

# Seroprevalence of Transfusion Transmissible Infections among Blood Donors at a Tertiary Care Teaching Hospital in Central India

Amit V. Varma<sup>1</sup>, Garima Malpani<sup>2</sup>, Susmit Kosta<sup>3</sup>, Kamal Malukani<sup>4</sup>, Bela Sarda<sup>5</sup>, Avinash Raghuvanshi<sup>6</sup>

## ABSTRACT

**Introduction:** Blood transfusion is both a life saving measure in many medical and surgical emergencies and a source of transfusion transmitted infections. So a provision for strict criteria in recruitment and deferral of blood donors may improve safe transfusion practice. The present study was conducted to estimate the prevalence of transfusion transmitted infections in voluntary and replacement donors at a tertiary care teaching hospital in Indore, Madhya Pradesh, Central India.

**Material and Methods:** The present study was a 4 year retrospective study from 2015 to 2018. Data was analyzed from blood bank records, pertaining to all donors who were screened for HBsAg, Hepatitis C virus and HIV by using appropriate methods.

**Results:** A total of 45,704 Voluntary & replacement donors were screened out of which 44,663 (97.72%) were males & 1041 (2.27%) were females. The overall seroprevalence of HBV & HCV was 1.29% & 0.072% respectively, while the prevalence of HIV was 0.076%. The prevalence rate was highest for HBV followed by HIV and HCV in decreasing order. The overall seroprevalence of various TTI's among the studied donors was 1.43%.

**Conclusion:** Blood is still one of the main sources of transmission of infections like HIV, Hepatitis B and Hepatitis C. Extensive donor selection and screening procedures will help in improving the blood safety.

**Keywords:** Transfusion Transmitted Infections, Blood Donors, Seroprevalence.

Even with effective strategies & policies transmission of diseases still occur because of the inability of the test to detect the disease in the window period of infection, high cost of screening, lack of trained staff, funds & laboratory testing errors.

The aim of the present study was to find the prevalence of transfusion transmitted infections in voluntary & replacement donors at a tertiary care hospital based blood bank in Madhya Pradesh. This knowledge can give us an idea of disease burden of society & the basic epidemiology of these diseases in the community.

## MATERIAL AND METHODS

We conducted a retrospective study conducted at the blood bank of Sri Aurobindo Institute of medical sciences, Indore, Madhya Pradesh. Data was collected from a period of 4 years from January 2015 to 2018.

Sera of voluntary & replacement donors were screened for HIV, HbsAg and HCV. A total of 45704 blood units were collected & tested. No professional/ paid donor was bled. Exclusion criteria for blood donation was any serious illness, H/O any medication, major surgical procedure, previous recent blood transfusion, weight <50 kg, age <18/>60 yrs, pregnant & lactating women.

All the samples were screened for hepatitis B surface antigen (III generation ELISA), HIV (IV generation ELISA), Hepatitis C (III generation ELISA).

Tests were done according to manufacturers instructions. All the reactive samples were repeated before labeling them as

## INTRODUCTION

Transfusion therapy has been the mainstay of several medico-surgical therapeutics since 1930.<sup>1</sup> There are 3 types of blood donors:-

Voluntary, replacement, & paid.<sup>2</sup> A voluntary blood donor intentionally donates blood without seeking for any kind of remuneration whereas a replacement donor is requested to do so by the patient or his attendants.<sup>3</sup>

Transfusion of blood & its components is life saving as well as it has its own immediate & delayed complications.

There is 1% chance of transfusion associated problems including transfusion transmitted diseases with every 1 unit of blood transfused.<sup>4</sup>

Blood transfusion increases the risk of transfusion associated infections like Hepatitis B, Hepatitis C, HIV, syphilis, & less commonly malaria, toxoplasmosis and other viral infections.<sup>5</sup>

It is quite difficult to prevent the transmission of infectious diseases through blood transfusion in developing countries because the resources required are not always available.

<sup>1</sup>Professor, Department of Pathology, Sri Aurobindo Institute of Medical Sciences, Indore, <sup>2</sup>Associate Professor, Department of Pathology, Sri Aurobindo Institute of Medical Sciences, Indore, <sup>3</sup>Scientist, Sri Aurobindo Institute of Medical Sciences, Indore, <sup>4</sup>Professor, Department of Pathology, Sri Aurobindo Institute of Medical Sciences, Indore, <sup>5</sup>Assistant Professor, Department of Pathology, Sri Aurobindo Institute of Medical Sciences, Indore, <sup>6</sup>PG Resident, Department of Pathology, Sri Aurobindo Institute of Medical Sciences, Indore, India.

**Corresponding author:** Dr. Garima Malpani, Associate Professor, Department of Pathology, Sri Aurobindo Institute of Medical Sciences, Indore, India

**How to cite this article:** Amit V. Varma, Garima Malpani, Susmit Kosta, Kamal Malukani, Bela Sarda, Avinash Raghuvanshi. Seroprevalence of transfusion transmissible infections among blood donors at a tertiary care teaching hospital in Central India. International Journal of Contemporary Medical Research 2019;6(12):L1-L4.

**DOI:** <http://dx.doi.org/10.21276/ijcmr.2019.6.12.34>

seropositive. The donated blood was discarded whenever the pilot donor sample was found positive for any transfusion transmitted infection.

### STATISTICAL ANALYSIS

Data was collected in excel data sheet and analyzed with IBM SPSS version 20. The associations between categorical variables were tested using Chi-square ( $\chi^2$ ) test.  $P < 0.05$  was considered to be significant. The correlation analysis and linear regression analysis was done between age groups and disease.

### RESULTS

In the present study, out of total 45,704 Voluntary & replacement donors, 44,663 (97.72%) were males & 1041 (2.27%) were females (Table 1). A Chi-square test of independence was performed to find the relation between gender and the total study population. The difference of prevalence by sex was statistically significant.

( $\chi^2$  7.78,  $p = 0.05$ .) Males were more in number than females among donors.

The prevalence of HBsAg, anti HCV, anti HIV among the donors in the study population is shown in table 2. The overall seroprevalence of HBV & HCV was 1.29% & 0.072% respectively, while the prevalence of HIV was 0.076%.

The prevalence rate was highest for HBV followed by HIV and HCV in decreasing order. A Chi square test was done to study the relation between various transfusions transmitted diseases and study population but no statistical significance was found. ( $\chi^2 = 3.79$ ,  $p$  value = 0.70)

We observed that there was a decrease in prevalence of HIV, HBV, HCV with successive years. Thus the year wise trend

Year	Total donors	Males	Females
2015	14008	13697 (97.77%)	311 (2.22%)
2016	11800	11562 (97.98%)	238 (2.01%)
2017	10153	9894 (97.44%)	259 (2.55%)
2018	9743	9510 (97.60%)	233 (2.39%)
Total	45,704	44,663 (97.72%)	1041 (2.27%)

**Table-1:** Distribution of donors in the study population

Year	Total no. of blood donors	HCV	HBV	HIV
2015	14008	12(0.08%)	159(1.13%)	13(0.09%)
2016	11800	10(0.08%)	132(1.11%)	10(0.08%)
2017	10153	07(0.06%)	133(1.30%)	08(0.07%)
2018	9743	04(0.04%)	106(1.08%)	04(0.04%)
Total	45704	33 (0.072%)	590 (1.29%)	35(0.076%)

**Table-2:** Prevalence of HIV, Hepatitis b virus and Hepatitis C virus infection among donors

Disease	Age 18-20	Groups 21-30	31-40	41-50	51-60
HIV	01(2.85%)	15(42.85%)	10(28.57%)	09(25.71%)	0
HBV	06(1.01%)	169(28.64%)	259(43.89%)	100(16.94%)	56(9.49%)
HCV	00(0%)	10 (30.30%)	18 (54.54%)	03 (9.09%)	2 (6.06%)

**Table-3:** Prevalence of HIV, Hepatitis b virus and Hepatitis C virus infection according to different age groups

of seroprevalence was statistically significant. ( $p < 0.05$ )

The age range in our study was 18-60 years. It was observed that highest prevalence of seropositive donors was found within the age group 21-40 yrs. The overall cumulative seroprevalence was lowest in donors of age  $< 20$  years, then increased upto 40 years of age followed by a decline with increasing age. The difference of the prevalence of transfusion transmitted diseases among different age groups was statistically not significant ( $\chi^2 = 12.87$ ,  $p$  value = 0.116,  $df = 8$ ). The correlation between transfusion transmitted diseases and various age groups was found ( $R = -0.026$ ,  $p$  value = 0.509, Adjusted  $R^2 = -0.001$ ,  $df_1 = 1$ ,  $df_2 = 656$ )

### DISCUSSION

Blood transfusion is an important & life saving procedure in treatment of patients but is also carries the risk of transmission of life threatening transfusion transmitted infections.<sup>6</sup> HIV, Hepatitis- B & Hepatitis C are major public health concerns in developing countries. They can be transmitted parenterally, vertically or through high risk sexual behaviors among one of which is blood transfusion which is a potential route of transmission of these TTI's.<sup>7,8</sup> The prevalence of TTI's among the Indian population is seen to be ranging as follows:-

HBV – 0.66% to 12%, HCV -0.5% to 1.5%, HIV – 0.084% to 3.87%, syphilis 0.85% to 3% respectively.<sup>9</sup>

Though our concern for blood safety was mainly due to HIV infection, hepatitis B was most prevalent infection in the present study similar to other studies from India.<sup>25,29</sup> Our study showed seroprevalence of HBV at 1.29% among the donors which is similar to findings by Chatteraj et al<sup>9</sup>, Kaur et al<sup>10</sup>, Singh B et al<sup>11</sup> and Giri et al.<sup>12</sup> Variable results of 0.66%<sup>13</sup>, 2.45%<sup>14</sup>, 3.44%<sup>15</sup>, 5.86%<sup>16</sup>, 25%<sup>17</sup> have also been reported in various other studies.

The prevalence of Hepatitis-C in our study was 0.072% similar to that reported by Dhruva et al.<sup>27</sup> Variable results of 0.79%<sup>9</sup>, 0.88%<sup>18</sup>, 1.57%<sup>19</sup>, 2.8%<sup>20</sup> 6.21%<sup>16</sup> have also been reported in various other studies. Hepatitis C is a blood borne infection & the chances of progression to cirrhosis & hepatocellular carcinoma is more as compared to HBV.

In this study the prevalence of HIV was found to be 0.076%. Similar findings by Dhruva et al<sup>27</sup> & Giri et al 0.19%<sup>21</sup>, Gupta et al<sup>13</sup> & Tiwari et al<sup>21</sup> have been reported. A much higher seroprevalence was reported by Dessie et al 11.7%<sup>17</sup> & Matte et al 3.8%.<sup>22</sup>

We observed a trend of decreased HIV prevalence from 0.09% to 0.04% during 2015-2018 similar to other studies.<sup>24,26,28</sup> Some studies have shown an increasing trend also like one by Sabharwal et al<sup>30</sup> and Patel et al<sup>31</sup> showed an increasing trend of HIV from 2007 to 2011 and 2009 to 2011 respectively. This discordances may be due to the difference

in the study population, study period and study areas.

As far as sex of the donor is concerned, our study showed that transfusion transmitted diseases are more prevalent among males than females which was comparable to other studies.<sup>14,16</sup> This difference can be due to large number of male donors in our study, difference in risk behaviour & a high incidence of anemia in Indian women who are likely to be rejected while being screened for blood donation.

The overall seroprevalence of 1.43% of various TTI's among apparently healthy adults points to the need for sensitive & stringent screening of all blood donors, public awareness programmes and behaviour change communication to young strata of society to keep them free of these infections.

In a study by Koshy et al<sup>24</sup> most of the seropositive donors were in the age group of 18-30 yrs, followed by 31-40 yrs. Most of the infected donors in present study were from 21-40 yrs age group, our findings is similar to study by Karmakar et al.<sup>23</sup> This may be due to sexual transmission of diseases in this age group and pregnant females being in this age group requiring transfusions for anemia or post partum hemorrhage.

## CONCLUSION

Blood transfusion is one of the major mode of transmission of Hepatitis B, Hepatitis C, HIV. Therefore, a sensitive & stringent screening of all blood donors should be done to minimize the transmission of potentially fatal infections. Public should be enlightened about the benefits of voluntary blood donation & feminine participation should be encouraged in donation campaigns.

## REFERENCES

- Zafar N. A survey of blood transfusion practices. *J Coll Physicians Surg Pak* 2000;10: 90-92
- WHO'S certified (Internet) June 2014. Media centre (IL): Blood safety and availability/ fact sheet N 279, <http://www.who.int/mediacentre/factsheets/fs279/en/>.
- Agravat A.H.,Gharia A.A.Pujara K. Dhruva G.A. Profile of blood donors and analysis of deferral pattern in a tertiary care hospital of Gujarat, India *Int J Biomed Adv Res.* 2014; 4:623-628.
- Widman FK (ed) (1985) Technical manual. American Association of Blood Banks, Arlington. 325-344
- Mollison P.L. Engelfriet C.P. Contreras M. Infectious agents transmitted by transfusion. In: Klein H, Anstee D, editors, *Mollisons Blood Transfusion in Clinical Medicine.* 11 edition, Blackwell Publishing; Massachusetts 2005 pp 701-702.
- Fernandes H. D' souza PF. Prevalence of transfusion transmitted infections in Voluntary and Replacement donors. *Indian J Hematol Blood Transfus* 2010;3:89-91.
- Irshad M, Peter S. Spectrum of viral hepatitis in thalassemic children receiving multiple blood transfusions. *Indian J Gastroenterol.* 2002; 21:83-4.
- Mollah AH, Nahar N, Siddique MA, Anwar KS, Harsan T, Azam MG. Common transfusion transmitted infectious agents among thalassemic children in Bangladesh. *J Health Popul Nutr* 2003; 21:67-71
- Chattoraj A, Bhel R, Kataria V. Infectious disease markers in blood donors *Med J Armed forces India.* 2008; 64:33-5
- Kaur H, Dhanon J, Pawar G. Hepatitis C infection among blood donors in Punjab –a six year study. *Indian J Hematol Blood Transfus.* 2001;19:21-2
- Singh B, Verma M, Verma K. Markers of transfusion associated hepatitis in North Indian blood donors: Prevalence and trends. *Jpn J Infect Dis,* 2004; 57:49-51
- Giri PA, Deshpande JD, Phalke DB, Karle LB. Seroprevalence of Transfusion Transmissible Infections among voluntary blood donors at a tertiary care teaching hospital in rural area of India. *J Family Med Prim Care.* 2012;1:48-51
- Gupta N, Vijay Kumar, Kaur A. Seroprevalence of HIV, HBV, HVC & syphilis in voluntary blood donors. *India J Med Sci* 2004; 58:255-7
- Choudhary IA, Samiullah, Khan SS, Masood K, Sardar MA, Mallhi AA. Seroprevalence of HBV and C among health donors at Fauji Foundation Hospital, Rawalpindi. *Pak Med J.* 2007; 23:64-7.
- Garg. S, Mathur DR, Garg DK. Comparison of seropositivity of HIV, HBsAg, HCV and syphilis in replacement and voluntary blood donors in Western India. *Indian J pathol Microbiol.* 2001;44:409-12
- Mumtaz S, Rehman MV, Muzaffar M, Hassan MU, Iqbal W. Frequency of seropositive blood donors for Hepatitis B,C & HIV viruses in railway hospital, Rawalpindi. *Pak J Med Res.* 2002;41:19-2.
- Dessie A Abera B, Fissehawale. Seroprevalence of major blood borne infections among blood donors at Felege Hiwat referral hospital, Northwest Ethiopia. *Ethiop J Health Dev.* 2007;21:68-9
- Bagga PK, Singh SP. Seroprevalence of hepatitis C antibodies in healthy blood donors - a prospective study. *Indian J Pathol Microbiol* 2007;50:429-32.
- Jain A, Rana SS, Chakravarty P, Gupta RK, Murthy NS, Nath MC et al. The prevalence of hepatitis C virus antibodies among voluntary blood donors of New Delhi, India. *Eur J Epidemiol* 2003; 18:695-7.
- Sood G, Chouhan A, Sehgal S, Agnihotri S, Dilawari JB. Antibodies to hepatitis C virus in blood donors. *Indian J gastroenterol* 1992;11:44.
- Tiwari B, Ghimire P, Karkee S, Rajkarnikar M. Seroprevalence of human immunodeficiency virus in Nepalese blood donors. A study from three regional blood transfusion services. *Asian J transf Sci* 2008;2:66-8.
- Matee M, Magese PM, Lyamuya EF. Seroprevalence of human immunodeficiency virus, hepatitis B and C viruses and syphilis infections among blood donors at the Muhimbili National hospital in Dar es Salam, Tanzania. *BMC Public Health* 2006; 6:21.
- Karmakar PR, Shrivastava P, Ray TG. Seroprevalence of transfusion transmissible infections among blood donors at the blood bank of a Medical College of Kolkata. *Indian J Public Health* 2014;58:61-4.
- Koshy JM, Manoharan A., John M., Kaur R., Kaur P. Epidemiological profile of seropositive blood donors at a tertiary care hospital in North India. *CHRISMED J Health Res.* 2014;1:91-94.

25. Unnikrishnan B,Rao P,Kumar N. Profile of blood donors and reasons for deferral in coastal South India. *Australas Med J.*2011;4:379-385.
26. Mandal R,Mondal K. Transfusion transmissible infections among blood donors from a sub- Himalayan rural tertiary care centre in Darjeeling, India. *J Tradit Complement Med.*2016;6:224-229.
27. Dhruva GA, Agravat AH, Dalsania JD, Katara AA, Dave RG. Transfusion transmitted diseases/infections among blood donors in a tertiary care hospital at Rajkot, Gujarat, India. *Int Res J Med Sci* 2014;2:16-9.
28. Sawke N,Sawke GK,Chawla S. Seroprevalence of common transfusion transmitted infections among blood donors. *Peoples J Sci Res* 2010;3:5-7.
29. Kaur G,Basu S,Kaur R,Kaur P,Garg S. Patterns of infections among blood donors in a tertiary care center: A retrospective study. *Nate Med J India* 2010;23:147-9.
30. Sabharwal ER,Biswas NK,Vishnu Purohit V. Prevalence and patterns of transfusion transmissible infections among blood donors in Sri Ganganagar, Rajasthan,India: A retrospective study. *J Pharm Biomed Sci.* 2012;15:1-4.
31. Patel SV, Popat CN,Mazumdar VS, Shah MB,Shringarpure K, Mehta KG,et al. Seroprevalence of HIV,HBV,HCV and syphilis in blood donors at a tertiary hospital (Blood Bank) in Vadodara. *Int J Med Sci Public Health* 2013;2:747-50.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 19-11-2019; **Accepted:** 30-11-2019; **Published:** 31-12-2019