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## Research Article

# SEROPREVALANCE OF TRANSFUSION TRANSMITTED VIRAL INFECTIONS (HIV, HBV, HCV) IN BLOOD DONORS FROM CENTRAL INDIA

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### ABSTRACT

**Aim:** To assess the proportion of Voluntary Blood Donors (VBD) and Replacement Blood Donors (RBD) and compare the prevalence of Transfusion Transmitted Diseases (TTD) in VBD and RBD and year wise trends of viral TTD's in government hospital blood bank in central India.

**Methodology:** A total of 46699 blood units were collected during four years period in blood donation camps and in blood bank. Donors were carefully selected by following strict donor's selection criteria, taking history and after doing clinical evaluation. 2 ml of blood sample was collected in test tube at the time of bleeding and serum was screened for HBsAg, anti HCV, anti HIV 1 and 2 with commercially available third generation ELISA test kits. All reactive samples were retested before being labeled as seropositive. Comparative analysis of 4 years data was done for trend analysis & prevalence rates were compared among VBD and RBD by using Chi Square & Anova test.

**Results:** VBD were 95.7% in our study. The overall prevalence of HIV, HBsAg and HCV was 0.15%, 0.7% and 0.04% respectively. Increasing & decreasing trend in all these TTDs was statistically significant. The differences in the prevalence of HIV, HBsAg & HCV between replacement and voluntary donors were statistically significant ( $p < 0.05$ ).

**Conclusion:** Voluntary blood donors have significantly lower rates of prevalence of Transfusion Transmitted Infections (TTIs) as compared to replacement blood donors. Hence we should try to increase VBD.

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## INTRODUCTION

Blood donation is one among the most significant contributions that the human being can make. Donor eligibility criteria, outlined by the Food and Drug Administration, should be fulfilled to ensure safe donation and reduce the risk of transfusion transmission of a disease to a patient.

The risk further increases with preparation of components from single donor that can be issued to multiple patients. Out of all transfusion transmitted diseases viral infections like HIV, HBV and HCV have major impact on society and can be fatal at times. Therefore safe blood transfusion is necessary for high quality health care system.<sup>1</sup>

In India, it is mandatory to screen blood donors for HIV, hepatitis B, hepatitis C, syphilis and malaria.<sup>2</sup>

Though various effective strategies are used for screening of blood, then also transmission of disease occurs, primarily because of the inability of the test to detect the disease in the 'window' period of infection, immunologically variant viruses, immune-silent carriers and inadvertent laboratory testing errors. Transfusion Transmitted Infections (TTI) is a major concern to patients, physicians and policy makers.

The magnitude of transfusion transmitted viral infections varies with area from where the donor population comes. It reflects the prevalence of asymptomatic carriers in the society.

Hiding the medical history by some donors also poses great problem in safe transfusion services.

Present study was carried out to assess the proportion of Voluntary Blood Donors (VBD) and Replacement Blood Donors (RBD) and compare the prevalence of TTD's in VBD

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and RBD and year wise trends of viral TTD in government hospital blood bank in central India.

## MATERIAL AND METHODS

The study was done over a period of last 4 years from 1 January 2014 to 31 December 2017 at blood bank of government medical college, Nagpur which is a tertiary care hospital in central India. A total of 46699 blood units were collected during this period in blood donation camps and in blood bank.

Donors were carefully selected by following strict selection criteria. History was taken and appropriate clinical evaluation was done. Voluntary Blood Donors (VBD) gave blood without any incentive either in the form of money or any substitute for money such as time off from work other than reasonably needed for blood donation and travelling. Replacement Blood Donors (RBD) donated blood in exchange of blood units issued for their patients.

2 ml of blood sample was collected in test tube at the time of bleeding and serum was screened for HBsAg, anti HCV, anti HIV 1 and 2 with commercially available third generation ELISA test kits. Tests were carried out in Transfusion Transmitted Disease (TTD) screening laboratory in blood bank by using standard protocol laid down by manufacturers. Known positive and negative samples were used randomly as external controls in each screening. All reactive samples were retested before being labeled as seropositive. Positive blood units were discarded according to standard protocol by autoclaving followed by incineration. Comparative analysis of 4 years data was done for trend analysis & prevalence rates were compared among VBD and RBD by using Chi Square & Anova test.

## RESULTS

Out of total 46699 donors, 1998(4.3%) were Replacement and 44701(95.7%) were Voluntary Donors (Table 1). Number of donors successively increased from 2014 to 2017.

**Table 1** Blood donors distribution

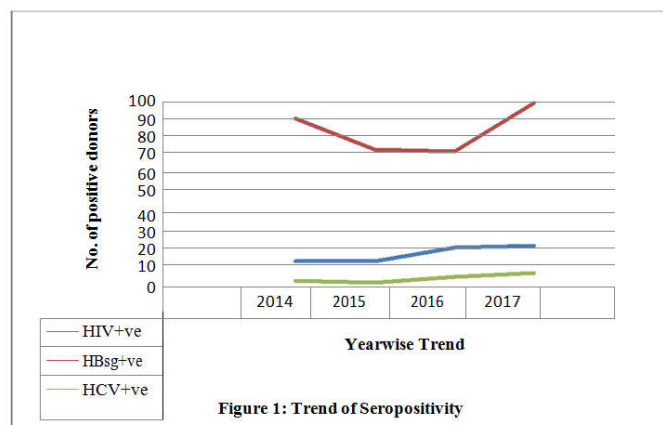
Year	Total	VBD	RBD	Total	Total
<b>Donors</b>					
				<b>Male</b>	<b>Female</b>
2014	11021	10569(95.9%)	452(4.1%)	10420(94.54%)	601(5.45%)
2015	11407	10921(95.7%)	486(4.3%)	10805(94.72%)	602(5.28%)
2016	11408	10788(94.6%)	620(5.4%)	10991(96.35%)	417(3.65%)
2017	12863	12423(96.6%)	440(3.4%)	12334(95.9%)	529(4.11%)
Total	46699	44701(95.7%)	1998(4.3%)	44550(95.4%)	2149(4.6%)

Among the donors, males dominated the donor population (95.4%) (Table1). The overall prevalence of HIV, HBsAg and HCV was 0.15%, 0.7% and 0.04% respectively (Table 2).

**Table 2** Year wise & overall seropositivity of HIV, HBV, HCV

Year	HIV+ve	HBsAg +v e	HCV+ve
2014	14 (0.12%)	87 (0.79%)	4 (0.04%)
2015	14(0.12%)	71 (0.62%)	3 (0.03%)
2016	21(0.18%)	70 (0.61%)	6 (0.05%)
2017	22 (0.17%)	95(0.74%)	8 (0.06%)
Total	71(0.15%)	323(0.71%)	21(0.04%)
Mean ±SD	17.75±2.128	80.75±6.11	5.250±1.02
F-value	5218.147		
p-value	0.0000 significant (p<0.05)		

The highest prevalence was observed for HBV followed by HIV and HCV in decreasing order. The prevalence of HIV increased from 0.12% in 2014 to 0.18% in 2016, with slight decrease in 2017 to 0.17%.The prevalence of HBsAg positivity decreased from 0.79% in 2014 to 0.61% in 2016, with increase to 0.74% in 2017. The prevalence of HCV increased from 0.04% in 2014 to 0.06% in 2017, with slight decrease in 2015 to 0.03% (Figure 1). Increasing & decreasing trend in all these TTDs was statistically significant.



**Figure 1:** Trend of Seropositivity

The prevalence of HIV among replacement donors was 0.5% while in Voluntary donors it was 0.13% (Table 3).

**Table 3** HIV positivity in voluntary & replacement donors

HIV Status	Voluntary	Replacement	Total
Positive	61 (0.13%)	10 (0.5%)	71 (0.15%)
Negative	44640	1988	46628
Total	44701	1998	46699

Chi square = (14.384), P = 0.0001(p<0.01) Highly significant

The HBsAg positivity among replacement donors was 4% while in voluntary donors it was 0.5% (Table 4).The HCV positivity in replacement donors was 0.25% while in voluntary donors it was 0.036% (Table 5). The differences in the prevalence of HIV, HBsAg & HCV between replacement and voluntary donors were statistically significant (p <0.05).

**Table 4** HBsAg positivity in voluntary & replacement donors

HBsAg Status	Voluntary	Replacement	Total
Positive	243(0.5%)	80 (4%)	323 (0.71%)
Negative	44458	1918	46376
Total	44701	1998	46699

Chi square = (333.407), P = 0.000 (p<0.001) Highly significant

**Table 5** HCV positivity in voluntary & replacement donors

HCV Status	Voluntary	Replacement	Total
Positive	16(0.036%)	5(0.25%)	21 (0.04%)
Negative	44693	1985	46678
Total	44701	1998	46699

Chi square = (15.177), P = 0.0001(P<0.001) Highly significant

## DISCUSSION

Transfusion of blood saves 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 are most significant for the long term detrimental side effects. Meticulous pretransfusion testing and screening particularly for transfusion transmissible infections (TTI) is the need of hour.<sup>3</sup>

It has been found that prevalence of various TTD varies from country to country.<sup>4</sup>

VBD were 95.7% in our study similar to study done by Kalpana RS *et al*<sup>5</sup>, where it was 100%. It is more as compared to study done by Patel SV *et al*<sup>6</sup>, where they comprised 52%. More number of voluntary donors in our study could be due to increased awareness among population about blood donation and also due to increased number of blood donation camps held by our blood bank. Males dominated among the donors constituting 95.4%, similar to study done by Bobde V *et al*.<sup>7</sup>

Seroprevalence of HIV was found to be 0.15% similar to Shah N *et al*<sup>8</sup> (0.15%). It is lower as compared to other studies of Reddy SG *et al* (0.26%)<sup>9</sup> and Kalpana RS *et al* (0.24%)<sup>5</sup>. Difference between VBD and RBD for seroprevalence of HIV was statistically significant similar to study by Patel SV *et al*.<sup>6</sup> Present study showed prevalence of HBsAg of 0.71% which was similar to Patel SV *et al*<sup>6</sup> (0.86%). Difference in prevalence of HBsAg in VBD and RBD was statistically significant. Similar findings were noted by Dowerah S *et al*<sup>10</sup> and Bobde V *et al*.<sup>7</sup>

HCV seropositivity of 0.04% was found in our study and was lower than other studies done by Patel SV *et al* (0.21%)<sup>6</sup>, Shah N *et al*<sup>8</sup> (0.1%). Significant difference was found between VBD and RBD, similar to Arya DR.<sup>11</sup>

## CONCLUSION

In our study, voluntary donors predominated and comprised 95.7%. The overall seroprevalence of HIV, HBsAg and HCV was found to be 0.15%, 0.7% and 0.04% respectively. It is apparent from the results of present study that voluntary blood donors have significantly lower rates of prevalence of TTIs as compared to replacement blood donors. Awareness of general population about voluntary blood donation should be created so that we have 100% VBD, which will 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. Hence blood from replacement donors should be accepted only in cases of emergencies when there is shortage of blood in blood bank. This can be done by arranging awareness programs like lectures, street plays and by distributing Information, Education Communication (IEC) material.

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