



## ORIGINAL ARTICLE

## Evaluation of the Seroprevalence of Transfusion Transmissible Infections among Blood Donors in a Tertiary Care Hospital of North India

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## ABSTRACT

**Background:** Unsafe transfusion practices put patients at high risk of transfusion transmissible infections. We aimed to evaluate the prevalence of transfusion transmissible infections (including Human Immunodeficiency Virus [HIV] 1 and 2, Hepatitis B Virus [HBV], Hepatitis C Virus (HCV) and syphilis) during a period of 18 months among blood donors in the Blood Bank of Lady Hardinge Medical College.

**Methods:** The prevalence of markers of HIV, HBV, HCV and syphilis was evaluated among blood donors from January 2013 to June 2014. All donors who came to donate blood in the blood bank as well as voluntary donors who donated in the outreach blood donation camps were included in the study.

**Results:** 15713 donations were received. The overall seroprevalence of HIV, HBV, HCV and syphilis was 0.2%, 1.54%, 0.49%, and 1.45%, respectively. The seroprevalence of HBV, HCV and syphilis was 0.57%, 0.14%, and 0.53%, respectively amongst voluntary donors.

**Conclusion:** transfusion transmissible infections were less common among voluntary donors than those among replacement donors. Awareness of the general population about voluntary blood donation should be created to minimize the chances of spreading transfusion transmitted infections.

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### Introduction

Unsafe transfusion practices put patients at high risk of transfusion transmissible infections. Proper donor counseling and selection along with sensitive screening tests ensure elimination or at least reduction of the risk of acquiring transfusion transmissible infections.<sup>1</sup> Efforts are being made to provide almost zero risk transfusion.

We aimed to evaluate the prevalence of transfusion transmissible infections (including Human Immunodeficiency Virus [HIV] 1 and 2, Hepatitis B Virus [HBV], Hepatitis C Virus [HCV] and syphilis) during a period of 18 months among blood donors in Blood Bank, Lady Hardinge Medical College.

### Materials and Methods

The prevalence of markers of HIV, HBV, HCV and

syphilis was evaluated among blood donors from January 2013 to June 2014. All donors were subjected to pre-transfusion counseling and screening which was done by qualified, trained doctors and staff. Strict criteria were used for donor selection. Donors who did not fulfill the criteria for blood donation, paid and commercial donors and those with history of high risk behavior were deferred. Consent for infectious marker testing was obtained from all the donors at the time of pre-test counseling prior to blood donation. All donors who came to donate blood in the blood bank as well as voluntary donors who donated in the outreach blood donation camps were included in the study.

All donor blood samples were collected at the time of blood donation from the primary bag and were screened for transfusion transmissible infections. HIV, HBsAg,

HCV testing was done by ELISA using BIORAD GENSCREEN ULTRA HIV Ag-Ab kit (4<sup>th</sup> generation ELISA), BIORAD Monolisa HBsAg ULTRA kit (3<sup>rd</sup> generation ELISA) and BIORAD HCV Ag-Ab ULTRA kit (4<sup>th</sup> generation ELISA) respectively. The BIORAD TPHA 500 test kit was done for syphilis. All seropositive cases were repeated in duplicate before being labeled as seropositive.

The procedures followed in the study were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki declaration of 1975, as revised in 2000.

## Results

A total of 15713 donations were received. The overall seroprevalance of HIV, HBV, HCV and syphilis was 0.2%, 1.54%, 0.49% and 1.45% respectively. Prevalence of HBV was the highest among the various markers.

Out of the total donations, 13618 (86.67%) were replacement donors and the rest (13.33%) were voluntary donors. Prevalence of all the transfusion transmissible infections was more common in the replacement donors as compared to voluntary donors (table 1).

None of the voluntary donors tested positive for HIV. The seroprevalence of HBV, HCV and syphilis was 0.57%, 0.14% and 0.53% respectively amongst voluntary donors. Prevalence for HBV was the highest in this group also.

When the age wise distribution of transfusion transmissible infections was evaluated, HIV was found to be most prevalent in donors aged 30-39 years, while both HBsAg and HCV positivity was most prevalent in the 20-29 year-old age group (table 2A).

Most donors were male (96.77%). All the transfusion transmissible infections were more common in men

compared with women (table 2B). None of the HIV positive donors were female and 0.2% of the total male donor population tested positive for HIV. In addition, seropositivity for HBsAg, HCV and TPHA was higher in the male donors compared with the female donors (table 2B).

## Discussion

According to estimations in 2012, there were 20.89 lakh HIV infected people in India.<sup>2</sup> The national average for HBV and HCV positivity in healthy donor population is around 4.7%<sup>3</sup> and 1-1.5%<sup>4</sup> respectively.

Blood donors from the community or the replacement donors in hospitals do not fall in the high risk group like intravenous drug users, professional health donors, or sex workers. So, prevalence of HBV, HIV and HCV among healthy blood donors or replacement donors reflects the disease prevalence in the general community. Also, it estimates the risk of chance of acquisition of these infections during blood transfusion.<sup>5</sup>

Table 3 sums up the results of seroprevalence of Transfusion transmissible infections from various regions of our country. The difference in the prevalence rates of the different studies is due to the difference in the population under study, the education and awareness level of the population, the type of donors and the levels to which individuals with risk factors for blood borne viral infections that have been excluded. Also, the difference in seropositivity of different markers in various series can be explained by the differences in the method used for testing and criteria of positivity. Seropositivity reflects the social, cultural, religious and sexual practices. Evaluation of transfusion transmissible infection among blood donors allows assessment of the prevalence of infections

**Table 1:** Comparison of TTIs in replacement and voluntary donors

	HIV	HBV	HCV	Syphilis
Replacement donors	31	230	74	216
Voluntary donors	0	12	3	11
Total	31	242	77	227

**Table 2A:** Age wise prevalence of TTIs

Age group (years)	HIV	HBV	HCV	Syphilis
18-19	0	12	2	1
20-29	11	105	40	80
30-39	15	96	26	97
40-49	4	25	8	40
50-59	1	4	1	9
60-65	0	0	0	0
Total	31	242	77	227

**Table 2B:** Gender wise prevalence of TTIs

Gender	HIV	HBV	HCV	Syphilis
Male	31/15216 (0.2%)	239/15216 (1.57%)	76/15216 (0.5%)	224/15216 (1.47%)
Female	0/497 (0%)	3/497 (0.6%)	1/497 (0.2%)	3/497 (0.6%)
Total	31/15713	242/15713	77/15713	227/15713

**Table 3:** Prevalence of TTIs in different studies

Study	HIV	HBV	HCV	Syphilis
Bhawani et al 2004-9 (Andhra Pradesh) <sup>6</sup>	0.39%	1.41%	0.84%	0.08%
Shah et al Jan 2006- July 2013 (Gujarat) <sup>7</sup>	0.16%	0.98%	0.11%	0.23%
Ahmed Z et al 2008-11 (Karnataka) <sup>8</sup>	0.1%	0.5%	0.08%	0.07%
Deshpande et al 2007-11 (Maharashtra) <sup>9</sup>	0.56%	3.75%	0.46%	0.09%
Sethi B et al 2007-11 (Uttarakhand) <sup>10</sup>	0.19%	0.63%	0.2%	0.02%
Lathamani et al Jan 2008-March 2010 (Karnataka) <sup>11</sup>	0.08%	0.53%	0.098%	0.09%

in the blood donor population and therefore the safety of the collected donations and the recipients. It allows estimation of the risk of accidental acquisition of these infections during blood transfusion. Also it gives an idea of the epidemiology of these diseases in the community.

A similar study was done in our institution by Pahuja et al in which the prevalence of HIV, HBV, HCV was 0.56%, 2.23%, 0.66% respectively from 2002-2005. Syphilis was not evaluated. All three viral markers were tested using 3<sup>rd</sup> generation ELISA kits.<sup>12</sup> It is noted that the seroprevalence of all of them has declined in the period Jan 2014 – June 2015.

The risk of transmission of HIV, HBV and HCV has reduced in the recent years because of improved donor selection, increased vigilance and making screening of all donated blood for Transfusion transmissible infections mandatory. Donors having history of being HIV, HBV or HCV positive are permanently deferred.<sup>13</sup> Donors must be screened for high risk behavior related diseases since most of the transfusion transmissible infections exist as asymptomatic diseases in the hosts. In India, the risk of transfusion transmission of HIV, HBV and HCV may be alarming due to high prevalence of anti-HIV-1, anti-HCV and HBsAg (0.5%, 0.4% and 1.4% respectively) in blood donors.<sup>14</sup> Rising trend in the prevalence of syphilis among blood donors reflects the changing lifestyle and social norms.

Higher seropositivity among males than females may be due to the heterosexual promiscuity.

Voluntary donors are motivated blood donors who donate blood at regular intervals. Replacement donors are usually one time donors who donate blood only when a relative or a friend is in need of blood. Transfusion transmissible infections among voluntary donors were less common than those among replacement donors. Awareness of the general population about voluntary blood donation should be created to minimize the chances of spreading transfusion transmitted infections. Replacement donors carry a relatively higher risk of transfusion transmitted

infections due to chances of missing professional donors during donor screening procedures as professional donors are aware of the criteria for deferral. Hence, blood from replacement donors should be accepted only in cases of dire emergencies when transfusion of blood would be lifesaving.<sup>7</sup> However, this is often not possible in our country since the number of voluntary donations are too less to cater to the demand of blood.

Efforts should be made to focus on voluntary donation by spreading awareness in the population about the scarcity of blood and sensitizing the general population for the need of blood. Meanwhile, individuals should also be educated regarding the Transfusion transmissible infections which are dangerous to both blood donors and recipients. For this, voluntary blood donation camps have to be arranged and proper counseling of the donors should be done.

Proper donor selection, education and uniform implementation of laboratory screening tests should be the points kept in mind. A more detailed history regarding sexual exposure of blood donors is advocated. Also, a lot more needs to be done regarding employing more field workers (Counselors) for voluntary blood donation. Success of a voluntary blood donation camp depends upon the number of donors. Also, judicious use of blood helps in reducing the transmission of transfusion transmissible infections, as lesser the transfusion, lesser the replacement donation and lesser the Transfusion transmissible infections.

### Conclusion

Evaluation of Transfusion transmissible infections among blood donors allows assessment of the prevalence of infections in the blood donor population and therefore the safety of the collected donations and the recipients. Among all the transfusion transmissible infections tested in the present study, incidence of HBV was found to be the highest. Prevalence of Transfusion transmissible infections was higher in men than women and in donors

belonging to age group of 20-39 years (reproductively active age group).

Blood transfusion is a life saving procedure and safety of blood and blood products is of utmost importance. Morbidity and mortality resulting from transfusion of infected blood has dire consequences not only for the recipient, but also for his or her family, community and the wider society. Prevalence of Transfusion transmissible infections was lower in voluntary donors than in replacement donors in our study. Therefore, regular, voluntary, unpaid donors are the safest group of donors. However, many a times individuals are forced to donate as replacement donors for want of blood for their relatives. Therefore, it is of utmost importance to continue screening donated blood with highly sensitive and specific tests and to counsel donors who are positive to any of the infections.

**Conflict of Interest:** None declared.

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