



Original Article:

Blood pressure response to Cold Pressor Test in the children of hypertensives

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Abstract:

Two hundred student volunteers of 16-24 yrs were divided into two groups of 100 each, as children of hypertensive and children of normotensive parents. It was observed that there was no difference in resting SBP and DBP in both groups before CPT. After CPT, significant higher values of SBP after immersion, DBP after immersion, difference of SBP and difference of DBP were observed in children of hypertensive parents as compared to children of normotensive parents. This study can be used as a predictor of future development of hypertension for which early preventive measures can be taken to reduce the morbidity and mortality due to hypertensive complications.

Key Words: Cold pressor test, Children, Hypertension

Introduction:

Systolic blood pressure is the maximum pressure during systole. It indicates the extent of work done by the heart. It undergoes considerable fluctuations. Diastolic blood pressure is the minimum pressure during the diastole. It undergoes much less fluctuations in normal subjects and remains within a limited range. Hence variations of diastolic blood pressure are of greater prognostic importance than those of systolic blood pressure.

Arterial blood pressure, an important physiological parameter has great etiological significance in epidemiology of cardiovascular disease due to its association with age, height, weight, diet, stress, socio-economic status etc.(1)

Familial aggregation of hypertension documents an important genetic component. Concordance of blood pressure is greater within families than in unrelated individuals, greater between monozygotic than between dizygotic twins and greater between biological than between adoptive siblings living in same household. About 70% of familial aggregation of blood pressure is attributed to shared genes rather than shared environment.(2)

Hypertension has been reported to be generally associated with sympathetic overactivity.(3) But the sympathetic response of certain individuals from both normotensive and hypertensive population have been reported to be more pronounced.(4)

Previous studies of family history of patients with hypertension have shown a hereditary factor in 76-86% of cases. Essential hypertension is a hereditary disease conveyed as a

Mendelian dominant with a rate of expression of more than 90%.(5)

In the study of hypertension, several authors have made use of a technique, known as **Cold Pressor Test**. It was introduced by Hines and Brown in 1932. The test is based on the fact that immersion of hand in ice cold water causes a rise of blood pressure. It was designed to measure the reactivity of blood pressure to a standard stimulus.(6)

The present study is aimed to compare the blood pressures of children of hypertensives in the age group of 16-24 years with that of the age matched children of normotensives and also to identify those who are at future risk of developing hypertension.

Materials and Methods:

The present study was conducted on a cross section of the subjects from various colleges of Patiala. 200 subjects were examined in this study. 100 subjects were the children whose parents were hypertensives and 100 subjects were the children whose parents were normotensives. Subjects in the age group of 16-24 years were taken for this study.

The BP in this study was recorded using the auscultatory technique. In addition to this, a technique of cold pressor test was employed, described by Hines & Brown (1932).

Individuals were then categorized into two groups, depending on their reactivity to cold pressor test as normoreactors (NR) and hyperreactors (HR).

The subjects who had registered a rise of more than 22 mmHg of SBP and 18 mmHg of DBP were grouped as hyperreactors.

Those, whose both SBP and DBP were not raised more than 22 mmHg and 18 mmHg respectively were grouped as normoreactors.

A standard proforma was prepared for every case screened. Age, sex, address, occupation, details of family history of hypertension was recorded. A general physical examination of each subject was carried out.

Data obtained was analyzed statistically.

Observations and Results:

In the present study, total 200 cases were studied from various colleges of Patiala which were divided into two groups depending on the blood pressure status of their parents into 100 children of normotensives and 100 children of hypertensives.

Table 1: Percentage of normoreactors and hyperreactors among children of normotensive and children of hypertensive parents

Type of Cases	Total No. of Cases	Hyperreactors		Normoreactors	
		No.	Percentage	No.	Percentage
Children of normotensives	100	31	31	69	69
Children of hypertensives	100	64	64	36	36

Table 1 shows among 100 children of normotensives, 31 (31%) were hyperreactors and 69 (69%) were normoreactors. Among 100 children of hypertensives, 64 (64%) were hyperreactors and 36 (36%) were normoreactors.

Table 2: Comparison of various parameters in the children of normotensive parents and in children of hypertensive parents

Parameters	Mean \pm SD in children of normotensive parents	Mean \pm SD in children of hypertensive parents	t value	p value	Significance
SBP	112.44 \pm 8.83	112.68 \pm 11.26	0.168	0.433	NS
DBP	75.1 \pm 7.82	74.62 \pm 9.41	0.376	0.354	NS
SBP after immersion	132.8 \pm 11.47	138.76 \pm 14.03	3.289	0.000	HS
DBP after immersion	88.1 \pm 9.92	92.12 \pm 11.84	2.628	0.004	HS
Difference of SBP	20.36 \pm 8.93	26.08 \pm 9.88	4.295	0.000	HS
Difference of DBP	12.98 \pm 6.45	17.5 \pm 7.58	4.54	0.000	HS

Table 2 shows mean \pm SD, t value, p value and its statistical significance in children of normotensive and hypertensive parents. SBP after immersion, DBP after immersion, difference of SBP, difference of DBP were found to be statistically highly significant ($p < 0.005$). Thus, it was observed that increase in SBP and DBP after cold immersion, in children of hypertensive parents is much more than in children of normotensive parents.

Discussion:

The present study was conducted to compare the blood pressure of the children of hypertensives in age group of 16-24 years with that of age matched children of normotensives.

The study was to identify those who may ultimately suffer from hypertension when they grow older. In this study, 200 subjects between the age group of 16-24 years from various colleges of Patiala were subjected to a technique known as **cold pressor test**. They were divided into two groups, one group of 100 who were children of hypertensives and other group of 100 who were children of normotensives. The results of the tests were recorded and compared between the two groups – children of hypertensives and children of normotensives.

1. Systolic and diastolic blood pressure

In the present study, it was seen that there was no significant difference in the value of SBP and DBP in the children of normotensive and children of hypertensive parents.

Similar results were reported by Verma et al.(7)

However, few studies have been carried out which do not show similar results, Cavalcante.(8) This may be probably due to the use of much smaller sample size in their studies.

2. Systolic blood pressure after immersion and diastolic blood pressure after immersion

In the present study, SBP after immersion and DBP after immersion showed statistically significant difference between children of normotensive parents and children of hypertensive parents.

Rajashekhar et al, Ashwini et al, Verma et al made a similar study and found the same results and demonstrated that increased sympathetic reactivity is the main basic mechanism in the development of hypertension and increase in sympathetic activity may be a result of inheritance or a consequence of interaction between genetic and environmental factors.(7,9,10)

Kasagi, Germano et al, Lambert and Schlaich concluded that BP responses to cold are probably influenced by different factors related to participants emotional state and coping style. (7,11,12)

3. Difference of SBP and Difference of DBP

In the present study, difference of SBP and Difference of DBP showed statistically significant difference between children of normotensive and hypertensive parents.

Similar results have been reported by Lopes et al, Rajashekhar et al, Ashwini et al, Verma et al and observed that they have an increased cardiovascular reactivity which was attributed to increased sympathetic activity.(7,9,10,13)

However, few studies showed the contradictory results Germano et al, Lambert and Schlaich all contradicted the above findings and concluded that BP responses to cold are probably influenced by different factors related to participants emotional state and coping style.(12,14)

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