

## Original Research Article

# A retrospective analysis of trends of HIV and syphilis among blood donors in north India

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### ABSTRACT

**Background:** In India, it is mandatory to screen blood donors for HIV, hepatitis B, hepatitis C, syphilis and malaria. The donor screening strategies include taking the elaborate medical history, performing preliminary clinical examination and screening for infectious markers. The infectious markers include anti-HIV (1 and 2) antibodies, hepatitis B surface antigen (HBsAg), anti-hepatitis C virus antibodies, and malaria antigens, such as histidine rich protein (HRP) and pan-aldolase. National adult (15-49 years) HIV prevalence is estimated at 0.26% (0.22%-0.32%) in 2015 (0.30% among males and 0.22% among females). The objective of this study was to be carried out with the aim to find out the seroprevalence of HIV infection and its trend among the blood donors a hospital based blood transfusion service set up in north India over a period of six years.

**Methods:** It was record based retrospective study from 2010 to 2015. Before donation "blood donation form" had been filled by every donor and this form had particulars about age, gender, address, and occupation, date of previous donation, any illness and medical treatment taken. The donor blood samples were collected at the time of blood donation from the primary bag and tested for the presence of HIV using enzyme linked immunosorbent assay (ELISA). All donors were subjected to a pre-test counselling which was done by qualified staff trained to screen donors for blood donation.

**Results:** A prevalence of 0.21% of HIV was seen among the donors from the period 2010-2015. The trend of HIV prevalence among donors has been fluctuating while ranging from 0.13% to 0.34%.

**Conclusions:** HIV remains the major threat for transfusion transmitted infections in India. For a safe blood service in our country, where comprehensive laboratory tests are neither possible nor pragmatic, it is best to switch over to 100% voluntary donations, as it is now established that only voluntary non-remunerated regular donation is the safest. Thus, one of our key strategies to enhance blood safety is to focus on motivating non-remunerated blood donors and phasing out even replacement donors.

**Keywords:** Blood safety, Donor, HIV, Replacement, Voluntary

### INTRODUCTION

It is a well-known fact that transfusion of blood and blood components as a specialized modality of patient management has been saving millions of lives worldwide each year. Amongst the undesirable complications arising

out of transfusion of blood and blood products, transmission of certain infections (TTIs) like HIV, Hepatitis B and C and syphilis are most significant for the long term detrimental side effects.

According to the United Nations Joint Program on HIV/AIDS (UNAIDS), at the end of 2010, an estimated

34 million people with AIDS were living in the world.<sup>1</sup> The highest number of patients (22.9 million) is reported from sub-Saharan Africa (31.6-35.2 million).<sup>2</sup> India harbours the third largest number of HIV infected individuals in the World.<sup>3</sup> Several States in India have now reported the presence of HIV-2 after the first case was reported from Mumbai in 1991.<sup>4</sup>

Cases of HIV-2 have been reported by several studies from southern and western part of India; however, not much evidence is available from the northern part of our country.<sup>4</sup>

National adult (15-49 years) HIV prevalence is estimated at 0.26% (0.22%-0.32%) in 2015 (0.30% among males and 0.22% among females).

Other transfusion transmitted infection is syphilis caused by *Treponema Pallidum*. Syphilis is usually transmitted by sexual contact. *Treponema pallidum* can also be transmitted by transfusion of blood or blood components from donors suffering from active syphilis or when the blood is not screened properly.

In developed countries, the prevalence of *T. pallidum* infection has dropped both in the general population and in blood donors. However, the scenario is different in developing countries of the sub-Saharan region where the prevalence may reach 25%.<sup>6</sup> In such a context, the poor quality of laboratory screening due to the lack of equipment, trained personnel, reagents and standard procedures compounds the need for systematic and better screening for syphilis to help ensure a safer blood supply.

The various markers of infection appear at different times after infection. Each transfusion transmitted infection has one or more window periods, ranging from a few days to months, depending on the infectious agent, the screening marker and the screening technology employed. During this period, the particular screening marker is not yet detectable in a recently infected individual, even though the individual may be infectious.

The present study was carried out with the aim to find out the seroprevalence of HIV infection and its trend among the blood donors a hospital based blood transfusion service set up in north India over a period of six years.

**METHODS**

This was a retrospectively record based study. All donors who donated blood at the Department of Transfusion Medicine, PGIMS, Rohtak, Haryana or either at camps organized by the department over a period of 10 years (2010-2015) were included in the study. The donors were apparently healthy adults of the age group 18-60 year. All donors were subjected to a pre-test counselling which was done by qualified staff trained to screen donors for blood donation. Donors who did not fulfil the general

criteria for blood donation, paid and commercial donors and those with a history of high risk behaviour were excluded. Consent for infectious marker testing was obtained from all donors at the time of pre-test counselling prior to blood donation.

The donor blood samples were collected at the time of blood donation from the primary bag and tested for the presence of HIV using enzyme linked immunosorbent assay (ELISA). Screening for syphilis was done by rapid plasma reagin (RPR) method. All donors were subjected to a pre-test counselling which was done by qualified staff trained to screen donors for blood donation.

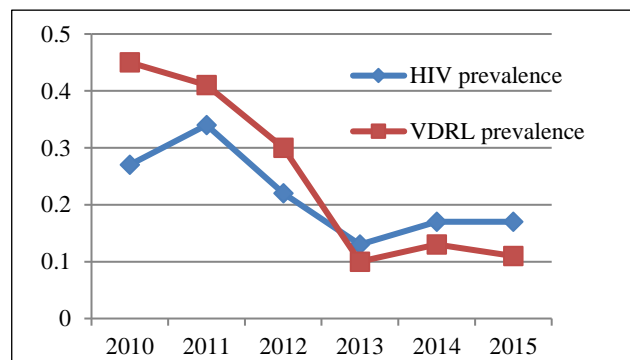
Also, some of the patients who were found positive for HIV were traced as per the demographic proforma filled by them and were asked about questions regarding the source of their infection. For example: Ear piercing, tattoo making, casual sex with sex workers etc.

**RESULTS**

A total of 217553 blood units were collected during this period. A prevalence of 0.21% of HIV was seen among the donors from the period 2010-2015. The trend of HIV prevalence among donors has been fluctuating while ranging from 0.13% to 0.34%. Figure 1 shows the line diagram for the HIV prevalence. For syphilis, VDRL test positivity was ranging from 0.10% to 0.45%. An overall prevalence of 0.24% was noted for VDRL seropositivity.

**Table 1: Trends in HIV prevalence among blood units tested over the study period.**

Year	HIV positive	VDRL positive
2010	89 (0.27%)	145 (0.45%)
2011	117 (0.34%)	141 (0.41%)
2012	85 (0.22%)	112 (0.30%)
2013	51 (0.13%)	38 (0.10%)
2014	60 (0.17%)	48 (0.13%)
2015	68 (0.17%)	45 (0.11%)
Total	470 (0.21%)	529 (0.24%)



**Figure 1: Trends in blood donations over the study period.**

**Table 2: Blood components prepared.**

Year	Plasma/cryoprecipitate	Fresh frozen plasma (FFP)	Platelet rich plasma (PRP)	Packed cell volume (PCV)
2010	238	8868	3993	28034
2011	165	11028	4245	29930
2012	76	14949	5648	31810
2013	151	17598	7404	33897
2014	26	17155	5449	33485
2015	12	18139	9946	37132
Total	668	87737	36685	194288

Table 2 shows the various blood components prepared which were plasma/cryoprecipitate, fresh frozen plasma, platelet rich plasma and packed cell volume.

**Table 3: Probable sources of HIV infection among positive cases.**

Probable source of infection	HIV
H/o therapeutic injection	5
Surgery	3
Sexual contact	2
Dental treatment	4
Tattoo	2
Toothbrush	2
Blade/Razor	6
Total	24

Patients who were found sero-positive for HIV and their probable sources of infection as per details revealed by them are depicted in Table 3.

**DISCUSSION**

Voluntary blood donors pose a minimal risk of transfusion transmissible infections therefore it is recommended that voluntary blood donors should comprise 100% of the blood donation. Voluntary donors are preferred over replacement donors because replacement donor may tend to hide some history with the intention of benefitting their patient, out of ignorance about the fact that they are putting someone’s life in danger.

**Table 4: Prevalence rates of different studies regarding HIV.**

Studies	Study region	Study period	HIV prevalence rate (%)
Leena MS et al <sup>8</sup>	South India	2004-10	0.27
Kumari A et al <sup>9</sup>	Karnataka	2006-2010	0.63
Kumar et al <sup>10</sup>	Punjab	2008-2013	0.26
Panda et al <sup>11</sup>	Orissa	2005	0.35
Srikrishna et al <sup>12</sup>	Bengaluru	1997-98	0.44
Sastry et al <sup>13</sup>	Pune	2008-2013	0.28
Makroo et al <sup>14</sup>	Delhi	1999-2009	0.24
Present study	Haryana	2010-2015	0.21

Replacement donors still provide about 45% of the blood collected in India. Such donors are supposed to be associated with a significantly higher prevalence of transfusion-transmissible infections (TTIs) including HIV, hepatitis B, hepatitis C, syphilis and malaria.<sup>7</sup>

Table 2 shows that FFP units demand has increased over the years. This is consistent with the rising number of dengue cases where patients are being given FFP. Packed Cell Volume demand has also increased as more number

of trauma patients is there which put heavy pressure on blood components supply.

The prevalence of HIV among our blood donor population was found to be 0.21 per cent using serological tests. The national HIV prevalence rate is 0.26%. The reasons for this may be increased awareness in blood donors for HIV and self-rejection related to it, improved pre-donation counseling of voluntary blood donors, deferring the donors with high risk behavior,

successful post donation counseling of sero reactive donors and increased voluntary blood donors in comparison of replacement donors. Table 3 shows the comparison of prevalence rates of HIV by various studies conducted at different places. Studies from different parts of country show somewhat similar prevalence of HIV seropositivity.<sup>8-14</sup> It is also seen that southern states show a higher prevalence of HIV seropositivity among blood donors which corresponds with the national data on HIV prevalence. Southern states have higher number of replacement or professional donors who are at higher risk of HIV infection.

Some of the patients who were interviewed for the probable sources of infection revealed that a trivial cut with razor/blade was present in 6 cases, dental treatment was taken by 4 patients and a therapeutic injection by a local provider was taken by 5 patients. Although the association with these incidents are trivial but unsterilized syringes and needles are in practice in rural area and in order to make profit, people go for used syringes and needles also.

Regarding syphilis, our study observed a sero-positivity rate of 0.24% during the study period 2010-15. Shah et al in a study done at Ahmedabad from 2006-13 reported a prevalence of 0.22% and 0.26% among voluntary and replacement blood donors.<sup>15</sup> Another study done by Chandra et al during period 2001-2007 concluded a syphilis sero-prevalence rate of 0.01%.<sup>16</sup> A comparatively higher sero prevalence was reported by Srikrishna et al which was much way above (1.6%) than our reported value. Another study by Makroo et al in Delhi (2005-2013) reported a sero-prevalence of 0.23% which was comparable to our findings.<sup>12</sup>

## CONCLUSION

Study analysis showed that risk of TTI's decreased over the period of time. A higher prevalence of diseases which are transmissible through blood in developing countries causes the risk of TTIs more than that in developed countries. Lack of access to safe blood places unacceptable burden on the health sector of developing countries. This urges the use of more sensitive donor screening tests such as Nucleic acid testing even more desirable in the developing countries. However, the cost effectiveness of Nucleic acid testing is low. There is a need for constant encouragement of voluntary blood donation, strict donor selection criteria and sensitive screening tests to minimize TTIs in Indian setting.

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