

Research Article**Study of Acute Response to Cold Pressor Test in Medical Students and its Correlation with Different Blood Groups****Reena Kaur Ruprai¹, Manisha V. Kurwale²**^{1,2}Assistant Professor, Department of Physiology, Government Medical College, Nagpur, Maharashtra, India
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Abstract: Hypertension is strongly correlated with modifiable risk factors like obesity, age, stress, high salt intake. On the other hand, non-modifiable factors like hereditary and genetics. ABO blood group also needs to be studied. The present study was undertaken to see the response of cold pressure test on healthy medical students in the age group of 17 – 21, and to see whether the blood group has any correlation with Body mass index (BMI) and hypertension (HT). The study revealed that acute responses to cold pressure test were found to be positive in blood group A+ve, also the family history was also positive in A+ve blood group. The other blood groups are not significantly correlated. These adolescents must be screened to detect asymptomatic hypertension. The CPT may identify individuals with an occult physiological abnormality that predisposes them to hypertension in their later life.**Keywords:** Blood pressure, Blood groups, Cold Pressor Test (CPT), Body mass index (BMI), Hypertension (HT), Cardio Vascular System (CVS)

INTRODUCTION

Autonomic reactivity to stress has been hypothesized to be a marker for subsequent neurogenic HT [1]. Medical students at the beginning of medical training are reported to be under stress. Many of them show reactivity to cold pressor test. Normotensive hyperreactors are more likely to have a positive family history of hypertension [2, 3].

The ABO blood group system was the first human blood group system to be discovered [4]. Most genetics believe that genetic factors are involved in susceptibility and resistance to many non – mendelian human diseases, though the explanation for the association between ABO blood group and same disease is still unclear, blood cellular genes and gene aberrations may be associated with the disease.

Blood group as a potential risk factor for CVS morbidity is still under evaluation. Studies are being done on relation of blood group and risk of developing CVS disease in future [5]. Abnormal autonomic responses also play a role in cardiac morbidity and sympathetic over activity plays a significant role in development of neurogenic HT [6].

In the following study an attempt was made to determine the sympathetic nervous system response to stimulus and its variation with blood groups. The cold

pressor test is an indicator of sympathetic activity of after cold stress.

A healthy response to CPT is sympathetic activation and in turn leads to increase in blood pressure. The family history of HT was taken into account.

Studies have shown that cold pressure test can be used as a tool to predict the chances of person becoming HT later on in life. Hence if a particular blood group individuals have an abnormal cold pressure response, this would reinforce that this blood group is a potential risk factor for cardiovascular morbidity.

MATERIALS AND METHODS

The study was conducted on 1st MBBS students in the department of physiology, after taking informed and written consent from the students and institutional ethical clearance. Subjects were in the age group of 17 – 20 years. 72 males and 66 females were enrolled in the study. Those subjects with any history of chronic illness or drug intake, which may have a potential effect on the CVS parameters were excluded from the study. Age, sex, blood group, height, weight were recorded. In the medical history special attention to family history was given. Height was measured using stadiometer to nearest 1 cm with subject standing without shoes. Weighing scale was used to measure

height. BMI was calculated with height and weight. Mercury sphygmomanometer was to record blood pressure in right arm in seated position. 10 minutes seat was given before measuring blood pressure, to free the subject's anxiety.

In CPT [7] after initial BP recording, subjects were asked to dip their left hand upto the level of their wrist in water having temperature of 4 degree Celsius for duration of 5 minutes, followed by which 2nd recording of BP was taken. All the BP recordings were taken by the same investigator after proper calibration of the instrument. 3rd reading was taken after wrapping the hand in towel for 5 minutes.

The blood group was determined by agglutination by using anti-sera.

Statistical analysis

SPSS version 10.0 was used for statistical analysis. After determining mean, SD, t test and chi square were used for statistical analysis.

RESULTS

As the table reveals the commonest blood group is B +ve both in males and females, followed by O+ve. The least common is AB+ve.

Table 1: showing distribution of blood groups among boys and girls

| Blood group | Male | Female |
|-------------|------|--------|
| O +ve | 23 | 21 |
| A +ve | 19 | 16 |
| B +ve | 24 | 24 |
| AB +ve | 6 | 5 |

Table 2: Showing the results of cold pressor test in various blood groups

| Blood group | Pre-test | Post-test | p value |
|-------------|---|---|------------------|
| | Systolic/diastolic (mm of Hg) Mean± SD | Systolic/diastolic (mm of Hg) Mean± SD | |
| A | 114.28±6.08 73.60±5.89 | 124 ± 6.70 82.05± 6.24 | 0.00 |
| O | 115.90±5.83 75.5±4.92 | 122.59±6.90 82.13±5.51 | 0.00 |
| B | 115.52±5.01 75.79±4.70 | 120.58±5.73 80.50±5.55 | 0.00 |
| AB | 115.45±5.22 75.63±5.04 | 117.63±5.04 77.45±4.74 | 0.0061 0.0046 |

Table 3: Showing change in percentage in systolic and diastolic blood pressure among different blood groups

| Blood group | Systolic BP% | Diastolic BP% |
|-------------|--------------|---------------|
| A | 8.50 | 11.48 |
| O | 5.7 | 8.78 |
| B | 3.87 | 6.21 |
| AB | 1.34 | 2.40 |

Table 4: showing family history distribution of hypertension in various blood groups

| Blood group | N | Family history positive | % |
|-------------|----|-------------------------|------|
| A | 35 | 9 | 27.2 |
| O | 44 | 19 | 43.2 |
| B | 48 | 8 | 16.6 |
| AB | 11 | 1 | 9 |

Table 5: Showing age and BMI in various blood groups

| Blood group | BMI | Age |
|-------------|------------|------------|
| A | 19.98±2.75 | 18.2±0.58 |
| O | 21.43±3.73 | 18.09±0.70 |
| B | 21.73±5.11 | 18.25±0.63 |
| AB | 21.84±3.29 | 19.4±1.78 |

DISCUSSION

In the present study, blood group, BMI and CPT were analysed in medical students to see if any positive correlation can be obtained.

Cold pressure measures the changes in BP in response to painful stimulus generated by placing hand in cold water. In our study pre- hypertensive, significant response was given by individuals having blood group A. The other blood groups did not show much significant correlation. Positive family history was also more common with blood group O & A, whereas obesity was not related to any particular blood group.

The normotensive hyperreactors to CPT are more likely to have a positive family history, than normotensive person who are less reactive [2, 3].

Also it was seen that hyperreactors have slower rate of recovery, may be a predisposition factor for future development if HT. None of our subjects showed incompetent autonomic response.

Thus family history of HT is a well established risk factor [8, 9].

Young subjects who show greater prolonged responsiveness to diastolic BP d/t sympathetic stimulation through CPT are repeated to be more prone to develop HT [10].

In our study we also used the Hamilton scale for assessment of anxiety. The scale showed score more in the A+ve subjects. Most of the subjects, were unaware of their hypertensive status, they were advised to modulate their diet and life style and introduce exercise in their daily routine. Study performed by Maxwell and Maxwell found that the chances of HT were highest in blood group, followed by A, B and lowest in AB [11].

Studies conducted by some other authors also could not find any major +ve correlation among blood group and HT [12]. At the end of discussion, many past and present studies indicate that CPT can be a predictor for development of HT later on in life.

CONCLUSION

Medical students at the start of their curriculum are under stress, they must be routinely screen to detect asymptomatic HT, CPT may identify individuals with occult physiological abnormality that predisposes them to HT in their later life.

From the present study we speculate that since BP, is multifactorial, perhaps ABO antigens plays an indirect role in influencing arterial BP.

In our study we can interpret that family history of hypertension plays a significant role in the reaction of cold pressure test. Thus children of hypertensive patients can take preventive life style changes to decrease their risk of developing HT & further CVS morbidity in future.

Since not much work is done on relation of blood group with Hypertension. More sample size should be analysed as further study, since blood groups are one of the very important non-modifiable, genetic risk factor.

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