Prevalence of HIV; Hepatitis- B; Hepatitis- C and Syphilis in blood donors at tertiary care centre
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Abstract:
Transfusion of blood and blood products is life saving intervention; at the same time it could be a mode of infection transmission to the recipients. One of the greatest challenges of transfusion medicine is to Screen, Monitor and control TTI. Donor selection and screening of donor’s blood for infective agents was undertaken during the period of Jan2011 to June 2013 a total number of 10,776 units of blood were collected from voluntary and replacement donors. There were10,496 Males and 280 females with a ratio of 37:1 in the age group of 18-60 years. Majority of donors were replacement donors with male preponderance in the age group of 21 to 40 years showing high prevalence rate of Transfusion Transmitted Infections (TTI). A total of 194 units (1.8%) of blood had serological evidence of infection, with Hepatitis-B (HBV) - 134(1.24%), Human Immunodeficiency Virus (HIV)-46 (0.42%), Hepatitis–C (HCV) -11 (0.10%), Syphilis-3 (0.02%). In our study Hepatitis-B was the most prevalent amongst TTI.

Key words: Blood donors; HIV; HBV; HCV; Syphilis; Screening; Transfusion transmitted infections (TTI).

Introduction
Use of unscreened blood transfusion keep the patient at risk of acquiring many Transfusion transmitted infections (TTI) like Hepatitis viruses (HBV, HCV), Human Immune deficiency viruses (HIV), Syphilis, Malaria, Filaria and other Bacterial infections; which are life threatening, demanding for meticulous Pretransfusion Testing and Screening. As per WHO guidelines, it is mandatory to screen all blood donations
for HIV; Hepatitis-B, Hepatitis- C & Syphilis. These strategies are extremely effective.

But Transmission of diseases still occurs because of inability to detect disease in Window phase, immunologically variant viruses, Lab Testing Errors, Non seroconverting silent carriers [1]. As large volumes of blood or blood components are given to patients during transfusion therapy, even a blood unit with a low viral load may cause infection in the recipient.

**Aim**

To study the Prevalence of HIV; HBV; HCV and Syphilis among the blood donors at Blood Bank Osmania General Hospital, Hyderabad.

**Materials and Methods**

The present study was carried out in Blood Bank, Osmania General Hospital, Hyderabad. A total of 10,776 donors were analyzed for over a period of two and half years from January 2011 to June 2013 with age groups ranging from 18 to 60 years (figure-1).

These included Replacement donors who donated blood for ailing patients and were family members, close relatives or friends of the recipient. Voluntary donors primarily were obtained from walk in donors, students, employees and outdoor blood donation camps. With the implementation of strict donor criteria [6] and Donor consent, blood is collected in CPDA-1 bags and screening was done by SD HIV 1/2 ELISA 3.0; 3rd Generation Anti- HIV1/2 ELISA Test for HIV, SD HCV ELISA 3.0; 3rd Generation Anti-HCV ELISA Test for HCV; Micro screen HbsAg ELISA Test kit for detection of Hepatitis-B surface antigen for HBV; RPR(Rapid Permeable Reagin) Test for Syphilis. Serological assay was done as per manufacturer’s instructions.

All the reactive samples were repeated in duplicate before labelling them seropositive. The donated blood was discarded whenever the pilot donor sample was found positive for any TTI. Donor notification, Counselling and Referral for treatment for all Seropositive Donors was done.

**Results**

Total of 10776 apparently healthy donors were screened during 2011 to 2013 (June). Among them total number of Males were 10496 (97.41%) and Females were 280(2.59%). Among them total number of replacement Donors (RD) were 9775 (90.72%) and Voluntary Donors (VD) were 1001(9.28%) with statistical significance of P-value<0.000 and Chi-square test value of 23.16. (Table-1). Maximum number of blood donors both males and females were in the age group of 21 to 30 years. (Figure-1).

**Table-1: Blood collection distribution of donors**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Donors</th>
<th>VD</th>
<th>RD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>4947</td>
<td>300</td>
<td>4647</td>
</tr>
<tr>
<td>2012</td>
<td>3856</td>
<td>401</td>
<td>3455</td>
</tr>
<tr>
<td>2013</td>
<td>1973</td>
<td>300</td>
<td>1673</td>
</tr>
<tr>
<td>Total</td>
<td>10776</td>
<td>1001(9.28%)</td>
<td>9775(90.72%)</td>
</tr>
</tbody>
</table>

**Figure 1: Age distribution of donors**

Total number of Positive cases for TTI are 194(1.8%) out of 10776, with serological evidence of infection. Overall prevalence of HIV-46(0.42%), HBV-134(1.24%), HCV-11(0.10%), SYPHILIS-03 (0.02%),
Dual infection of HIV and HBV - 3 cases (0.02%) (figure-2).

Figure 2: Seroprevalence of TTI

Seroprevalence of TTI in the year 2011 with total number of donors 4947 is 85 donors with maximum positivity for Hepatitis–B of 67 cases, HIV of 12 cases, HCV of 05 cases and least is Syphilis with positivity of 1 case. Total number of donors in 2012 and 2013 (June) were 3856 and 1973 donors respectively of which seropositivity of 73 and 34 cases respectively was recorded with same trend of maximum positivity for Hepatitis-B followed by HIV, HCV and least for Syphilis (Table-2). Graphical representation of trend of TTI from 2011 to 2013 (June) is shown in figure-3.

Figure 3: Trend of TTI from 2011-2013 (June)

In our study seropositivity of TTI is more in Replacement donors (RD) than Voluntary donors (VD) (Table-2).

Discussion

With every unit of blood, there is 1% chance of transfusion associated problems like TTI. The risk of TTI has declined dramatically in high income nations over the past two decades, primarily because of extraordinary success in preventing HIV and other established transfusion transmitted viruses entering the blood supply. Voluntary donors (VD) are motivated blood donors who donates blood at regular intervals and Replacement donors (RD) are usually one time blood donor who donates blood only when a relative is in need of blood.

In our study there is predominance of RD of 90.72% than VD which is comparable to Arora et al study of Haryana [2], and Singh et al study [3] with RD of 68.6% and 84.43% respectively. The majority of Donors in our study were Males of 97.41% which is comparable to Arora et al study of Haryana [2] and Pallavi et al study [4], with Male predominance of 96.2% and 97.84% respectively.
Table 2: TTI among voluntary and replacement donors

<table>
<thead>
<tr>
<th>YEAR</th>
<th>HIV</th>
<th></th>
<th>Hbs Ag</th>
<th></th>
<th>HCV</th>
<th></th>
<th>SYPHILIS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VD</td>
<td>RD</td>
<td>VD</td>
<td>RD</td>
<td>VD</td>
<td>RD</td>
<td>VD</td>
</tr>
<tr>
<td>2011</td>
<td>05</td>
<td>07</td>
<td>25</td>
<td>42</td>
<td>02</td>
<td>03</td>
<td>01</td>
</tr>
<tr>
<td>2012</td>
<td>03</td>
<td>21</td>
<td>09</td>
<td>35</td>
<td>00</td>
<td>05</td>
<td>00</td>
</tr>
<tr>
<td>2013 (Till June)</td>
<td>04</td>
<td>06</td>
<td>03</td>
<td>20</td>
<td>01</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>TOTAL</td>
<td>12</td>
<td>46</td>
<td>37</td>
<td>97</td>
<td>03</td>
<td>08</td>
<td>01</td>
</tr>
</tbody>
</table>

Table 3: Comparison of TTI prevalence rate in different parts of India

<table>
<thead>
<tr>
<th>PLACE</th>
<th>HIV %</th>
<th>Hbs Ag %</th>
<th>HCV %</th>
<th>SYPHILIS %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ludhiana</td>
<td>0.084</td>
<td>0.66</td>
<td>1.09</td>
<td>0.85</td>
</tr>
<tr>
<td>Delhi</td>
<td>0.56</td>
<td>2.23</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>Lucknow</td>
<td>0.23</td>
<td>1.96</td>
<td>0.85</td>
<td>0.01</td>
</tr>
<tr>
<td>Southern Haryana</td>
<td>0.3</td>
<td>1.7</td>
<td>1.0</td>
<td>0.9</td>
</tr>
<tr>
<td>West Bengal</td>
<td>0.28</td>
<td>1.46</td>
<td>0.31</td>
<td>0.72</td>
</tr>
<tr>
<td>Bangalore</td>
<td>0.44</td>
<td>1.86</td>
<td>1.02</td>
<td>1.6</td>
</tr>
<tr>
<td>Present study HYDERABAD</td>
<td>0.42</td>
<td>1.24</td>
<td>0.10</td>
<td>0.02</td>
</tr>
</tbody>
</table>
India has been placed in the intermediate zone of Prevalence of Hepatitis-B by the World Health Organization [4]. With our study showed prevalence of Hepatitis-B is high in Delhi of 2.23% but in present study it is 1.24%. Prevalence of HBV infection is lower in the United States and Western Europe (0.1-0.5%) and is reported to be higher, 5-15% in South East Asia and China [4]. Prevalence of HIV in Delhi of 0.56%, prevalence of HIV in our study of 0.42% stands next along with prevalence of HIV in Bangalore with 0.44%. Prevalence of Hepatitis-C in our blood donors is least of 0.10% whereas it is high in Ludhiana of 1.09%. Prevalence of Syphilis is high in Bangalore of 1.6% and in our study it is least of 0.02%.

Comparison of TTI prevalence rate in different parts of India with the present study is shown in Table-3.

The risk of TTI has declined in developed countries with the use of 3rd generation ELISA kits and advent of NAT (Nucleic acid Amplification Testing) [4]. It is used to detect very low levels of DNA or RNA that may be present in donated blood.

To screen RNA in HIV and HCV, DNA in HBV. By which it reduces Window period by direct detection of viral nucleic acid sequences and it reduces the time for effective detection from 22days of serological identification to 11days by NAT Testing for HIV. 70<10 days for HCV, 56 days to <13days for HBV [5].

By the practice of donor self-exclusion helps in the deferral of high risk donors. Due to low socioeconomic status and lack of awareness of risk factors, the implementation of donor self-exclusion is difficult in India.

Replacement donors constitute the largest group of Blood donors in India [4], which reflects the lack of awareness among the general population. The strict selection of donor, screening with standard methods and promoting more of voluntary Blood donation would reduce the prevalence of Transfusion Transmitted Infections (TTI).

Conclusion:

Our study showed predominance of RD with Male preponderance. There is increased prevalence of Hepatitis-B followed by HIV, HCV and Syphilis and promotion of voluntary blood donation can be done through Educational and Motivational Programmes and involvement of Government bodies like NACO & APSACS. Women can also be encouraged for Voluntary Blood Donation.

Voluntary blood donation has to be made as a part of healthy lifestyle, enlightening the public about the benefits of voluntary blood donations. Voluntary donations are safer as compared to replacement donors and should be encouraged. Based on the results of our study TTI can be reduced by strict selection of donors and NAT Donor screening can be implemented in blood centers all over India.

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5. Transfusion-transmitted infectionsFlorian Bihl*1, Damiano Castelli2, Francesco Marincola3, Roger Y Dodd4 and Christian Brander1. Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA.