

## Seroprevalence of transfusion transmitted infections among blood donors at district hospital of banaskantha in North Gujarat, India

Gaurav B. Modi<sup>1</sup>, Hema S Patel<sup>2,\*</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Tutor, <sup>1</sup>Dept. of Microbiology, <sup>2</sup>Dept. of Pathology, Banas Medical College & Research Institute, District General Hospital, Palanpur, Banaskantha, Gujarat, India

**\*Corresponding Author:**

Email: gaurav1985bj@gmail.com

### Abstract

**Aim:** Blood transfusion is a life-saving therapeutic intervention and essential element of a health care system that plays a crucial role in the overall management of patients. Transfusion-transmissible infectious agents such as Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Human Immunodeficiency Virus (HIV) and Syphilis are among the greatest threats to blood safety for recipients and WHO has recommended that these diseases should be screened to get safe blood. This study aimed to evaluate the prevalence of transfusion transmissible infections (TTI) among donors at District Hospital of Palanpur and compare it with other studies.

**Material and Methods:** HBV, HCV and HIV were tested by ELISA and RAPID methods approved by NACO in voluntary as well as replacement blood donors. RPR was carried out for screening of syphilis.

**Results:** Seroprevalence of Transfusion Transmitted Infections (TTIs) among blood donor is 1.712%. The prevalence of HIV, HBV, HCV and syphilis was found to be 0.043%, 0.259% 0.173% and 0.302% respectively in voluntary blood donors as against 0.238%, 1.549%, 0.715% and 1.788% being the seroprevalence of HIV, HBV, HCV and syphilis in replacement blood donors. The seroprevalence of TTIs in replacement donors (4.290%) is higher than voluntary donors (0.777%).

**Conclusion:** Voluntary blood donors have been found to be safer than replacement blood donors. The present study concluded that motivating voluntary blood donors and diligent donor selection are the most effective way of ensuring adequate supplies of safe blood on a continuing basis.

**Keywords:** Seroprevalence, Transfusion Transmitted Infections(TTIs), Blood donor, Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Human Immunodeficiency Virus (HIV), Syphilis.

### Introduction

Blood transfusion, life-saving element is an integral part of patients' management<sup>1</sup>. HIV, Hepatitis, Syphilis, Brucellosis, CMV, EBV, Toxoplasmosis, Malaria and other viral infections are transmitted by blood and its products.<sup>1</sup> There is 1% chance of blood transfusion related diseases.<sup>1</sup>

In 2005, all countries signed a document that commits to supply safe and adequate blood and blood products<sup>2</sup>. Transfusion transmitted infectious diseases remain a major topic of interest for health care related people<sup>2</sup>. As per guidelines of the ministry of health and family welfare under The Drug and Cosmetic Act, 1945, all the blood samples from donors are to be screened against the five major infections namely HIV I & II, HBsAg, HCV, syphilis and malaria<sup>3,4</sup>. With great advancement of medical science, we do not find blood substitute, so blood and blood transfusion remains the most crucial and critical components of health care systems. Thus aim of study is to know sero-prevalence of TTIs among blood donors in blood bank from July 2015-June 2018 of District Hospital, Palanpur and compare it with other studies.

### Material and Methods

Duration of study was from July 2015 to June 2018. All donors coming to donate their blood at Blood Bank, General Hospital, Palanpur, Banaskantha and blood donation camps organised by blood bank were included in this study. Donors were selected by the standard criteria as per government norms. 3155 Serum Samples from blood Donors were tested for prevalence of markers for TTIs viz., HIV, HBsAg, HCV antibody & RPR for syphilis. The screening for HIV was done by ELISA (Merilisa HIV 1-2 Gen 3, Meril Diagnostics), HBsAg was detected by ELISA (Merilisa HBsAg, Meril Diagnostics), and Anti-HCV test was done by ELISA (Erba Lisa HCV Gen3, Erba Manheim) methods using NACO approved commercially available kits... Test for Syphilis was done by Rapid Plasma Reagin (RPR) method (Beacon Diagnostics, India). All the reactive samples were repeated as recommended by NACO (National AIDS Control Organization). After that all the reactive samples were labelled seropositive and respective blood units were discarded as per standard protocols. Further, within the seroreactive group, cases with a combination of  $\geq 2$  TTI's were labeled as co-infection.

### Results

In all, 3155 units of blood were collected and screened for mandatory tests.

**Table 1: Year and Sex Wise Distribution of Blood Donors**

Year And Sex Wise Distribution Of Donors						
Year	Male Donor(3070)		Female Donor (85)		Total Donor (3155)	
	Voluntary	Replacement	Voluntary	Replacement	Voluntary	Replacement
2015 (July to December)	221	98	25	1	246	99
2016	794	342	23	0	817	342
2017	755	235	30	0	785	235
2018 (Upto June-18)	463	162	5	1	468	163
Total	2233	837	83	2	2316	<b>839</b>
Grand Total	3070 (97.31%)		85 (2.69%)		3155(100%)	

From Table 1, Out of 3155 blood donors, 2316(73.41%) were voluntary blood donors and 839(26.59%) were replacement blood donors. Majority of blood donors were male(97.31%). Of these 2316

voluntary blood donors, 2233 (96.42%) were males and 83 (3.58%) were females. There were 837(99.76%) male and 2 (0.24%) female donors in 839 replacement blood donors.

**Table 2: Year wise (%) distribution of seropositive blood donors**

Year	Total		
	Donor	Seropositive	%
2015 (July-December)	345	4	1.15942
2016	1159	27	2.329594
2017	1020	17	1.666667
2018 (Upto June-18)	631	6	0.950872
	3155	54	1.712

As per table 2 there were 54 seropositive donors out of 3155 total blood donors. So prevalence of Transfusion Transmitted Infections (TTIs) among blood donor was 1.712%. From the table, seroprevalence of

TTIs were 1.159%, 2.330%, 1.667% and 0.950% in 2015, 2016, 2017 and 2018 respectively. All seropositive donors were males.

**Table 3: Seroprevalence of transfusion transmitted infections among blood donors**

	Blood Donor		
	Voluntary	Replacement	Total
HIV	1(0.043%)	2(0.238%)	3(0.095%)
HBV	6(0.259%)	13(1.549%)	19(0.602%)
HCV	4(0.173%)	6(0.715%)	10(0.317%)
Syphilis	7(0.302%)	15(1.788%)	22(0.697%)
Total	18(0.777%)	36(4.290%)	54(1.712%)

From Table 3, the prevalence of HIV, HBV, HCV and syphilis were 0.095%, 0.602%, 0.31% and 0.697% respectively. The prevalence of HIV, HBV, HCV and syphilis was found to be 0.043%, 0.259% 0.173% and 0.302% respectively in voluntary donors as against

0.238%, 1.549%, 0.715% and 1.788% being the seroprevalence of HIV, HBV, HCV and syphilis in replacement donors. The seroprevalence of TTIs in replacement donors (4.290%) was higher than voluntary donors (0.777%).

**Table 4: Percentage (%) distribution of transfusion transmitted infections**

	Blood Donor		
	Voluntary	Replacement	Total
HIV	1	2	3(5.55%)
HBV	6	13	19(35.19%)
HCV	4	6	10(18.52%)
Syphilis	7	15	22(40.74%)
Total	18(33.34%)	36(66.66%)	54(100%)

In TTIs, highest numbers of donors (22) were positive for syphilis (40.74%), followed by HBV (35.19%), HCV (18.52%) and HIV (5.55%). TTIs were high in replacement blood donors (66.66%).

**Table-5: Age wise distribution of TTIs**

Age Group	HIV	HBV	HCV	Syphilis	Total
18-30	1	12	4	7	24
31-40	2	6	2	12	22
41-50	0	0	3	2	5
51-60	0	1	1	1	3
Total	3	19	10	22	54

Maximum number of TTIs was found in 31-40 years age group followed by 18-30 age groups. Syphilis was noted more in 31-40 years while HBV was more in 18-30 year age group. 1 voluntary blood donor had co-infection with HBV and Syphilis.

### Discussion

Transfusion Transmissible Infections (TTI's) is to be a threat to safe transfusion practice.<sup>5</sup> With every unit of blood, there is 1% chance of transfusion associated problem including TTI's.<sup>6</sup> Acquisition of HIV disease through blood transfusion was a relatively efficient

mode of transmission, with rates approaching 100%.<sup>7</sup> In 15 percent of total patients infected with HIV, blood transfusion has been the responsible mechanism of transmission.<sup>8</sup> Absolute strict criteria for screening of donors is crucial to supply safe blood and blood products. Voluntary donors mainly consists of students, religious groups and voluntary organizations. Females made a smaller because they were found anaemic and did not fulfil the required fitness criteria. The prevalence of all TTIs was found to be zero among females.

**Table 6: Comparison of seropositivity of blood donors in different studies**

Sr. No.	Author	Area	Year	HIV (%)	HBV (%)	HCV (%)	Syphilis (%)
1	Srikrishna et al <sup>9</sup>	Bangaluru	1999	0.44	1.86	1.02	1.6
2	Kaur et al <sup>10</sup>	Chandigarh	2001-2005	0.6	1.7	0.8	0.7
3	Yanase et al <sup>11</sup>	Philippines	2002-2004	0.006	4.16	0.33	0
4	Gupta N. et al <sup>12</sup>	Ludhiana	2004	0.084	0.66	1.09	0.85
5	Makroo et al <sup>13</sup>	New Delhi	2005-2013	0.24	1.18	9.87	0.43
6	Pahuja S et al <sup>14</sup>	Delhi	2007	0.56	2.23	0.66	0
7	Bhattacharya P et al <sup>15</sup>	West Bengal	2007	0.28	1.46	0.31	0.72
8	Deshpande et al <sup>16</sup>	Latur, Maharashtra	2007-2011	0.38	2.82	0.22	0.22
9	Lathamani et al <sup>17</sup>	Karnataka	2008-2010	0.08	0.53	0.098	0.09
10	Patil et al <sup>18</sup>	Mumbai	2008-2014	0.4	1.48	0.37	0.11
11	Chandra T et al <sup>19</sup>	Lucknow (UP)	2009	0.23	1.96	0.85	0.01
12	Arora D et al <sup>20</sup>	Southern Haryana	2010	0.3	1.7	1	0.9
13	Mandal et al <sup>21</sup>	West Bengal	2010-2012	0.42	1.24	0.62	0.65
14	Nirali shah et al <sup>22</sup>	Ahmedabad	2013	0.16	0.98	0.11	0.23
15	Sulhyan Kalpana R et al <sup>23</sup>	Sangli, Maharashtra	2013-2017	0.24	1.15	0.11	0
16	NACO <sup>24</sup>	Maharashtra	2015	0.19	1.09	0.28	0.04
17	Present Study	Palanpur, Gujarat	2015-2018	0.095	0.602	0.317	0.697

The present study revealed that TTIs were more prevalent in replacement donors than voluntary donors. Same findings with high sero-positivity in replacement donors were noted by Pahuja et al.<sup>14</sup> Chandra et al<sup>19</sup> had found almost negligible TTIs in voluntary donors and no voluntary donor was found to be positive for HIV by Arora D et al.<sup>20</sup>

According to estimations in 2012, there were 20.89 lakh HIV infected people in India.<sup>25</sup> The national average for HBV and HCV positivity in Indian

population are around 4.7%<sup>26</sup> and 1-1.5%<sup>27</sup> respectively.

Prevalence of HIV among blood donor was 0.095% very nearly comparable to Gupta N. et al<sup>12</sup> and Lathamani et al<sup>17</sup> studies.

In present study, prevalence of HBV was 0.602% which was comparable to study of Gupta N. et al,<sup>12</sup> Lathamani et al<sup>17</sup> and Nirali shah et al.<sup>22</sup>

Prevalence of HCV in blood donor was 0.317%. it was below the national average of HCV positivity. Prevalence of HCV was very much close to NACO<sup>24</sup>

and Bhattacharya P et al<sup>15</sup> study and nearly comparable to other studies as per Table 6.

Prevalence of syphilis was 0.697% which was comparable to studies of Kaur et al,<sup>10</sup> Mandal et al<sup>21</sup> and Bhattacharya P et al.<sup>15</sup> There was single donor with co infection over the study period in institute. In our study, most prevalent age group was between 18 to 30 years followed by 31-40 years. There were 24(44.44%) and 22(10.74%) seropositive donors from this age group respectively. Mandal et al <sup>21</sup> also found the highest prevalence of TTI in the age group of 26-35 years. The high infection rates in adult suggests a close relationship in sexually active age groups and high risk behaviour population.

The difference in the values of seropositivity in different studies may be due to the difference in prevalence of TTI in different areas, the different methods of selection of donors and variable proportion of voluntary and replacement blood donations in different studies.

The declining trends in TTI's in the blood donors is a good signal for the society because the risk of getting infections due to transfusion is decreased. The declining trends may be due to the public awareness created by social and electronic media to motivate voluntary donors to self-deferral if they belong to any of the high risk groups. Also the NACO (National AIDS Control Organization) strives very hard in providing latest generation kits for the detection of TTI's so that the transfusion practice remains nearly 100% safe.

Low seropositivity for diseases in our study could be attributed to proper counselling of blood donors and donor selection criteria. As well as GSACS (Gujarat State AIDS Control Society) is making everyone well aware by promoting blood donation activities as well as Blood Banks.

## Conclusion

Blood being a scarce and expensive human resource, should be prescribed very carefully. Prescribing decisions should be based on national guidelines on the clinical usage of blood; taking the individual patient's needs, with minimum cost, safety and efficacy. Motivation of potential local blood donor population would help in effective blood donation program in the community. In short, Voluntary blood donors have been found to be safer than replacement blood donors. The present study concluded that motivating voluntary blood donors and diligent donor selection are the most effective way of ensuring adequate supplies of safe blood on a continuing basis.

## References

1. Widmann FK, editor. Technical manual American association of blood banks. Aglington USA 1985;325-44.
2. WHO (2010). Screening donated blood for transfusion transmissible infections: recommendations. WHO document Government of India.

3. 3Drugs and Cosmetics rules, 1945 (amended till 30THJune2005) available at <http://www.cdsc.nic.in/html/Drugs&cosmeticsAct.pdf> "National Blood Policy" produced & published by NACO (National AIDS Control Organization), Ministry of Health and Family Welfare, Government of India, New Delhi. June 2003 (reprint 2007).
4. Dolly R, Annie S, Thaiyanayaki P, Babu George P, Hohn Jacob T. Increasing prevalence of HIV antibody among blood donors monitored over 9 years in blood bank. *Ind J Med Res*1998;108:42-44.
5. Garg S, Mathur DR, Garg DK. Comparison of seropositivity of HIV, HBV, HCV and Syphilis in replacement and voluntary blood donors in western India. *Ind J Pathol Microbiol* 2001;44:409-412.
6. Ward JW, Deppe DA, Samson S, Perkins H, Holland P, Fernando L, et al. Risk of HIV infection from blood donors who later developed the acquired immunodeficiency syndrome. *Ann Intern Med* 1987;106:61-2.
7. Lal S. Monthly update on HIV infection in India. *Center AIDS Res Contr* 1993;6:133-34.
8. Srikrishna A, Sitalakshmi S, Damodar P (1999) How safe are our 21. Garg S, Mathur DR, Gard DK (2001) Comparison of seropositivity of HIV, HBV, HCV and syphilis in replacement and voluntary 44:409-12.
9. Kaur G, Basu S, Kaur R, Kaur P, Garg S. Patterns of infections among blood donors in a tertiary care centre: A retrospective study. *Natl Med J Ind* 2010;23:147-9.
10. Yanase Y, Ohida T, Kaneita Y, Agdamag DMD, Leano PSA, Gill CJ. The prevalence of HIV, HBV and HCV among Filipino blood donors and overseas work visa applicants. *Bulletin World Health Organization* 2007;85:131-37.
11. Gupta N, Kumar V, Kaur A (2004) Seroprevalence of HIV,HBV,HCV and syphilis in voluntary blood donors. *Ind J Med Sci* 58:255-57.
12. Makroo RN, Hegde V, Chowdhry M, Bhatia A, Rosamma NL. Seroprevalence of infectious markers and their trends in blood donors in a hospital based blood bank in north India. *Ind J Med Res* 2015;142:317-22.
13. Pahuja S, Sharma M, Baitha B, Jain M (2007) Prevalence and trends of markers of hepatitis C virus, hepatitis B virus and human immunodeficiency virus in Delhi blood donors. A hospitalbased study. *Jpn J Inf Dis* 60:389-91.
14. Bhattacharya P, Chakraborty S, Basu SK (2007) Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004-2005. Exploratory screening reveals high frequency of occult HBV infection. *World J Gastroenterol* 13:3730-33.
15. Deshpande RH, Bhosle S, Gadgil PA, Sonawane M. Blood donor's status of HIV, HBV, HCV and syphilis in this region of Marathwada, India. *JKIMSU* 2012;1:111-6.17. Lathamani K, Bhaktha G, Nayak S, Kotigadde S. Prevalence of HIV, HCV, HBV and Syphilis in blood donors among Dakshina Kannada District, India. *Int J Curr Microbiol App Sci* 2013;2:249-52.
16. Patil AS, Pawar AS. Blood donation in Maharashtra: prevalence of transfusion transmitted infections in blood donors. *Int J Pharm Bio Sci* 2015;6:981-87.
17. Chandra T, Kumar A, Gupta A (2009) Prevalence of transfusion transmitted infections in blood donors: an Indian experience. *Trop Doct* 39:152-54, *Ind J Hematol Blood Transfus* 2011;27(1):1-65.
18. Arora D, Arora B, Khetarpal A (2010) Seroprevalence of HIV, HBV, HCV and syphilis in blood donors in Southern Haryana. *Indian J Pathol Microbiol* 53:308-309 21.

- 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;6:224-29.
19. World Health Organization (WHO). Blood Safety Strategy for the African Region. Brazzaville, World Health Organization, Regional Office for Africa (WHOAFR /RC51/9 Rev.1). 2002.
  20. Makroo RN, Hegde V, Chowdhry M, Bhatia A, Rosamma NL. Seroprevalence of infectious markers and their trends in blood donors in a hospital based blood bank in north India. *Ind J Med Res* 2015;142:317-22.
  21. Assessment of NACO supported blood banks, A preliminary report 2016. National AIDS Control Organisation Available at: <http://naco.gov.in/sites/default/files/Assessment%20of%20NACO%20supported%20BBs%20in%20India.pdf> accessed on 26/07/2017.
  22. Annual Report 2013-14. New Delhi: 2014. p.ix. 26. Anand V, Bhaktha G, Sridevi V. Prevalence of HIV, HCV an HBV in blood donors among the population of Bhadravathi Taluk, Karnataka, India. *IJPCBS* 2015;5(1):126-8.
  23. Acharya SK. Hepatology in India. Sailing without a mast. *Trop Gastroenterol* 1999;20:145.