Original Research Article

Frequency Distribution of ABO blood group and Rh factor in Bhanpur, Bhopal

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Abstract: Blood group system was discovered way back in 1901 by Karl Landsteiner, Clinically, only ‘ABO’ and ‘Rhesus’ groups are of major importance. ABO blood group distribution varies in different geographical, ethnic and socio-economic groups. Apart from blood transfusion practice, knowing of the ABO and Rh blood groups were useful in population genetic studies, researching population migration patterns as well as resolving certain medico legal issues. This study was conducted to determine and compare the frequency of ABO and Rh blood groups in general population of Bhanpur, Bhopal, and M.P. During the study period from March 2015 to July 2015 volunteers were screened by antigen antibody agglutination method using commercially available antiseras. The study revealed that the commonest ABO blood group was B (39.25 %), followed by O (28.63 %), A (25.63 %) and AB (6.50 %) respectively. Rh positive were 94.88 % and Rh negative were 5.12 %.

Keywords: Blood groups, ABO, Rhesus, Rh +ve and Rh – ve, agglutination method.

INTRODUCTION

Blood group antigens are hereditary determined and plays a vital role in transfusion safety, understanding genetics, inheritance pattern, and disease susceptibility. Nearly 700 erythrocyte antigens are described and organized into 30 blood group systems by the International Society of Blood Transfusion of which ABO and Rh are important [1].

ABO blood group system is widely credited to have been discovered by the Austrian scientist Karl Landsteiner, who found three different blood types in 1900 [2]. He described A, B and O blood groups for which he was awarded the Nobel Prize in 1930. Alfred Von Decastello and Adriano Sturli discovered the fourth type AB, in 1902 [3].

Antibodies against red blood cell antigens are called agglutinins and individuals are divided into 30 blood group systems by the International Society of Blood Transfusion of which ABO and Rh are important [1].

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MATERIALS & METHOD

The study was conducted in the People’s Hospital and Research Center, Bhanpur, Bhopal, Madhya Pradesh from March 2015 to July 2015. All randomly selected 800 subjects were above 20 years belonging to Bhopal region and gave their informed consent that their blood samples be used to generate information on frequencies of ABO, Rh antigens. ABO and Rh blood group was determined by conventional slide agglutination method. Under all aseptic condition ring finger of the subject was pricked. Few drops of blood were mixed with isotonic saline in test tube and subsequently blood group was determined by mixing with antisera (anti A, anti B and anti D) on

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slide and observing for agglutination. Confirmation of agglutination was done by using microscope.

**OBSERVATION AND RESULTS**

Out of total 800 subjects studied, 56.25% (450) are males and 43.75% (350) are females. From the table 1 it is evident that around 39.11% of the male and 39.43% of female subjects belong to B blood group whereas only 5.56% of the males and 7.71% of the females have AB blood group. Overall, maximum 39.25% of the study subjects belong to B blood group followed by O (28.63%) and A (25.63%) blood groups whereas AB blood group contributes minimum 6.50% of the study subjects.

Table 2 shows that 93.56% of the male subjects and 96.57% of the females have Rh positive blood group whereas 6.44% of the males and 3.43% of the females have Rh negative blood group. Overall, Rh positive seen in 94.88% of the subjects. Only 5.12% of the subjects in our study group were Rh negative. So, Rh positive is commonest among both males and females. The complete analysis of ABO group and Rh type of all the subjects in the study group is illustrated in table 3. It is observed that overall B positive is the commonest group in both sexes followed by O positive and A positive. Interestingly we find that the second most common blood group for male subjects was O positive and for female subjects was A positive. And AB negative blood group is least common and equally distributed in study group.

We compare the traits of blood group in India and outside India in table 4. It is found that our study shows same trend as found in other two studies done in India in other states. The difference found in distribution when we compare our study internationally with study done in USA and Nepal. This will help to map the genetic distribution of blood groups all over the world.

**Table 1: Distribution of ABO blood groups**

<table>
<thead>
<tr>
<th>Blood group</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>113</td>
<td>25.11</td>
<td>92</td>
<td>26.29</td>
<td>205</td>
</tr>
<tr>
<td>B</td>
<td>176</td>
<td>39.11</td>
<td>138</td>
<td>39.43</td>
<td>314</td>
</tr>
<tr>
<td>AB</td>
<td>25</td>
<td>5.56</td>
<td>27</td>
<td>7.71</td>
<td>52</td>
</tr>
<tr>
<td>O</td>
<td>136</td>
<td>30.22</td>
<td>93</td>
<td>26.57</td>
<td>229</td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td>100</td>
<td>350</td>
<td>100</td>
<td>800</td>
</tr>
</tbody>
</table>

**Table 2: Distribution of Rh positive and Rh negative blood groups**

<table>
<thead>
<tr>
<th>Rh factor</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rh +ve</td>
<td>421</td>
<td>93.56</td>
<td>338</td>
<td>96.57</td>
<td>759</td>
</tr>
<tr>
<td>Rh –ve</td>
<td>29</td>
<td>6.44</td>
<td>12</td>
<td>3.43</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td>100</td>
<td>350</td>
<td>100</td>
<td>800</td>
</tr>
</tbody>
</table>

**Table-3: Complete analysis of ABO blood group and Rh type of all subjects included the study**

<table>
<thead>
<tr>
<th>Blood Group</th>
<th>Male</th>
<th></th>
<th>Female</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+ve</td>
<td>103</td>
<td>22.89</td>
<td>89</td>
<td>25.43</td>
<td>192</td>
</tr>
<tr>
<td>A-ve</td>
<td>10</td>
<td>2.22</td>
<td>03</td>
<td>0.86</td>
<td>13</td>
</tr>
<tr>
<td>B+ve</td>
<td>167</td>
<td>37.11</td>
<td>137</td>
<td>39.14</td>
<td>304</td>
</tr>
<tr>
<td>B-ve</td>
<td>09</td>
<td>2.00</td>
<td>01</td>
<td>0.29</td>
<td>10</td>
</tr>
<tr>
<td>AB+ve</td>
<td>24</td>
<td>5.33</td>
<td>26</td>
<td>7.43</td>
<td>50</td>
</tr>
<tr>
<td>AB-ve</td>
<td>01</td>
<td>0.22</td>
<td>01</td>
<td>0.29</td>
<td>02</td>
</tr>
<tr>
<td>O+ve</td>
<td>127</td>
<td>28.22</td>
<td>86</td>
<td>24.57</td>
<td>213</td>
</tr>
<tr>
<td>O-ve</td>
<td>09</td>
<td>2.00</td>
<td>07</td>
<td>2.00</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td>100</td>
<td>350</td>
<td>100</td>
<td>800</td>
</tr>
</tbody>
</table>
DISCUSSION
The membrane of a human red blood cell contains a variety of blood group antigens, the most important and best known of these are A and B antigens. The Rh blood group system is the second most important in blood transfusions [20]. In this study, the distribution of ABO and Rh blood groups are depicted in Table I. The results of this study were comparable to the studies done at Indore [5], Lucknow [6], Punjab [7], Western Rajasthan [8], Eastern Ahmedabad [9], Western Ahmedabad [10], Surat [11], Latur [12], and Durgapur (Steel City) [13]. All these studies have described ‘B’ as the most frequent and ‘AB’ as the least common blood group.

The studies done at Indore by Narendra Kumar et al.; [5] revealed B group to be the most common followed by O, A and AB. The same incidence is found in our study i.e. B is more frequent than O followed by A and AB blood groups. The studies done in Northern parts of India by authors like Tulika Chandra et al.; [6] at Lucknow, and by Sidhu et al.; [7] at Punjab showed blood group B was the commonest, followed by O, A and AB; which is in consonance with present study.

In Western parts of India like in West Rajasthan by Behra R et al.; [8], Eastern Ahmedabad by Wadhwa MK et al.; [9] Western part of Ahmedabad by Patel, Piyush et al.; [10] and studies done at Surat by Nidhi et al.; [11] showed blood group B was the commonest followed by O, A and AB which is same as in our study.

Study done in Eastern part of India, Durgapur by Nag I et al.; [13] showed O group to be the commonest group which is different from our study. In Southern part of India studies done by Periyavan A et al.; [14] at Bangalore, Das PK Nair et al.; [15] at Vellore, and at Davanagere by Mallikarjuna S et al.; [16] found that the commonest blood group was O followed by B, A and AB whereas our study shows commonest blood group B followed by O, A & AB.

Geographical distribution of Blood Groups in India shows that in Central, Northern and Western part of India, B is the commonest blood group; whereas in Eastern, Southern part, O is the most frequently occurring blood group. In Pakistan, the study done by Hammed A et al.; [17] the commonest blood group is B which is same as in our study. The study done in USA by Mollison PL et al.; [18] the commonest blood group was O, followed by A, B & AB, which is different from our study.

The study done at Nepal by Pramanik et al.; [19] found the commonest blood group was A, whereas the studies done in most parts of India the commonest blood group is either B or O followed by A and then AB. The incidence of Rh blood group in most of the part of India varies from 94 to 98 % were Rh+ve and 2 to 6% were Rh-ve ; whereas in our study 94.88 % were Rh+ve and 5.12 % were Rh-ve (table II). Thus frequency of Rh +ve blood group is more which coincides with most of the other studies done as depicted in table IV.

CONCLUSION
It is concluded that the most common blood group was B (39.25 %) followed by O (28.63 %), A (25.63 %) and AB (6.50 %). Amongst Rhesus (Rh)
The study of distribution of blood group is very important for blood banks & transfusion services, forensic studies, medical diagnosis, genetic information; genetic counselling that could contribute to the general well-being and health care of individuals.

REFERENCES