

## Seroprevalence of Transfusion Transmitted Infection (TTI) among Healthy Blood Donor and Their Distribution within Blood Groups - A Study from Kolkata

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### Abstract

**Introduction:** *Blood transfusion is an integral and life saving procedure of modern medicine, but simultaneously it carries the risk of transmitting the life- threatening transfusion-transmissible infectious agents such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis and malaria. Thus ensuring the safety of blood is a major concern in transfusion therapy although the improved screening and testing of blood donors has significantly reduced transfusion-transmitted diseases The aim of the study was to find out the prevalence of transfusion transmitted infections (TTI) in voluntary donors.*

**Materials & Methods:** *A total of 14646 voluntary donors were analysed for the prevalence of TTI over a period of 1 year. HBV, HCV and HIV were tested by ELISA methods malaria also screened with rapid card test with pinciple of immunochromatography. syphilis was screened with the principle of rapid plasma reagin test*

**Results:** *Prevalence of TTI in total donors was 3.56 % as whole, whereas in Rh negative donors it is only 1 %. Prevalence of Hepatitis B was highest (1.38) followed by Hepatitis-C (1.31), HIV (0.4), VDRL (0.32) and malaria (0.12). Distribution pattern of TTI follows identically with the blood group distribution in Rh positive population but does not follow in Rh negative blood group population.*

**Conclusion:** *TTI remains a important problem in blood transfusion. Proper protocol should be applied in selecting and screening donors to safeguard the health of people receiving blood transfusions.*

**Keywords:** *Transfusion transmitted infections Blood donors, Human immunodeficiency virus, Hepatitis-B, Hpatitis-C, VDRL*

## Introduction

Blood transfusion is an integral and life saving procedure of modern medicine, but simultaneously Transfusion transmitted infection (TTI) is also a major concern for any blood or blood related products. Though blood transfusion became much safer today than it was before. But we still far behind from zero risk. With every unit of blood there is a 1% chance of transfusion associated problems including transfusion transmitted diseases <sup>[1]</sup>. An increase in Transfusion related infection has been reported in India <sup>[2]</sup>. India is already carrying a burden of 50 million of HBV (Hepatitis-B virus) carriers <sup>[3]</sup> and 2.27 million of HIV (human immunodeficiency virus) cases <sup>[4]</sup>. Keeping in mind the grave consequences of these infections and to cut down the transmission to minimum, it is very important to remain vigilant about the possible spread of these diseases through blood transfusion. In India drug control authorities have made mandatory for screening five transfusion transmitted infections. We hereby discuss comparative seroprevalances of different transfusion transmitted infection in this study.

## Materials and methods

The retrospective study was carried out in Medical College a tertiary medical centre, Kolkata. We have conducted the study from the sample of healthy volunteers blood donor, aged between 18 to 60 years, collected consecutively for one year from both urban and rural area. They were declared healthy after doing clinical examination and history taken to exclude high risk behavior.

Total population of this study is 14646. All the donors having a history of jaundice, drug abuse, promiscuous sexual behavior and history of major and minor surgeries were excluded from the study. Samples of blood donor was screened with third generation ELISA kit. For hepatitis B screening was made with third generation ELISA kit (ErbaLisa hepatitis B kit), reported sensitivity 100% and specificity 100%. Hepatitis C was screened with third generation ELISA kit (ErbaLisa hepatitis C kit), reported sensitivity 100% and specificity 100%. HIV was screened with third generation of anti-HIV 1/ ELISA (SD HIV ½ ELISA 3.0) with sensitivity  $\geq 99.8\%$  and specificity  $\geq 98\%$ . malaria also screened with rapid card test (Malarigen) with principle of immunochromatography with reported sensitivity 100% and specificity 99.5%. syphilis was screened with VDRL test with the principle of rapid plasma reagin test (CARBOGEN). Data are collected analysed statistically by SPSS version 20.

## Results

In our study seroprevalance of TTI is 3.56%. Out of total 14646 blood donors 522 were seropositive. Prevalence of seropositivity for HIV, VDRL and MP was 0.4%, 0.32% and 0.12% respectively. Seropositivity of HBsAg is 1.38 which is comparable with anti HCV. Prevalance of Hepatitis-C virus (HCV) infection in this study is 1.31. Rh positive blood group distribution is more or less parallel with TTI among Rh positive blood group. In this study A+ blood group (2519\14646), 17.2% B+ blood group (4511\14646) ,30.8%), AB+ve blood

group(1215\14646) 8.3%,O+ ve blood group(5332\14646) 36.4% and Rh negative blood group is (1069\14646), 7.3%. The study did not find any relation with Rh negative blood group

distribution, only 2.1 %(11/522) infection from the total infection occurred in Rh negative blood group which is remarkably low.

Distribution of seropositivity of TTI among different blood groups

|        | HIV | Hepatitis -B | Hepatitis-C | VDRL | MP |
|--------|-----|--------------|-------------|------|----|
| A+ve   | 05  | 44           | 33          | 08   | 04 |
| B+ve   | 12  | 68           | 71          | 14   | 09 |
| AB+ve  | 06  | 19           | 17          | 02   | 01 |
| O+ve   | 36  | 71           | 65          | 22   | 04 |
| A -ve  | 00  | 00           | 04          | 00   | 00 |
| B -ve  | 00  | 00           | 02          | 00   | 00 |
| AB -ve | 00  | 00           | 00          | 00   | 00 |
| O -ve  | 01  | 01           | 01          | 01   | 01 |
| TOTAL  | 60  | 203          | 193         | 47   | 19 |

Distribution of blood groups among different seropositive blood donors

|             | A+ve     | B+ve      | AB+ve     | O+ve        | A-ve      | B-ve      | O-ve      |
|-------------|----------|-----------|-----------|-------------|-----------|-----------|-----------|
| HIV         | 05(5.3%) | 12(6.9%)  | 06(13.3%) | 36(18.1%)   | 00        | 00        | 01(20%)   |
| Hepatitis-B | 44(46%)  | 68(39%)   | 19(42.2%) | 71(35.8%)   | 00        | 00        | 01(20%)   |
| Hepatitis-C | 33(35%)  | 71(40.8%) | 17(37.7%) | 65(32.8%)   | 04(100%)  | 02(100%)  | 01(20%)   |
| VDRL        | 08(8.5%) | 14(8%)    | 02(4.4%)  | 22(11.1%)   | 00        | 00        | 01(20%)   |
| MP          | 04(4.2%) | 09(5.1%)  | 01(2.2%)  | 04(2%)      | 00        | 00        | 01(20%)   |
| Total       | 94(18%)  | 174((33%) | 45(8.62%) | 198(37.93%) | 04(0.76%) | 02(0.38%) | 05(0.95%) |

Distribution pattern of different seropositive blood donors among Rh negative blood groups

| HIV    | Hepatitis-B | Hepatitis-C | VDRL   | MP     | Total    |
|--------|-------------|-------------|--------|--------|----------|
| 01(9%) | 01(9%)      | 07(64%)     | 01(9%) | 01(9%) | 11(2.1%) |

## Discussion

Acquisition of transfusion transmissible infectious in the in the process of therapeutic blood transfusion is a major global health challenge in transfusion medicine; therefore no effort should be spared at reducing this complication to the barest minimum. It is particularly important because of the long term morbidity and mortality associated with infections caused by hepatitis B and C viruses, and HIV. It is therefore important to continue to monitor the trend in the prevalence of transfusion transmitted infections (TTIs).

For any seroprevalence study, sample from the general population is ideal. However, prevalence amongst healthy blood donors is often used as representative of the general population. Seroprevalence of syphilis varies world-wide. The present study was done to assess the prevalences of seropositivity of TTI among healthy blood donors and to observe any association between different blood group and TTI. Testing the blood serum for various antibodies and more conservative guidelines for blood transfusion have been effective and have successfully brought down the transmission rate. Inability of the serological tests to detect the diseases in their window period and virus immunological variants is a major drawback in making the preventive approaches more effective. Earlier studies have shown that even HBsAg negative bloods may be anti-HBc/ HBV DNA positive and may retain the capacity to transmit infection<sup>[5]</sup>. Presence of occult HBV infection has also been reported from various parts of India<sup>[6,7,8,9]</sup>. As a result TTI still

remains a concern for both the patient and the physician.

Out of total 14646 blood donors 522 were seropositive. prevalence of seropositivity of TTI is 3.56%. but study did not find any relation with Rh positive blood group, only one thing we have found only 2.1%(11/522) infection from the total infection occurred in Rh negative blood group. Incidence of the normal population of Rh negative blood group is 5-6%.that does mean TTI is not evenly distributed in Rh positive and Rh negative blood group. TTI occurrence in Rh negative blood group is significantly low (p value<0.05) in comparison to Rh positive blood group. The study shown only 1 % seropositivity among Rh negative blood donor which is significantly low in comparison to prevailing seropositivity (3.56%) in this study. this study definitely indicate disproportionate relation with TTI and Rh negative blood group. 63% of infection by transfusion of Rh negative blood group are anti HCV positive.

The prevalence of HIV seropositivity 0.4. The frequency of HIV is less compared to HBsAg. Sero-positivity for HIV is very low as compared to the study done by Ramanamma et al<sup>[10]</sup> in Vishakapatnam, Shashikala et al<sup>[11]</sup> in North Karnataka and Kulkarni et al.,[12] in Mumbai. Moreover, it should never be forgotten that blood donations collected in the latent period of infection may be infectious despite a negative antibody test<sup>[13]</sup> Adding nucleic acid testing (NAT) to routine blood screening protocol helps in detecting very low levels of viral RNA or DNA that may be present in the donated blood.

Seropositivity of (Hepatitis-B) HBsAg is 1.38 which is comparable with anti HCV. Prevalence of anti HCV in this study is 1.31. In spite of without any history of high risk behavior prevalence of VDRL is 0.32. Prevalence of positive malaria antigen is 0.12.

Seroprevalence of HBsAg in this study was 1.38% and in various other studies was 3.2%<sup>[13]</sup>, 2.9%<sup>[14]</sup> 1.7%<sup>[15]</sup> and 5%.<sup>[16]</sup> Seroprevalence of HBsAg in Bombay was 6% and 5% in Pakistan<sup>[16, 18]</sup> The frequency of HBsAg is more than other infectious diseases because of asymptomatic carriers.

This study highlights 0.4% prevalence of HIV infection. Seropositivity of HIV in other studies was observed to be 0.91%<sup>[13]</sup>, 0.5%<sup>[14]</sup> 0.3%<sup>[15]</sup> and 0%

The prevalence of seropositivity for HCV and VDRL was 1.31% and 0.32% respectively. Other study also showed 0.5% and 0.23% prevalence respectively.<sup>[17]</sup>

Previous studies have reported that prevalence of an infection among the donors reflects the disease burden in the society<sup>[19]</sup>. The prevalence rate obtained from this study found to be a bit higher from various previous reports<sup>[15, 20]</sup>. This may be due to variation in the population or may reflect an increased burden of infection in the community. Increased prevalence of HBV among the donors underscores the concern about growing infection of this disease in the community. In India transfusion associated HBV is estimated to be approximately 50% or more in multiple transfused patients and approximately 1.5% in post surgical recipients<sup>[21]</sup>. Thus the absence of HBsAg in the blood of apparently healthy

individuals may not be sufficient to ensure lack of circulating HBV. More appropriate methods need to be applied to find out the exact scenario.

### Conclusion

TTIs continue to be a threat to safe transfusion practices. Among the healthy blood donors seroprevalence of HIV, HBV, HCV is alarming. Based on the results we feel that to reduce the risk of these infections non-remunerated voluntary donor services need to be encouraged. Extensive and meticulous donor selection and screening procedures can improve the blood safety. The emphasis must also be laid on voluntary risk reduction, which will require increased awareness and change in the attitude of people. Voluntary blood donation has to be made a part of healthy lifestyle, enlightening the people about the benefits of voluntary blood donations.

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