To Study the Relation between ABO Blood Groups, Prehypertension and BMI

Kavita Singh¹, Rinku Garg², Shikha Gautam³, Yogesh Tripathi⁴

¹PG, Department of Physiology, Santosh Medical College, Ghaziabad
²Professor, Department of Physiology, Santosh Medical College, Ghaziabad
³Associate Professor, Department of Physiology, Santosh Medical College, Ghaziabad
⁴Professor, Department of Physiology, Santosh Medical College, Ghaziabad

1. Introduction

Hypertension has emerged as a major health issue in younger population intoday’s fast-moving life. Hypertension goes unnoticed most of the times and has been rightly termed as “silent killer”. Factors like obesity, increased fat intake, sedentary lifestyle, high cholesterol level, psychosocial stress has been implicated in the cause of hypertension. These all factors are modifiable and are common problems in younger population. Genetic factors are also important risk factors in developing hypertension and ABO blood group system is one such factors which needs investigation. ABO blood groups have been related to various diseases. There are many studies which found out correlation between ABO blood group and Smoking, pancreatic cancer. Sharma G et al found more prevalence of lung and oral cancer in males with blood group B, while prevalence of cervical cancer was also more in females with Blood group B. The ABO system is important genetic make up of an individual and provides valuable information for detection of diseases. There are evidences from some studies showing link between blood groups and genetic markers and familial patterns. The blood group system in many researches associated with various diseases including cardiovascular diseases.

According to World health organization, body mass index (BMI) is defined as a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It provides a measure to determine the distribution of fat in children and adults. The precision of measurements of height and weight suggests that a variant for height for weight provides a more reliable measure of adiposity within populations. Obesity and overweight both are harmful for health and many studies have reported the link between increased BMI and risk of developing many diseases like diabetes mellitus, stroke, coronary heart diseases, allergic diseases.

If high risk individuals are identified at an early stage, preventive lifestyle and dietary modifications can reduce the risk of developing hypertension and its complications.

And thus, to study the association between ABO blood group with prehypertension and BMI in medical students was undertaken.

2. Material and Methods

A cross-sectional study was conducted at Santosh medical college, Ghaziabad from February – March 2018. 250 medical students were randomly selected, who were between the age of 17-28 years. The purpose of the study was explained and informed consent was taken. Ethical clearance was taken from the ethical committee of our college.

Measurement of Blood Pressure

Blood pressure was measured in morning between 10-11 am, in sitting posture with the help of mercury sphygmomanometer. The subject was made to sit relaxed in a comfortable position with back and arm supported. The cuff was placed 2cm above the cubital fossa. Brachial artery was palpated and the chest piece of stethoscope was placed over it. Radial artery was palpated while inflating the cuff. It was inflated 20-30 mmHg above the point at which the radial pulse disappears. Then, cuff was deflated slowly and Korotkoff sounds were noticed. Systolic blood pressure (SBP) was recorded with the onset of clear Korotkoff sound and diastolic blood pressure (DBP) reading was noted with the disappearance of these sounds. Manometer was properly observed in a direct line to avoid parallax error. Zero error was checked prior to measurement of blood pressure. Three readings were taken at intervals of at least 1 minute, and the average value was recorded in order to acquire an accurate blood pressure. Three readings were taken and average was noted.

The individuals were categorized into normotensive, prehypertensive, and hypertensive based on the below guidelines:

<table>
<thead>
<tr>
<th>Classification</th>
<th>SBP (mm Hg)</th>
<th>DBP (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 120</td>
<td>&lt; 80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120-139</td>
<td>80-89</td>
</tr>
<tr>
<td>Stage I</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>Stage II</td>
<td>≥ 160</td>
<td>≥ 100</td>
</tr>
</tbody>
</table>

Determination of BMI

BMI (kg/m²) was calculated by Quetlet index for which height and weight was measured using standard scales and same apparatus for all the students.
The frequency of study subjects with blood group B is 10.4%. The frequency of study subjects with blood group O is 26.4%. The frequency of study subjects with blood group AB is 10.4%.

**Table 1: Distribution of study subjects according to their blood group**

<table>
<thead>
<tr>
<th>Blood group</th>
<th>frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>43</td>
<td>17.2</td>
</tr>
<tr>
<td>B</td>
<td>115</td>
<td>46</td>
</tr>
<tr>
<td>AB</td>
<td>26</td>
<td>10.4</td>
</tr>
<tr>
<td>O</td>
<td>66</td>
<td>26.4</td>
</tr>
</tbody>
</table>

The frequency of study subjects with blood group B is highest with 46% followed by O (26.4%), A (17.2%) and least is in AB (10.4%).

**Table 2: Relationship of blood pressure of the study subjects according to their blood groups**

<table>
<thead>
<tr>
<th>Blood group</th>
<th>JNC – 8 BP classification</th>
<th>Prehypertension</th>
<th>Hypertension</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16 (6.4%)</td>
<td>23 (9.2%)</td>
<td>4 (1.6%)</td>
<td>43</td>
</tr>
<tr>
<td>B</td>
<td>37 (14.8%)</td>
<td>63 (25.2%)</td>
<td>15 (6%)</td>
<td>115</td>
</tr>
<tr>
<td>AB</td>
<td>4 (1.6%)</td>
<td>20 (8%)</td>
<td>2 (0.8%)</td>
<td>26</td>
</tr>
<tr>
<td>O</td>
<td>23 (9.2%)</td>
<td>36 (14.4%)</td>
<td>7 (2.8%)</td>
<td>66</td>
</tr>
</tbody>
</table>

**Discussion**

Prevalence of hypertension is increasing rapidly among Indians. An early and a regular screening to detect underlying hypertension is necessary to prevent any future complications and to start control measures for hypertension. A non-modifiable factor like blood group can be used as a predictor for hypertension and its awareness can be created to initiate early lifestyle modifications in the susceptible group.

Different studies have suggested the association of ABO blood group with different diseases and so the knowledge of distribution of blood groups may help in managing the various health issues. Several vascular disorders like atherosclerosis and thromboembolism are linked to non-O blood groups and hypercholesterolaemia was the probable cause in these individuals.

It was observed that B blood group was most common type of blood group in our study subjects. (46%>26.4%>17.2%>10.4% - B> O>A>AB) The blood group frequency distribution in North India is B>O>A>AB. The study conducted in Amritsar also observed similar frequency distribution B (38.5%)>O (33.5%)>A (21.62%)>AB (5.12%) and this trend was followed by our study also.

Our study reported increased prevalence of prehypertension (25.2%) and also the tendency for being overweight (7.6%) (BMI = 25 -29.9 kg/sq.m) in subjects with B blood group. This could possibly suggest that students with B blood group are more prone to develop prehypertension and these findings are similar to findings of a study conducted with 340 medical students of Nepal medical college. However, O blood group was most common in their study subjects. 

(1524) Another study conducted in blood donors showed that B blood group was more susceptible to develop hypertension and obesity.

Qung and Abdel Hamid found high incidence of overweight and high leptin levels in subjects with group B compared to other blood groups within 151 staff and student participants. This is similar to our findings which shows 7.6% of subjects with B blood group being overweight, in comparison with blood group O >A>AB.

This study indicates that individuals having BMI >25 kg/m² are at the risk of getting pre-hypertension and subsequent hypertension later on. The current study observed that 48% of obese population was pre-hypertensive. (27) Modifying weight help to modify the development of hypertension rate.
5. Conclusion

Blood group B was predominant and it showed increased predisposition to prehypertension and increased BMI. The increased BMI (< 25kg/m²) may be one of the reasons for increased prevalence of prehypertension. Thus, we can conclude that various health awareness programmes should be organized to make society aware of blood group-related diseases and to develop effective ways to identify the high-risk population of pre-hypertension. This can reduce the risk of hypertension and cardiovascular complications associated with it.

6. Limitations

Further studies should be conducted with larger and wider group of population.

7. Acknowledgment

We are very grateful to the first year students of our medical college for their co-operation and participation in conducting the study. We are also thankful to the technical staff for their valuable help in collecting the data.

References


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