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# Seroprevalence of Transfusion transmitted infections in healthy blood donors attending a tertiary care hospital in Southern Rajasthan

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Introduction Ensuring blood safety is crucial in transfusion medicine, as transfusion-transmitted infections (TTIs) pose significant risks and represent a major public health concern.[1] An individual can transmit an infection during the asymptomatic phase, making transfusions a potential source of increased infection within the population. Unsafe blood transfusions carry significant consequences for both the recipient and society as a whole. Therefore, screening for transfusion-transmitted infections (TTIs) is vital to ensure the safety of blood transfusions and safeguard human lives.[2] Blood transfusion is a life-saving procedure, but it may lead to both immediate and delayed complications. Blood donors play a crucial role as the foundation of a safe supply of blood and its components.[3] Blood transfusion complications can range from mild to life-threatening, making thorough pre-transfusion testing and screening for transfusion-transmissible infections essential.[4] Transfusion-transmissible infections pose a significant threat to blood safety, requiring blood transfusion services to ensure a safe, sufficient, accessible, and efficient blood supply at all levels. These infections often lead to prolonged viremia, as well as carrier or latent states, and are associated with severe, chronic, and life-threatening conditions. Key TTIs include human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and syphilis. Notably, 12.5% of patients who undergo blood transfusions are at risk of developing post-transfusion hepatitis.[5] To minimize the risk of transfusion-transmissible infections (TTIs), it is crucial to carefully select donors, ensuring that blood is sourced only from individuals unlikely to carry infectious agents. Evaluating TTIs is essential for assessing the safety of the blood supply and monitoring the effectiveness of existing screening procedures.[6] Study aims to determining the seroprevalence of TTI among healthy blood donors in a tertiary care hospital

## Methodology

A cross-sectional was conducted at our institution where data were analyzed over a period of 1 year from January 2022 to December 2022. Blood was collected from apparently healthy individuals after detail history and examination, aged 18–60 years with weight >45 kg with hemoglobin concentration >12.5 gm%. All blood donors' samples were screened for HIV, hepatitis B surface antigen (HBsAg), HCV, and syphilis. Blood bank donor cards were used as a source of information. HIV, HBsAg, HCV tests were done by enzyme-linked immunosorbent assay (ELISA) procedure using the third generation kits. Syphilis was diagnosed by performing the venereal disease research laboratory (VDRL) test. Malaria testing was done by slide method using Leishman's staining. Blood donors were selected if they fulfilled all the criteria to be eligible for donation as described by the standard operating procedure of our blood bank.

**Blood sampling**

Venous blood was collected in plain vacutainer tubes which was allowed to clot naturally at room temperature. The clotted blood sample in plain vacutainer tubes was then spun in a centrifuge machine at 2500 rpm for 5 min to separate the serum which was further used for serological analysis. Hemoglobin determination was done by the traditional CuSO4 method. Tests on donor blood were carried out according to manufacturer's instructions with positive and negative controls. Before drawing the blood, each donor was requested to fill blood donor's card. Blood samples were tested, and reactive sera were confirmed by repeat testing using another kit manufactured by the different company. Confidentiality of reports was maintained as per standard guidelines.

**Human immunodeficiency virus serology**

Microlisa HIV (J. Mitra and Co., Pvt., Ltd.,) kits were used for detection of antibodies to HIV-1 (including subgroups O and C) and HIV-2. The Microlisa test is an enzyme immunoassay based on indirect ELISA.

**Hepatitis B surface antigen serology**

Microscreen HBsAg ELISA test kits (Span Diagnostic Ltd.,) were used for detection of HBsAg. The test is based on solid phase microplate direct ELISA (Sandwich ELISA) technique.

**Hepatitis c virus serology**

SD HCV ELISA 3.0 (SD Bio-standard diagnostic Pvt., Ltd.,) kits were used which is indirect sandwich ELISA for the qualitative detection of antibodies against HCV. It contains a microplate, which is precoated with recombinant HCV antigens (Core, NS3, NS4, and NS5) on the well. The amount of conjugate bound and hence color, in the wells, is directly related to the concentration of antibody in the sample.

**Syphilis serology**

Syphilis was diagnosed using Accucare™ rapid plasma reagin (RPR) syphilis screening test (Lab-care Diagnostic Pvt., Ltd.,). The RPR syphilis screening test is macroscopic nontreponemal flocculation card test for detection and to quantify reagin, an antibody-like substrate present in serum or plasma and spinal fluid from syphilitic persons.

**Quality control**

Internal and external quality controls were carried out.

**Statistical analysis**

After data collection, data entry was done in Excel. Data analysis was done with the help of SPSS 27. Qualitative data were analyzed with the help of frequency and percentage table. The association among various study parameters was assessed with the help of Chi-square test. P < 0.05 consider as statistically significant.

## Result

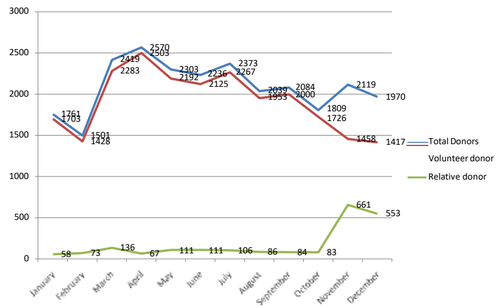


Figure 1: Total blood collection month-wise

The study included a total of 25,184 healthy donors, out of which 23,055 (91.79%) were voluntary donors and the remaining were family donors. Sudden surge in the number of family donors in the month of November and December might be due to increased dengue cases after rainy season escalated RDP demand.

Out of 25,184 donors, 65 donors (0.26%) were HIV-positive, 219 donors (0.87%) were HbsAg positive, and 39 donors (0.15%) were HCV positive while VDRL reactivity was seen in 18 donors (0.07%). The overall prevalence of HIV, HBsAg, HIV, and syphilis was 0.26%, 0.87%, 0.15%, and 0.07% respectively which was found to be statistically significant (P < 0.001). No blood donor tested showed positivity for malaria parasite. The number of blood donors was highest in the month of April and lowest in month of February.

Table 1: Incidence of syphilis, HBsAg, HIV, HCV & Malaria in blood donors

| Month | Reactive donors | VDRL | HIV | HBsAg | HCV |
|---|---|---|---|---|---|
| January | 14 | 0 | 1 | 11 | 2 |
| February | 36 | 4 | 8 | 24 | 0 |
| March | 27 | 0 | 12 | 13 | 2 |
| April | 22 | 0 | 3 | 17 | 2 |
| May | 32 | 3 | 8 | 20 | 1 |
| June | 29 | 0 | 5 | 19 | 5 |
| July | 30 | 1 | 6 | 19 | 4 |
| August | 31 | 0 | 7 | 15 | 9 |
| September | 28 | 4 | 2 | 18 | 4 |
| October | 31 | 2 | 4 | 20 | 5 |
| November | 34 | 2 | 6 | 24 | 2 |
| December | 27 | 2 | 3 | 19 | 3 |
| **TOTAL** | **341** | **18(0.07%)** | **65(0.26%)** | **219(0.87%)** | **39(0.15%)** |

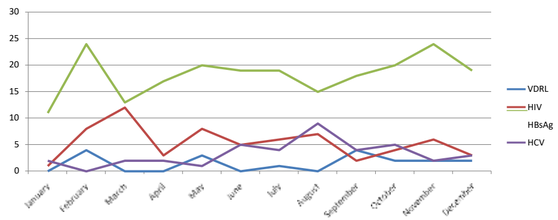


Figure 2: Seasonal trend in the sero-prevalence of HIV, HBsAg, HCV & Syphilis

Sero-conversion of VDRL was high in February and September month, HIV was highest in March, HBsAg in February and November, HCV in August month.

Table 2: Comparison of transfusion transmitted infections prevalence rate with other studies

| Studies | HIV % | HBsAg % | HCV % | VDRL |
|---|---|---|---|---|
| Srikrishna et al. (1999), Bangalore, India | 0.44 | 1.86 | 1.02 | 1.6 |
| Matee et al. (2006), Tanzania | 3.8 | 8.8 | 1.5 | 4.7 |
| Pahuja et al. (2007), Delhi, India | 0.56 | 2.23 | 0.66 | - |
| Bhattacharya et al. (2007), West Bengal, India | 0.28 | 1.46 | 0.31 | 0.72 |
| Fiekumo et al. (2009), Nigeria | 3.1 | 18.6 | 6 | 1.1 |
| Adhikari et al. (2010), Sikkim, India | 0.32 | 0.78 | 0.27 | 0.27 |
| Arora et al. (2010), Southern Haryana, India | 0.3 | 1.2 | 1 | 0.9 |
| Pallavi et al. (2011), Mysore, India | 0.44 | 1.27 | 0.23 | 0.28 |
| Chandekar SA et al (2012), Mumbai, India | 0.26 | 1.3 | 0.25 | 0.28 |
| Anjali et al. (2012), Kerala, India | 0.6 | 1.5 | 0.4 | 0.1 |
| Present Study, Udaipur, Rajasthan, India | 0.26 | 0.87 | 0.15 | 0.07 |

## Discussion

## Conclusion & Recommendation

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