



## Is Hypertension In Both Parents A Greater Risk For Childhood Hypertension Compared To Hypertension In One Of The Parents Only: An Observational Study

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### Abstract

**Introduction:** This single-centre observational study was conducted to find out whether the offspring of hypertensive parents had any greater risk of hypertension if they had only single parent hypertensive as compared to offspring who had both their parent hypertensive.

**Material and Methods:** The study was carried out at a tertiary centre in North India. Those adults attending cardiac out patient department(OPD), were enrolled in study and their spouses and off springs called to have their blood pressure measured. The relative risk ratio of children having hypertension if single parent had hypertension compared to offspring whose both the parents were hypertensive was calculated.

**Results:** 850 adults were enrolled in the study and their 735 children had their BP measured. Out of 735 children, 185 were found to be hypertensive. Out of 185 hypertensive children, 27 had one parent hypertensive and 158 had both parents with hypertension. However, the relative risk of children (with one parent hypertensive vs children with both parent having hypertension) is 0.81 (0.548-1.199) RR (95%CI) which does not show any statistical significance between single or both parents having hypertension and their children having hypertension as well.

**Conclusion:** Children with both the parent hypertensive had similar chances of having childhood hypertension as compared to children who had only one of their parent hypertensive.

**Keywords:** children, hypertension, offspring, parents

### Introduction

Family history of hypertension is an important predictor of high blood pressure<sup>[1]</sup>. However, whether history of hypertension in one of the parent is sufficient to cause hypertension in offspring or whether hypertension in both the parent carry greater risk of hypertension in offspring is something we aim to answer. There have been various nationwide studies like the Dutch hypertension and offspring study, which found that the magnitude of familiar aggregation of BP(blood pressure) increases during childhood and adolescence<sup>[1]</sup>. A similar study of Iran found that mean SBP (systolic blood pressure) and

DBP (diastolic blood pressure) and mean arterial BP was significantly higher in children of hypertensive

parent than controls in pre adolescents<sup>[2]</sup>. Due to lack of such nationwide large-scale study in our country we are unable to corroborate these findings to our population. Hence, we aim to study the relationship between childhood hypertension in one or both of the parent in this observational study.

### Subjects And Methods:

The study was conducted in tertiary care hospital in North India for one year from March 2018 to

February 2019. The study was approved by the Ethical committee of the institute. Parental information regarding their age, family structure and history of hypertension was recorded from their OPD record. They were informed regarding the study and consent was taken. Those adults who consented, their BP was measured by trained medical staff. A BP of 120/80mm of Hg was taken as normal for all adults. Any value, either systolic or diastolic, above it was considered as hypertension. Those adults who had normal BP were excluded from the study. Adults included in the study were asked to bring their spouses and children the next day and latter's BP was recorded. Children born preterm and with pre-existing medical illness were excluded from the study as these conditions may have influence on child's BP<sup>[3]</sup>. The children's BP was measured by trained doctor after resting the children for at least ten minutes in a quiet room. Two readings, one-two minutes apart were recorded using a mercury sphygmomanometer with cuff, that fits 80% of child's arm, tied on child's right upper arm. Systolic blood pressure(SBP) is the point of onset of Korotkoff sounds and disappearance of fourth Korotkoff sound(K4) is used to define diastolic blood pressure(DBP)<sup>[4]</sup>. The average value of BP was recorded to the nearest millimetre of mercury. Blood pressure measurements were screened according to screening data of American Academy of Paediatrics,2017[5]. All kids who were hypertensive by screening, their height was recorded and finally labelled as hypertensive or non-hypertensive, by taking into account the height and consulting the detailed table<sup>[5]</sup>. They were categorized as blood pressure elevated, Stage 1 and Stage 2 hypertension. Those who had at least one hypertensive parent were considered offspring of hypertensive parents.

The relative risk ratio of children with single hypertensive parent and children with both the hypertensive parent was found out and their

respective 95% confidence interval(CI) calculated. A p value of <0.05 was taken as statistically significant.

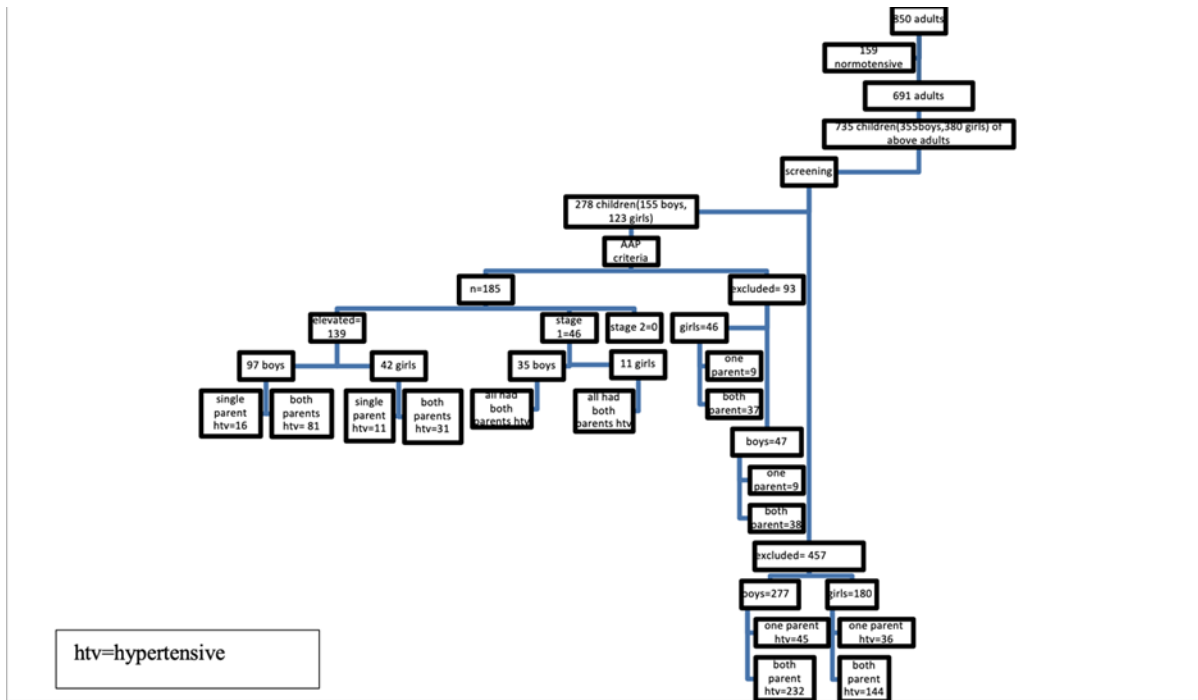
### Results:

Total 850 adults were examined in the study(Figure 1). Of these 159 adults were normotensive so not enrolled. Hence 691 adults(aged 23years 2months to 49years 3 months) and their 735 children(355boys, 380girls) were enrolled for hypertension screening. On application of screening cut-off for hypertension, 278 children were found to be hypertensive(155 boys and 123 girls). Of these, there were ten pairs of siblings. On application of detailed hypertension criteria on these children, 185 children(25.2%) were found to be hypertensives(132 boys and 53 girls) (aged 3years 11months to 13years 3 months). Of these only five pairs of children were siblings. Among the hypertensive children, 79 children were first born child of their parents and 106 were second born child of their parents.

On categorization of hypertension in children 139 children were categorized as elevated (97 boys and 42 girls), 46 as stage 1 (35 boys and 11 girls) and none were in stage 2. Among the siblings all the children were in elevated group. Among 97 boys in elevated group, 16 had one parent hypertensive and 81 had both the parent hypertensive. Among 46 girls in elevated group, 35 girls had one parent hypertensive and 11 girls had both the parent hypertensive. Of 46 children having stage 1 hypertension, 35 were boys and 11 were girls. All the 46 children had both their parent hypertensive.

Total 550 children were found to be normotensive(457 found normotensive on screening cut offs and 93 found normotensive on detailed criteria). Out of these 324 were boys and 226 were girls(aged 3years 6months to 14years 1 month). Among normotensive children, 99 children(108 boys & 88 girls) had one parent hypertensive. Four hundred fifty-one children (270 boys & 181 girls) had both the parents hypertensive.

Figure 1: Subject recruitment flowchart



The probability of hypertensive girls having hypertension if one of the parents is hypertensive is  $11/53=20.7\%$  and probability if both parents are hypertensive is  $42/53=79.3\%$ . The probability of boys having hypertension when only single parent was hypertensive was  $16/132=12.1\%$  and if both parents were hypertensive was  $116/132=87.9\%$ .

Relative risk(95%CI) of children having hypertension if any one of the parents is hypertensive versus children having both parent hypertensive is 0.81 (0.548-1.199) ( $p=0.29$ ). Similar values for boys are 0.727 (0.432-1.223)( $p=0.23$ ) and for girls is 1.042 (0.579-1.876)( $p=0.89$ ).

**Discussion:**

Childhood hypertension is a problem which needs to be addressed to understand the burden of adult hypertension in future. A significant percentage of children studied were hypertensive and had one or both parent hypertensive. Although the probability of both girls and boys having hypertension is higher when both their parent is hypertensive compared to when only one of their parent is hypertensive but, the relative risk of children having hypertension if both his parents are hypertensive is similar to relative risk

of their having hypertension if only one of the parents is hypertensive.

Since this study was time bound post-doctoral research project so small number of observations is a limitation of the study. Secondly ABPM(ambulatory blood pressure monitoring) findings can better corroborate with day long BP measurement for such studies but we could not afford ABPM study due to financial constraints. Also, we did not collect information on dietary intake of the children (which could influence their BP), and assumed that all patients are from same socioeconomic background with similar dietary habits.

Parental basis of childhood hypertension has been frequently studied with another parameters. Elias et al found that increase blood pressure levels are found among off springs of hypertensive parents<sup>[6]</sup>. Also, Henson et al indicated that higher level of blood pressure in children with a parental history of hypertension is apparent before the age of 10 years. They also concluded that less favourable lipid profiles among off springs of hypertensive parents where low levels of HDL C were the most relevant finding regardless of anthropometric or nutritional variables<sup>[7]</sup>. Studies on ABPM measurement of kids

and their parents showed that BP in offspring of hypertensive parents was influenced by the gender of the affected parents<sup>[8,9]</sup>. We however did not find any similar observation. Parental hypertension has more than one influence on childhood parameters like Rongling Li et al found out that parental hypertension independently predicted children BMI, BMI z-score, resting BP and BP reactivity<sup>[10]</sup>. Azli et al suggested in a study a possible difference in mechanism between different sexes<sup>[11]</sup>.

With better control of infectious disease in developing country like ours, especially in the urban population, non-communicable disease like hypertension takes over as upcoming health hazard. Early screening and management of these illness in paediatric population can prevent a major emergence of these diseases in our future generations by early preventive interventions. A nationwide study of factors leading to childhood hypertension with bigger cohorts will help us bring out other general and regional factors of the illness.

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