

## Seroprevalence of transfusion transmitted infections in voluntary and replacement donors: A five years study

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### Abstract

The transfusion of blood and its component is very essential health care modality wherein it saves life, but can also be hazardous to recipients. Despite of stringent screening methods done prior to transfusion there is always a bleak possibility of getting infections like HIV, HCV, HBV, Treponema pallidum and malaria. This study was a retrospective study carried out at Blood Bank and Component Lab, Dr. Panjabrao Deshmukh Memorial Medical College, Amravati over period of five years. A total of 52606 donor's blood was collected over the period of 5 years (From 1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2016). Out of these 45,796 (87.05%) were voluntary blood donations and 6,810 (12.94%) were replacement Blood donations. The overall seropositivity for all TTIs (HIV, HCV, HBV, Treponema pallidum and malaria) over a period of five years was found to be 1425 (2.71%) in which 1081 (2.36%) were voluntary donors and 344 (5.05%) were replacement donors. It was observed from the findings of this study that seropositivity rate of TTIs was less among voluntary donors. It was concluded that to improve blood safety extensive donor selection, use of sensitive screening and establishing strict guidelines in blood transfusion will help us to reduce burden of TTIs in our society.

**Keywords:** Seroprevalence, Seropositivity, TTIs, Voluntary donors, Replacement donors.

### Introduction

Blood transfusion services is a vital part of modern health care with the aim to provide safe and effective blood and blood products to the needy.<sup>1</sup> The transfusion of blood and its component is very essential health care modality wherein it saves life, but can also be hazardous to recipients. There is always a risk (1%) associated with transfusion including Transfusion Transmitted Infections (TTIs).<sup>2</sup> Despite of stringent screening methods done prior to transfusion there is always a bleak possibility of getting infections like HIV, HCV, HBV, Treponema pallidum and malaria.<sup>3</sup> To prevent the transmission of infections through transfusion and to make it effective various factors are involved that includes sensitivity, specificity of test, window period of infection, variant of viruses, cost and method of test and staff carrying out the test. Blood collected from low risk population has low percentage of TTIs,<sup>4</sup> hence voluntary donor has less prevalence of TTIs when compared with replacement and paid donor.<sup>5</sup> The key to reduce the risk involved in blood transfusion related infections is to educate, motivate and to promote voluntary blood donation.<sup>6</sup> This study was conducted with aim to find the prevalence of various TTIs in our blood bank and compare prevalence rate in voluntary and replacement donors.

### Materials and Methods

This study is a retrospective study carried out at Blood Bank and Component Lab, Dr. Panjabrao Deshmukh Memorial Medical College, Amravati. The duration of study was 5 years (1<sup>st</sup> January 2012 to 31

December 2016). All the donors (Voluntary and replacement) who fulfill the criteria laid down by National Blood Transfusion council were included in this study. During collection of Blood, Blood samples were collected for TTI testing in Pilot test tube. All the test were performed under strict supervision of Blood Transfusion officer. All ELISA testings (HIV, HBsAg, HCV) were done on DS2 Fully Automated ELISA processor. HIV tests were done using HIV Advance, 4<sup>th</sup> Generation kit, BeneSphera, Avantor Performance Materials India Ltd. For testing Hepatitis B virus, HBsAg ELISA was done using BeneSphera 3<sup>rd</sup> generation ELISA kit, Avantor Performance Materials India Ltd. HCV testing was done using BeneSphera, 3<sup>rd</sup> generation ELISA kit, Avantor Performance Materials India Ltd. Test for Syphilis was done by using Aspen Syphilis Rapid test strip, Aspen Labs Pvt. Ltd. Lastly Malaria tests were done using Rapid Malaria Antigen Card test, Malarigen (P.f/Pan Antigen), Aspen Labs Pvt. Ltd. All tests were performed according to instructions provided by kit manufacturer and was done by trained and approved staff under supervision of Blood Transfusion officer.

### Results

A total of 52606 donor's blood was collected over the period of 5 years (From 1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2016). Out of these 45,796 (87.05%) were voluntary blood donations and 6,810 (12.94%) were replacement Blood donations (Table 1).

**Table 1: Distribution of donors**

Year	Total Collection		
	Voluntary Donations	Replacement Donations	Total
2012	8477 (80.82%)	2012 (19.18%)	10489
2013	8950 (84.95%)	1585 (15.04%)	10535
2014	9658 (87.38%)	1395 (12.62%)	11053
2015	8422 (88.40%)	1105 (11.60%)	9527
2016	10289 (93.52%)	713 (6.48%)	11002
<b>Total</b>	45796 (87.05%)	6810 (12.94%)	52606

Screening for HIV was done on all 52606 donors samples which showed total positivity for HIV in 216 (0.41%) cases. Out of these 216 HIV positive donors, 137 (0.30%) were voluntary donors and 79 (1.16%) were replacement donors (Table 2).

**Table 2: HIV seropositive cases in donors**

Year	Total Donors	Total HIV positive donors	Voluntary Donors		Replacement Donors	
			Total	HIV Positive	Total	HIV Positive
2012	10489	76 (0.72%)	8477 (80.82%)	34 (0.40%)	2012 (19.18%)	42 (2.10%)
2013	10535	77 (0.73%)	8950 (84.95%)	44 (0.49%)	1585 (15.04%)	33 (2.08%)
2014	11053	23 (0.21%)	9658 (87.38%)	21 (0.22%)	1395 (12.62%)	02 (0.14%)
2015	9527	25 (0.26%)	8422 (88.40%)	23 (0.27%)	1105 (11.60%)	02 (0.18%)
2016	11002	15 (0.15%)	10289 (93.52%)	15 (0.15%)	713 (6.48%)	00
<b>Total</b>	52606	216 (0.41%)	45796 (87.05%)	137 (0.30%)	6810 (12.94%)	79 (1.16%)

Seropositivity for HBV was found in total 740 (1.41%) donors, out of which 571 (1.25%) were voluntary donors and 169 (2.48%) were replacement donors (Table 3).

**Table 3: HBV seropositive cases in donors**

Year	Total Donors	Total HBV positive donors	Voluntary Donors		Replacement Donors	
			Total	HBV Positive	Total	HBV Positive
2012	10489	167 (1.60%)	8477 (80.82%)	91 (1.07%)	2012 (19.18%)	76 (3.78%)
2013	10535	161 (1.53%)	8950 (84.95%)	108 (1.20%)	1585 (15.04%)	53 (3.34%)
2014	11053	141 (1.27%)	9658 (87.38%)	125 (1.29%)	1395 (12.62%)	16 (1.14%)
2015	9527	105 (1.10%)	8422 (88.40%)	97 (1.15%)	1105 (11.60%)	08 (0.72%)
2016	11002	166 (1.61%)	10289 (93.52%)	150 (1.46%)	713 (6.48%)	16 (2.24%)
<b>Total</b>	52606	740 (1.41%)	45796 (87.05%)	571 (1.25%)	6810 (12.94%)	169 (2.48%)

Seropositivity for HCV was found in total 424 (0.80%) donors, out of which 334 (0.73%) were voluntary donors and 90 (1.32%) were replacement donors (Table 4).

**Table 4: HCV seropositive cases in donors**

Year	Total Donors	Total HCV positive donors	Voluntary Donors		Replacement Donors	
			Total	HCV Positive	Total	HCV Positive
2012	10489	84 (0.80%)	8477 (80.82%)	42 (0.50%)	2012 (19.18%)	42 (2.09%)
2013	10535	90 (0.85%)	8950 (84.95%)	60 (0.67%)	1585 (15.04%)	30 (1.89%)
2014	11053	54 (0.49%)	9658 (87.38%)	49 (0.50%)	1395 (12.62%)	05 (0.36%)
2015	9527	67 (0.70%)	8422 (88.40%)	62 (0.73%)	1105 (11.60%)	05 (0.45%)
2016	11002	129 (1.17%)	10289 (93.52%)	121 (1.17%)	713 (6.48%)	08 (1.12%)
<b>Total</b>	52606	424 (0.80%)	45796 (87.05%)	334 (0.73%)	6810 (12.94%)	90 (1.32%)

Seropositivity for Syphilis was found in total 44 (0.08%) donors, out of which 38 (0.08%) were voluntary donors and 06 (0.09%) were replacement donors (Table 5).

**Table 5: Syphilis seropositive cases in donors**

Year	Total Donors	Total Syphilis positive donors	Voluntary Donors		Replacement Donors	
			Total	Syphilis Positive	Total	Syphilis Positive
2012	10489	00	8477 (80.82%)	00	2012 (19.18%)	00
2013	10535	01 (0.009%)	8950 (84.95%)	01 (0.01%)	1585 (15.04%)	00
2014	11053	03 (0.02%)	9658 (87.38%)	02 (0.02%)	1395 (12.62%)	01 (0.07%)
2015	9527	39 (0.41%)	8422 (88.40%)	34 (0.40%)	1105 (11.60%)	05 (0.45%)
2016	11002	01 (0.009%)	10289 (93.52%)	01 (0.01%)	713 (6.48%)	00
<b>Total</b>	<b>52606</b>	<b>44 (0.08%)</b>	<b>45796 (87.05%)</b>	<b>38 (0.08%)</b>	<b>6810 (12.94%)</b>	<b>06 (0.09%)</b>

Screening for Malaria showed seropositivity in only 01 (0.002%) donor, which was a voluntary donor (0.002%). The overall seropositivity for all TTIs over a period of five years was found to be 1425 (2.71%) in which 1081 (2.36%) were voluntary donors and 344 (5.05%) were replacement donors (Table 6).

**Table 6: Overall seropositivity in TTIs (HIV, HBV, HCV, Syphilis & Malaria)**

Year	Total Donors	Overall Seropositivity in TTIs	Voluntary Donors		Replacement Donors	
			Total	Seropositivity in TTIs	Total	Seropositivity in TTIs
2012	10489	327 (3.11%)	8477 (80.82%)	167(1.97%)	2012 (19.18%)	160 (7.95%)
2013	10535	330 (3.13%)	8950 (84.95%)	214 (2.39%)	1585 (15.04%)	116 (7.32%)
2014	11053	221 (1.20%)	9658 (87.38%)	197 (2.04%)	1395 (12.62%)	24 (1.72%)
2015	9527	236 (2.48%)	8422 (88.40%)	216 (2.56%)	1105 (11.60%)	20 (1.81%)
2016	11002	311 (2.82%)	10289 (93.52%)	287 (2.78%)	713 (6.48%)	24 (3.36%)
<b>Total</b>	<b>52606</b>	<b>1425 (2.71%)</b>	<b>45796 (87.05%)</b>	<b>1081 (2.36%)</b>	<b>6810 (12.94%)</b>	<b>344 (5.05%)</b>

## Discussion

In present study, a total of 52606 donor's were collected over the period of 5 years (From 1<sup>st</sup> January 2012 to 31<sup>st</sup> December 2016). Out of these 45,796 (87.05%) were voluntary blood donations and 6,810 (12.94%) were replacement Blood donations which correlates with studies of Tulika Chandra et al<sup>7</sup> and Kirana Pailoor et al<sup>8</sup> in which 93.77% & 79.82% were voluntary donors and 6.23% and 20.21% were replacement donors respectively.

The overall prevalence rate in our study for HIV, HBV, HCV, Syphilis and Malaria was found to 0.41%, 1.41%, 0.80%, 0.08%, and 0.002% respectively. These findings correlate with studies of Kirana Pailoor et al<sup>8</sup> where prevalence rate were 0.06%, 0.30%, 0.06%, 0.12% and 0.01% respectively. Our finding also correlates with T. Pallavi et al<sup>9</sup> where prevalence rate was 0.44%, 1.27%, 0.23%, 0.20% and 00 respectively. Among the entire TTIs, prevalence rate for HBV was found to be highest.

The overall seropositivity for all TTIs over a period of five years was found to be 1425 (2.71%) in which 1081 (2.36%) were voluntary donors and 344 (5.05%) were replacement donors. This suggests TTIs are more common among Replacement donors as compared to voluntary donors which correlates with studies of Tulika Chandra et al<sup>7</sup>, Kirana Pailoor et al,<sup>8</sup> T. Pallavi et al,<sup>9</sup> Hilda Fernandes et al<sup>3</sup> and Misganaw Birhaneselassie.<sup>10</sup> These findings can be attributed to

the increase in awareness among donors due encouragement by various NGOs and Governmental organizations. The cause for increase number of TTIs among replacement donors can be due to hiding of medical history by donors due to peer pressure.

## Conclusion

The low prevalence of TTIs among voluntary donors indicates that, to reduce the risk of TTIs non remunerated voluntary donor services need to be instituted. To improve blood safety extensive donor selection, use of sensitive screening and establishing strict guidelines in blood transfusion will help us to reduce burden of TTIs in our society.

**Abbreviations:** **TTIs:** Transfusion Transmitted Infections, **HIV:** Human Immunodeficiency Virus, **HBV:** Hepatitis B Virus, **HCV:** Hepatitis C Virus.

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