Frequency of ABO and Rh blood groups in Healthy Donors

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Abstract

Background: To document the frequency of ABO and Rh blood groups in volunteer non-remunerated blood donors of Rawalpindi/Islamabad

Methods: Record of blood donors from Jamila Sultana Thalassaemia Foundation was analyzed for ABO and Rh blood groups from Sept 2005 to Mar 2008. Double/multiple entries were excluded.

Results: Among voluntary blood donors 3519(79.5%) were males and 907(20.5%) were females. Blood group B+ve was the most frequent (31.2%). AB-ve was the least frequent (0.6%). Frequency of Blood groups A+, AB+, O+, A-ve, B-ve, and O -ve was 21.5%, 9.8%, 29.7%, 1.8%, 2.9%, and 2.5% respectively. The percentage of Rh+ and Rh- blood groups was 92.2% and 7.8% respectively.

Conclusion: Blood group B+ was commonest and AB- was least frequent among donors. Rh+ blood group was 92.8%. There was no significant difference in males and female donors.

Introduction

The surface of our red blood cells contains different sugars and proteins called blood group antigens. Ability to form these substances is inherited. Humans have many blood group systems so that each individual has a unique spectrum of blood groups with exception of identical twins and triplets only.

ABO blood groups were discovered by Landsteiner in 1901. Later on in 1939 Rhesus blood groups were discovered by Landsteiner and Wiener. Apart from transfusion science, blood groups have also been studied in association with various diseases e.g. salivary gland tumors, colorectal cancer, carcinoma stomach, thyroid disorders, ovarian tumors and small cell lung cancer.

This study was designed to find out ABO and Rh blood groups frequencies in healthy non-remunerated blood donors, who donated blood for beta thalassaemia major patients.

Subjects and Methods

The study was carried out from Sept 2005 to Mar 2008 at Jamila Sultana Foundation. Blood samples from healthy blood donors were analyzed for serological phenotyping for ABO and Rhesus blood groups by slide method. On a labelled slide a drop of ant-A, anti-B and anti-D was placed and a drop of blood from finger prick sample added to each and mixed. Results of agglutination were recorded after mixing. The data of all donors was recorded on a proforma.

Results

A total of 4426 donors were analyzed for their blood groups. Among them 3520(79.5%) were males and 907 (20.5%) were females.

2754 donors were students of various colleges and universities, 335 were madrassa students 446 were employees of different NGO’s and private institutions. 57 were government employees and 360 were walk-in donors.

Blood group B+ was the most frequent (31.2%). AB- was the least frequent (0.6%). Frequency of Blood groups A+, AB+, O+, A-ve, B-ve, and O -ve was 21.5%, 9.8%, 29.7%, 1.8%, 2.9%, and 2.5% respectively. (Table 1) 92.2% were Rh positive and 7.8% were Rh negative.

Discussion

Ever since the discovery of ABO blood groups by Landsteiner and his pupils, comprehensive works have accumulated in literature on the relation of ABO blood groups to transfusion, on its anthropological and genetical applications, on its use in medico-legal identification and disputed paternity and also on its relationship to various diseases.

Our study population was concentrated around twin cities of Rawalpindi and Islamabad. In our study blood group B was found to be most frequent. The results are comparable with studies from other cities of Punjab and NWFP. In Sind and Baluchistan blood group O was relatively more common. This reflects clustering of genes in various geographical parts of the
country. Blood group AB was the rarest group in all studies within Pakistan and abroad (Table 2).  

### Table 1: Frequency of ABO blood group distribution among donors

<table>
<thead>
<tr>
<th>Sex</th>
<th>No of Donors</th>
<th>O+</th>
<th>O-</th>
<th>A+</th>
<th>A-</th>
<th>B+</th>
<th>B-</th>
<th>AB+</th>
<th>AB-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>3519</td>
<td>1038</td>
<td>82</td>
<td>757</td>
<td>69</td>
<td>1090</td>
<td>104</td>
<td>354</td>
<td>25</td>
</tr>
<tr>
<td>Female</td>
<td>907</td>
<td>276</td>
<td>27</td>
<td>197</td>
<td>12</td>
<td>287</td>
<td>24</td>
<td>81</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>4426</td>
<td>1314</td>
<td>109</td>
<td>954</td>
<td>81</td>
<td>1377</td>
<td>128</td>
<td>435</td>
<td>28</td>
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</table>

### Table 2: Comparison of ABO blood group distribution among different areas of Pakistan

<table>
<thead>
<tr>
<th>Blood group</th>
<th>This study</th>
<th>Mandi Bahauddin</th>
<th>Peshawar</th>
<th>Swabi</th>
<th>Wah cantt</th>
<th>Gujrat</th>
<th>Hazara</th>
<th>Bannu</th>
<th>Bahawalpur</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>23</td>
<td>13.8</td>
<td>28</td>
<td>28</td>
<td>18</td>
<td>18</td>
<td>24</td>
<td>31</td>
<td>21</td>
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<tr>
<td>B</td>
<td>34</td>
<td>26.3</td>
<td>34</td>
<td>30</td>
<td>24</td>
<td>22</td>
<td>32</td>
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<td>36</td>
</tr>
<tr>
<td>AB</td>
<td>11</td>
<td>4.5</td>
<td>7</td>
<td>9</td>
<td>5</td>
<td>4</td>
<td>11</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>O</td>
<td>32</td>
<td>55.4</td>
<td>31</td>
<td>33</td>
<td>53</td>
<td>56</td>
<td>33</td>
<td>25</td>
<td>37</td>
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</tbody>
</table>

### Table 3: Comparison of ABO blood group distribution among different areas of world with our study

<table>
<thead>
<tr>
<th>Blood group</th>
<th>This study</th>
<th>Gaza</th>
<th>Saudi Arabia</th>
<th>Egypt</th>
<th>Syria</th>
<th>Lebanon</th>
<th>Germany</th>
<th>Turkey</th>
<th>Britain</th>
<th>Nigeria</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>23</td>
<td>39</td>
<td>24</td>
<td>34</td>
<td>46</td>
<td>47</td>
<td>26</td>
<td>12</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>B</td>
<td>34</td>
<td>21</td>
<td>17</td>
<td>21</td>
<td>13</td>
<td>12</td>
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<tr>
<td>AB</td>
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<td>1</td>
<td>3</td>
<td>3</td>
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<tr>
<td>O</td>
<td>32</td>
<td>33</td>
<td>52</td>
<td>36</td>
<td>37</td>
<td>36</td>
<td>64</td>
<td>75</td>
<td>47</td>
<td>49</td>
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</tbody>
</table>

### Table 4: Comparison of Rh blood group distribution among different areas of Pakistan

<table>
<thead>
<tr>
<th>Blood group</th>
<th>This study</th>
<th>Mandi Bahauddin</th>
<th>Bannu</th>
<th>Islamabad</th>
<th>Lahore</th>
<th>Gujrat</th>
<th>Peshawar</th>
<th>Wah cantt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rh+</td>
<td>92.8</td>
<td>91.4</td>
<td>67.2</td>
<td>72.9</td>
<td>71.7</td>
<td>79.5</td>
<td>76.8</td>
<td>73.9</td>
</tr>
<tr>
<td>Rh-</td>
<td>7.8</td>
<td>8.6</td>
<td>32.8</td>
<td>26.1</td>
<td>26.3</td>
<td>20.5</td>
<td>23.2</td>
<td>26.1</td>
</tr>
</tbody>
</table>

In the world we see variable distribution of blood groups in different geographical areas. Thus blood group O is more prevalent in Turkey, Hungary, Ukraine, Germany, and Nigeria, while in Arab countries like Lebanon and Jordan blood group A was more commonly seen (Table 3) 14-20.

In Pakistan the blood group O is most prevalent in Bahawalpur, Wah Cantt, Gujrat and Mandi Bahauddin22-24.

Rh positive population was 92% in our study. This distribution is though comparable with findings in Mandi Bahauddin, but it differs greatly with other studies (Table 4). The difference needs to be further explored. Our figures are, however, more close to international figures.

### References

2. Mollison PL. The genetic basis of Rh blood group system. Transfusion 1994;34:539-41
15. Mukhin VN. 1999. Gene frequencies and heterozygosity of the population of Donetsk Province, Ukraine by the alleles of the ABO and Rhesus systems.Tsitol Genet. 33; 10-30