CHAPTER- FOUR

Results
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RESULTS

4.1 Patients Data

The experimental study was conducted at NIMS Medical College and Hospital, SDM Hospital, Jaipur-Rajasthan-India.

Completed data was available in 263 multiple-transfused patients. The study population consisted of 127 males (48.3%) and 136 females (51.7%). There were no patients from other ethnic groups.

In this study, 103 were Anemia, 47 Thalassemia, 39 Chronic Renal failures, 22 previous blood transfusions, 22 Surgery, 8 Mothers negative blood group, 8 Leukemia, 6 Liver Diseases, 6 patients have bleeding and 2 Cancers.

Out of 263 patients, the age range was from 1 year to 87 years with the mean age of 36 year. Female: male ratio of (1.07:1). Mean age of patients developing alloantibodies was 39 years.
4.2 Prevalence of Alloantibodies among 263 Patients:
A total of 263 multiple blood transfusion patients, received at least two units of red blood cell transfusion were screened for the presence of red blood cell alloantibodies (immunized patients). Forty eight patients (18.3%) of the total number of patients (263) were found to have alloantibodies to RBCs (Figure: 1).

Figure 3 Prevalence of Alloantibodies:
4.3 Alloimmunization Ratio in Male and Female Patients
The study population consisted of 136 females (51.7%) and 127 males (48.3%). The Alloimmunization rate among female patients was 33/136 (24.3%) more than male patients 15/127 (11.8%). Female and Male immunized ratio is (2.1:1). (Figure: 2).

Figure 4 Female and Male Ratio:
4.4 Distribution of Specificity of Unexpected Alloantibodies among 48 Immunized Patients

A total of 48 immunized patients, 44 patients (91.7%) developed single alloantibodies while 3 (6.3%) patients developed dual alloantibodies and one (2%) patient developed triple alloantibodies in their sera. Out of 16 types deferent alloantibodies detected (M, E, D, C, c, e, N, Fy\textsuperscript{a}, Le\textsuperscript{a}, Le\textsuperscript{b}, K, Jk\textsuperscript{a}, Jk\textsuperscript{b}, P1, Fy\textsuperscript{b} and Anti-S illustrated in table 1), representative in 18 cases expounded in Figure 3. The most alloantibody frequent case combination was Anti-M (n=9, 18.7%) which is detected in 9 patients, Anti-E (n=6, 12.5%), Anti-D (n=6, 12.5%), Anti-C (n=5, 10.3%), Anti-c (n=3, 6.2%), Anti-e (n=2, 4.2%), Anti-N (n=3, 6.2%), Anti-Fy\textsuperscript{a} (n=2, 12.5%), Anti-Le\textsuperscript{a} (n=2, 4.2%), Anti-Le\textsuperscript{b} (n=2, 4.2%), Anti-K (n=1, 2.1%), Anti-Jk\textsuperscript{a} (n=1, 2.1%), Anti-Jk\textsuperscript{b} (n=1, 2.1%), Anti-P1 (n=1, 2.1%). Some cases were have dual alloantibodies Anti-E+ Fy\textsuperscript{b} (n=1, 2.1%), Anti- Fy\textsuperscript{b}+S (n=1, 2.1%) and Anti-D+C (n=1, 2.1%) while one patient was have triple alloantibodies Anti-C+E+K (n=1, 2.1%). Where all alloantibodies were IgG class except Anti-M was IgG & IgM.

![Unexpected Alloantibodies (18 cases)](image)

Figure 5 Frequency of Alloantibodies Cases:
4.5 Distribution of Specificity of Unexpected Alloantibodies Depend on Blood Group System

The most common alloantibodies produced were against Rh system (50.8 %) flowed by MNs system, Duffy system, Lewes system, Ked system, Kell system, P system illustrated in table 4.

Table 14 Rh and Other blood groups Distributions:

<table>
<thead>
<tr>
<th>Blood Group System</th>
<th>Alloantibodies</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rh system</td>
<td>E -15%, D- 13.2%, C-13.2%, c- 5.6%, c-3.8%</td>
<td>50.8</td>
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<tr>
<td>MNs system</td>
<td>M-18.9%, N-5.6%, S-1.9%</td>
<td>26.4</td>
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<tr>
<td>Duffy system</td>
<td>Fy*-3.8%, Fy*-3.8%</td>
<td>7.6</td>
</tr>
<tr>
<td>Lewes system</td>
<td>Le* -3.8%, Le*-3.8%</td>
<td>7.6</td>
</tr>
<tr>
<td>Ked system</td>
<td>Jk* -1.9%, Jk*-1.9%</td>
<td>3.8</td>
</tr>
<tr>
<td>Kell system</td>
<td>K-1.9%</td>
<td>1.9</td>
</tr>
<tr>
<td>P system</td>
<td>P1- 1.9%</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>Total 100</td>
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</table>

Figure 6 Rh and Other Blood Groups Distributions
4.6 Alloimmunization Rate in Different Age Groups:
Alloimmunization rate in different groups according to age subtypes. According to age of distribution patients were divided into 8 age groups. In between 1 and 10 years of age total patients were 35 and among them 6 (17.1%) cases of alloimmunization were detected. In 11–20 years of age total 23 patients but no patient has alloantibody. In 21–30 years of age total patients were 68 and among them 13 (19.1) had alloantibodies. In 31–40 years of age among 39 patients 9 (23%) had alloimmunization. In 41–50 years of age among 32 patients 4 (12.5%) had alloimmunization. In 51–60 years of age among 36 patients 10 (27.7%) had alloimmunization. In 61–70 years of age among 20 patients 3 (14.3%) had alloimmunization. In 71–80 years of age among 8 patients 3 (37.5%) had alloimmunization. In 81–90 years of age among 2 patients but no patient has alloantibody.

![Figure 7 Alloimmunization Depending to Patients’ Age](image)

4.7 Alloimmunized Patients According to Blood Groups:
According to blood group of the (n=237, 90.1%) patients among Rh (D) positive patients (Immunized 39 case-16.5%), 58 of them were A (Immunized 8 case-13.8%),
90 of them were B (Immunized 12 case-13.3%), 65 of them were O (Immunized 13 case-20%), and 24 of them were AB (Immunized 6 case-25%).

On the other side among (n=26, 9.8%) Rh (D) negative patients (Immunized 9 case-34.6%), 10 of them were A (Immunized 3 case-30%), 6 of them were B (Immunized 1 case-16.6%), 6 of them were O (Immunized 3 case-50%), and 4 of them were AB (Immunized 2 case-50%).

Figure 8 Alloimmunization Depending to Blood Groups:
Table 15 Demographic Details, ABO and Rh Distribution:

<table>
<thead>
<tr>
<th>ABO groups</th>
<th>Total attended/%</th>
<th>Immunized / %</th>
<th>Rh</th>
<th>Total Attended</th>
<th>Immunized</th>
<th>Immunized % of 48</th>
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</thead>
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<tr>
<td>A Group</td>
<td>68/25.8</td>
<td>11 / 22.9</td>
<td>A+</td>
<td>58</td>
<td>8 (13.8%)</td>
<td>16.6</td>
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<td>A-</td>
<td>10</td>
<td>3 (30%)</td>
<td>6.3</td>
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<tr>
<td>B Group</td>
<td>96/36.5</td>
<td>13 / 27.1</td>
<td>B+</td>
<td>90</td>
<td>12 (13.3%)</td>
<td>25</td>
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<td></td>
<td></td>
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<td>B-</td>
<td>6</td>
<td>1 (16.6%)</td>
<td>2.1</td>
</tr>
<tr>
<td>O Group</td>
<td>71/27</td>
<td>16 / 33.4</td>
<td>O+</td>
<td>65</td>
<td>13(20%)</td>
<td>27</td>
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<td></td>
<td>O-</td>
<td>6</td>
<td>3(50%)</td>
<td>6.3</td>
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<tr>
<td>AB Group</td>
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<td>8 / 16.6</td>
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<td>6 (25%)</td>
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<td>AB-</td>
<td>4</td>
<td>2 (50%)</td>
<td>4.2</td>
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<tr>
<td>Total</td>
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<td>48/100</td>
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<td>263</td>
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### 4.8 Details of Immunized Patients

Table 16 Details of Immunized Patients:

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<th>Age</th>
<th>ABO &amp; Rh</th>
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<th>Auto Control</th>
<th>DCT</th>
<th>ICT</th>
<th>Abs Screening/ 11 cell</th>
<th>Abs Identification</th>
<th>DC Screening-monoantibody</th>
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<td>P</td>
<td>P</td>
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<td>AntiFyby +Anti-S</td>
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<td>P</td>
<td>p</td>
<td>Anti-Leb</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>M</td>
<td>50</td>
<td>A Positive</td>
<td>Surgery</td>
<td>N</td>
<td>P</td>
<td>P</td>
<td>p</td>
<td>Anti-E</td>
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</tr>
<tr>
<td>46</td>
<td>F</td>
<td>30</td>
<td>O Positive</td>
<td>Leukemia</td>
<td>N</td>
<td>N</td>
<td>P</td>
<td>p</td>
<td>Anti-M</td>
<td>IgM</td>
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<tr>
<td>47</td>
<td>M</td>
<td>52</td>
<td>O Positive</td>
<td>Bleeding</td>
<td>N</td>
<td>P</td>
<td>P</td>
<td>p</td>
<td>Anti-C</td>
<td>IgG</td>
</tr>
<tr>
<td>48</td>
<td>M</td>
<td>75</td>
<td>O Positive</td>
<td>Bleeding</td>
<td>N</td>
<td>N</td>
<td>P</td>
<td>p</td>
<td>Anti-Lea</td>
<td></td>
</tr>
</tbody>
</table>
4.9 Alloimmunized Patients According To Clinical Diagnosis:

In this study, 103 were Anemia, 47 Thalassemia, 39 chronic renal failures, 22 previous blood transfusions, 22 Surgery case, 8 Mothers negative blood group, 8 Leukemia, 6 Liver Diseases, 6 Bleeding case and 2 Cancer cases.

Table 17 Alloimmunized Patients According To Case Type:

<table>
<thead>
<tr>
<th>Patients</th>
<th>Total</th>
<th>Immunized</th>
<th>Immunized Percent /48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anemia</td>
<td>103</td>
<td>18 (17.5%)</td>
<td>37.5</td>
</tr>
<tr>
<td>Thalassemia</td>
<td>47</td>
<td>7 (14.8)</td>
<td>14.5</td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td>39</td>
<td>6 (15.4)</td>
<td>12.5</td>
</tr>
<tr>
<td>Previous blood transfusions</td>
<td>22</td>
<td>5 (22.7)</td>
<td>10.4</td>
</tr>
<tr>
<td>Surgery case</td>
<td>22</td>
<td>5 (22.7)</td>
<td>10.4</td>
</tr>
<tr>
<td>Mothers negative blood group</td>
<td>8</td>
<td>2 (25)</td>
<td>4.2</td>
</tr>
<tr>
<td>Leukemia</td>
<td>8</td>
<td>1 (12.5)</td>
<td>2.1</td>
</tr>
<tr>
<td>Liver Diseases</td>
<td>6</td>
<td>2 (33.3)</td>
<td>4.2</td>
</tr>
<tr>
<td>Bleeding case</td>
<td>6</td>
<td>2 (33.3)</td>
<td>4.2</td>
</tr>
<tr>
<td>Cancer case</td>
<td>2</td>
<td>0</td>
<td>00</td>
</tr>
<tr>
<td>Total</td>
<td>263</td>
<td>48</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 9 Alloimmunized Patients According To Case Type: