contribute to primary hypertension in adults and possibly in children include high blood cholesterol levels, Overweight, Inactivity, Smoking and excessive consumption of salt. Secondary causes of hypertension in children include diseases of the kidney kidneys play an important role in regulating blood pressure and often have diminished ability to perform this vital task when they are diseased. A congenital heart defect called coarctation of the aorta may also cause high blood pressure readings. Head injury may raise the pressure inside the brain, which affects the body's ability to regulate blood pressure normally. Use of prescribed or illegal recreational drugs (such as steroids taken to decrease inflammation, oral contraceptives or cocaine) leads to high blood pressure (Lucile Packard Children's Hospital, 2006).

If a secondary cause has been found, such as kidney disease, the underlying disease will be treated. If no cause has been determined the first treatment approach is lifestyle therapy, which includes weight reduction, increasing physical activity, healthy diet, cut down on salt and alcohol: Many children eat more than the recommended daily amount of salt in their diet, two of the main contributors to this are the salt found in processed foods (for example ready meals and crisps) and salt that is added while cooking, stop smoking, stress management or relaxation therapy (BUPA's Health: Hot topic, 2004).

Aim and Objectives

1) To find out the proportion of study subjects with high blood pressure readings
2) To evaluate family history of hypertension among the study subjects

MATERIALS AND METHODS

Study Area

This study was conducted among the selected schools of Bangalore city, located at Karnataka in South India. Only the schools from which permission could be obtained to conduct the study were included for the study purpose.

Study Design

Cross sectional study

Method of Collection of Data

Source of Data

The study population consisted of 8 standard, 9 standard and 10 standard students of the selected schools. This study was done for a period of 6 months, 1203 students were interviewed of which 600 students were from government schools another 603 were from private schools. There were 5 government and 5 private schools which participated in the study 120 students were taken from each of the government schools and in each school 40 students were selected from 8, 9 & 10 standards respectively, the students were chosen randomly with the help of attendance registers. The same technique was followed in private schools also, as the total students were 603, these 3 extra students as compared to government schools was chosen from the 10 standard of the last school which was interviewed for the study.

The instrument used for the purpose of the study is a predesigned and pretested structured questionnaire which was administered using the interview method by going to each school. The Questionnaire contains the general information of the person along with details regarding family history of hypertension. Blood pressure was measured using mercury sphygmomanometer, 2 successive readings at an interval of 15 minutes was taken, one at the beginning of the interview and one at the end of the interview and then the lower reading was considered. Blood pressure is measured according to the report of the second task force on blood pressure control in children, hypertension in the young is defined as average systolic or diastolic blood pressure equal to or greater than the 95 percentile for age (WHO, 1996).

The details of the second task force report are as follows:

Years	Normal to high(b)	Significant hypertension (c)	Severe hypertension (d)
10- 12	SBP : 122-125	SBP : 126-133	SBP : > 134
	DBP : 78-81	DBP : 82-89	DBP : > 90
13-15	SBP : 130-135	SBP : 136-143	SBP : > 144
	DBP : 80-85	DBP : 86-91	DBP : > 92
16-18	SBP : 136-141	SBP : 142-149	SBP : > 150
	DBP : 84-91	DBP : 92-97	DBP : > 98

***Data Entry and Analysis*:** Using Micro soft excel and Statistical package for social sciences
***Statistical Tests Used*:** 1) Descriptive statistics
2) Chi-Square test

RESULTS AND DISCUSSION

Observation and Results

A total of 1203 students were interviewed of which 600 were from Government schools, 603 were from private schools. Males constituted 648(53.9%) and females 555(46.1%). The age of the study subjects ranged from 11 to 18 years, maximum numbers of students were in the age group of 14 years 390 (32.3%), details are shown in table below. Family history of Hypertension was reported among 380(31.5%) study subjects, 193 (16 %) had history among single parent followed by 160 (13.3 %) among single grandparent. Details are as seen in the table below. The different ranges of high blood pressure reading among the study subjects are as follows.

Table 1: Distribution of study population according to Age

Age	Frequency	Percent
11	1	0.1
12	58	4.8
13	315	26.2
14	390	32.3
15	339	28.2
16	80	6.7
17	18	1.5
18	2	0.2
Total	1203	100.0

The readings corresponding to significant hypertension was recorded among 51(4.2%) and severe hypertension among 8(0.7%) of the study subjects. 15(5.9%) of the study subjects showed increase in

blood pressure readings among government schools and 44(4.6) % in private schools, however the difference observed is not statistically significant (P = 0.3).

Table 2: Distribution of study population according to family history of hypertension

Family history of hypertension	Yes	No	Total
Both parents	15 (1.2)	1188 (98.8)	1203
Single parent	193 (16.0)	1010 (84.0)	1203
Both grand parents	9 (0.7)	1194 (99.3)	1203
Single grandparent	160 (13.3)	1043 (86.7)	1203
Siblings	3 (0.2)	1200 (99.8)	1203

N = 1203 Note (Figures in parenthesis includes percentage)

Table 3: Distribution of study population according to blood pressure readings

Age	Normal	Normal to High	Significant HTN	Severe HTN	Total
10 - 12	47 (79.6)	9 (15.3)	3 (5.1)	0	59
13 - 15	963 (92.2)	25 (2.4)	48 (4.6)	8 (0.8)	1044
16 - 18	92 (92.0)	8 (8.0)	0	0	100
Total	1102	42 (3.4)	51 (4.2%)	8 (0.7%)	1203

N = 1203 Note (Figures in parenthesis includes percentages)
Note: As the blood pressure was measured only during one occasion we cannot label the subjects as Hypertensive's. However these were the subjects with high blood pressure readings at the time of examination who may need tracking of blood pressure.

Discussion

A total of 1203 students were interviewed of which 600 were from Government schools, 603 were from private schools. Among the study subjects males constituted 648 (53.9%) and females 555 (46.1%). The age of the study subjects ranged from 11 to 18 years, maximum numbers of students were in the age group of 14 years 390 (32.3%).

Details regarding the family history of Hypertension were elicited from the study subjects which is as follows, total of 380 (31.5%) study subjects reported family history of hypertension. History of hypertension among single parent was the maximum reported by 193 (16.0%) students, followed by single grandparent as reported by 160 (13.3%) study subjects, similarly history of hypertension among both the parents was reported by 15 (1.2%) students, both the grandparents were diagnosed as hypertensive's as reported by 9 (0.7%) study subjects, and siblings were hypertensive's as reported by 3 (0.2%) students which is the lowest.

Surekha Joshi *et al.,* (2003) in Mumbai (India) conducted a study on "Essential hypertension: Antecedents in children" the results are as follows. A prospective study was conducted to determine the incidence of essential hypertension (EH) and identify markers, if any, in children of essential hypertension families. The study group included 90 children (2-18 years) with a parent or grandparent with EH while the control group had 25 age matched children from non-hypertensive families. Around

30% children (n=27) from these families had a diastolic blood pressure of >95th centile and an additional 27% (n=24) had borderline hypertension. The serum cholesterol, serum triglycerides and 24 hour urinary sodium excretion were significantly higher in the study group ($p < 0.05$) as compared to controls. The children from the study group also had a significant high salt ($p< 0.001$) and fat intake ($P < 0.05$) (Surekha Joshi *et al.*, 2003).

Blood pressure was measured among the school students using a mercury sphygmomanometer 2 successive readings at an interval of 15 minutes was taken, one at the beginning of the interview and one at the end of the interview and the lowest reading was considered. As per the cut off points based on second task force report the findings are as follows, normal to high range of blood pressure measurement was recorded among 42 (3.5%) students, readings corresponding to significant hypertension were seen among 51 (4.2%) study subjects and readings corresponding to severe hypertension were recorded among 8 (0.7%) students. We tried to find if there is any difference in blood pressure readings among male and female students, findings are as follows. Both significant hypertension and severe hypertension together were recorded among 19 (3.4%) females (N= 555). Whereas 40 (6.1%) Male students (N=648) had blood pressure readings corresponding to significant hypertension plus severe hypertension together. The observed difference of blood pressure readings between male and female students was not found to be statistically significant (P=0.09).

Supreet Kaur *et al.,* (2005) in an epidemiological study on school children in Delhi found that prevalence of hypertension (systolic, diastolic or both) was 11.9% in boys and 11.4% in girls (Supreet Kaur *et al.,* 2005). On comparison it is seen that the present study has reported lower percentage of hypertension. Bishav Mohan *et al.,* (2004) conducted a study on Prevalence of Sustained Hypertension and Obesity in Urban and Rural School Going Children in Ludhiana (India). The prevalence of sustained hypertension in urban population between ages 11-17 years was 6.69% where as the results of the present study revealed lesser percentage of hypertensives. According to the same study mentioned above by Bishav Mohan *et al.,* (2004) prevalence of sustained hypertension in rural population, in similar age group was 2.56%. In both urban and rural areas, the number of hypertensive males was more. However the difference between the two sexes is statistically significant in urban population ($P< 0.05$). (Bishav Mohan *et al.,* 2004). Where as in the present study number of hypertensive males are more as reported by Bishav Mohan et-al, but the difference between the two sexes is not statistically significant ($P = 0.09$).

In the above discussion increase in blood pressure readings in the subjects labeled as hypertensives may be due to anxiety among students. Therefore the study subjects labeled as hypertensives may not be truly hypertensives. This is the limitation of the present study, however these were the study subjects where the blood pressure readings were higher at the point of examination and the cut off point's corresponded to the ranges of hypertension as shown in the table. The cut off points was based on second task force report (refer methodology). Tracking of blood pressure is recommended for such students with increase blood pressure readings. The concept of tracking is explained as follows. If blood pressure levels of individuals were followed up over a period of years from early childhood into adult life, then those individuals whose pressures were initially high in the Distribution would probably continue in the same "track" as adults. In other words, 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". This knowledge can be applied in identifying children and adolescents "at risk" of developing hypertension at a future date (Park, 2009).

Klumbiene *et al.,* (2000) took up a study to find relationship of childhood blood pressure to adult blood pressure. Longitudinal study of a cohort of children with baseline data and a follow-up survey after 20 years was conducted. In the 20 years between the two surveys blood pressure increased more in men than in women. Statistically significant correlation between childhood and adult blood pressure levels was estimated (for systolic blood pressure $r=0.40$ in men and $r=0.24$ in women for diastolic blood pressure $r=0.14$ in men and $r=0.34$ in women). Stepwise regression analysis of the data showed that the best predictors of adult blood pressure were the initial childhood blood pressure levels and change in BMI

during the 20-year period for both men and women (Klumbiene *et al.,* 2000). These findings support the concept: Tracking of blood pressure.

Conclusion

There is evidence of family history of hypertension and elevated levels of blood pressure amongst the school students. Hypertension directly increases the risk of coronary heart disease (heart attack) and stroke (brain attack). With high blood pressure, the arteries may have an increased resistance against the flow of blood, causing the heart to pump harder to circulate the blood. Therefore preventive strategies have to be implemented among the school children so as to modify the risk factor or to completely avoid the risk factors before they set in. This can be largely done by health education activities.

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