

Prevalence of HIV, Hepatitis B, Hepatitis C and Syphilis in donor's blood: A study from eastern part of India

Swapan Kumar Sinha¹, Sudarshana Roychoudhury^{1,*}, Kuntal Biswas¹, Pranab Biswas¹, Ranjana Bandopadhyay²

¹ Department of Pathology, Medical College, Calcutta, India

² Department of Pathology, Burdwan Medical College, India

Corresponding Author & Address:

Sudarshana Roychoudhury*

Medical College, Calcutta, 88 College Street, Kolkata- 700073, West Bengal, India. Tel: 033- 22551632;

Email: madhua83@gmail.com

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ABSTRACT

Objectives: Voluntary donor selection and screening of donor's blood for infective agents are the cornerstones of transfusion medicine. Strict donor selection criterion, proper counselling and deferred collection may reduce wastage of resources.

Materials and Methods: During the period of 01.01.2007 to 31.12.2008, a total number of 44,173 units of blood were collected from healthy voluntary donors. There were 39,734 males and 4,439 were females with a ratio of 9:1. Age ranged from 18-60 years. Blood was collected CPDA-1 bags.

Discussion: All blood samples were tested for HIV I & II, Hepatitis B surface Antigen, Hepatitis C and VDRL (Reagin) for Syphilis. It was observed that 283 tested positive for HIV (0.64%), 1001 were positive for HbsAg (2.27%), 717 were positive for HCV (1.62%) and 577(1.31%) were Regain (VDRL) positive. Total 2,578 Units (5.8%) of blood were discarded due to presence of infective agents. There was a significant increment in HbsAg prevalence among blood donors from 2007 to 2008.

Conclusion: Strict quality control, proper counselling of donors and training of blood transfusion personnel including deferring of suspected donors may help wastage of huge resources and reduce inventory.

INTRODUCTION

Blood transfusion, an integral part of medicine and surgery, also carries the risk of transfusion-transmissible infections like Hepatitis

B and C, HIV and Syphilis, malaria and infrequently toxoplasmosis, brucellosis and viral infections like CMV, Epstein Barr Virus and Herpes [1]. Measuring their severity, WHO has recommended pre-transfusion blood test for HIV, HBV, HCV and Syphilis as mandatory [2]. All these diseases are

capable of causing significant mortality, morbidity along with a financial burden for both the affected person and the country.

With every one unit of blood transfusion there is 1% chance of transfusion related complications including Transfusion transmitted infections [1]. An increase in Transfusion related infection has been reported in India [3]. India is already carrying a burden of 50 million of HBV carriers [4] and 2.27 million of HIV cases [5]. Keeping in mind the grave consequences of these infections and to restrain the transmission to minimum, it is very important to remain vigilant about the possible spread of these diseases through blood transfusion.

In our study, we aimed to estimate the prevalence of HIV, HBV, HCV and Syphilis among blood donors. It would also reflect on the blood safety measurements and can be carefully extended to provide estimation about the disease burden in the community. We included two consecutive years in our study to identify the trend of increase or decrease among these diseases.

MATERIALS AND METHODOLOGY

Blood was collected from healthy voluntary donors through blood camps organized by various voluntary organizations and student bodies including the students of Medical College, Kolkata. Name, age (18-60 years), Sex, date of birth, address and contact number were recorded for each donor, while giving them a unique identification number. Donors with history of any febrile illness in the recent past, weight loss,

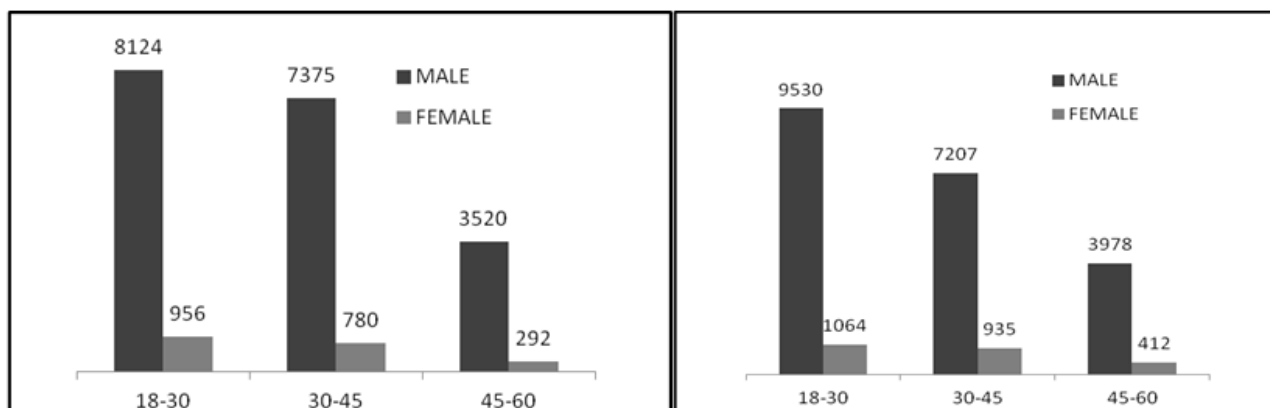
uncontrolled diarrhea, recent jaundice, liver disease, cardiovascular disease, pulmonary disease, malignancy, epilepsy, malaria, unusual or excessive bleeding, recent donation of blood, receipt of blood, and taking contraindicated drugs were excluded. Detailed history of immunization was taken. Weight, pulse, blood pressure and temperature were recorded for each patient. Screening for anemia was done clinically along with copper sulfate specific gravity method. Inspection was made for any marks of drug abuse or any skin lesions/ infections at the venepuncture site. A written informed consent was taken from each patient before the blood donation. Proper sterilization and other precautions were taken during the blood collection and blood units were stored by appropriate methods.

After collection all samples were screened for Human Immunodeficiency Virus I & II: By microwell ELISA to detect antibodies against HIV I & II in plasma. Hepatitis B Virus: By microwell ELISA, Hepatitis C Virus: By microwell ELISA and Treponema Pallidum: Detection of Treponemal Antibodies (Reagin) by Rapid Plasma Reagin Test.

RESULTS AND OBSERVATIONS

A total of 44,173 units of blood were collected during the period of 01-01-2007 to 31-12-2008. In 2007 out of total 21,047 units, 19,019 (90.36%) units were from male donors and 2,028 (9.64%) units were from female donors. In 2008 a total of 23,126 units of blood were collected among them 20,715 (89.6%) units were from male donors and 2,411 (10.4%) units were donated by female donors (Table 1).

Figure 1: Age distribution of male and female donors



Male and female donors were subdivided into three age groups between 18-30 years, 30-45 years and 45-60 years. Maximum donors were from the age group of 18-30 years in both 2007 and 2008 (Figure 1, Supplementary Tables).

Table 1: Percentage of Male and Female donors among total donors

Year	Male Donors	Female Donors
2007	19,019 (90.36%)	2,028 (9.64%)
2008	20,715 (89.6%)	2,411 (10.4%)

2007 prevalence rate for HIV, HBV, HCV and Syphilis were 0.62%, 2.04%, 1.53%, and 1.47%

respectively. In 2008 respective prevalence rates were 0.66%, 2.47%, 1.70% and 1.15%. In relative risk analysis significant statistical difference were found in case of HBV and Syphilis (Table 2, Figure 2). Frequency of co-infection among these viruses was negligible. When we looked into gender variation of prevalence it was found that in both HBsAg and VDRL the relative risks were significantly different in the male age groups, more specifically male age group above 30 years (Table 3, Figure 3). For other subgroups there was no statistically significant variation in the prevalence of TTIs (Supplementary Tables).

Table 2: Prevalence of TTI among blood donors in the year 2007-2008

Disease	No of samples reactive		Statistical Analysis	
	2007	2008	RR Value with 95% Confidence Interval	P value
HIV	131 (0.62%)	152 (0.66%)	1.05 (0.84-1.33)	0.6466
HBsAg	430 (2.04%)	571 (2.47%)	1.2 (1.07-1.37)	0.0027*
HCV	323 (1.53%)	394 (1.7%)	1.1 (0.96-1.3)	0.1605
Syphilis	310 (1.47%)	267 (1.15%)	0.78 (0.67-0.92)	0.0033*

Figure 2: Prevalence of TTI in 2007-2008

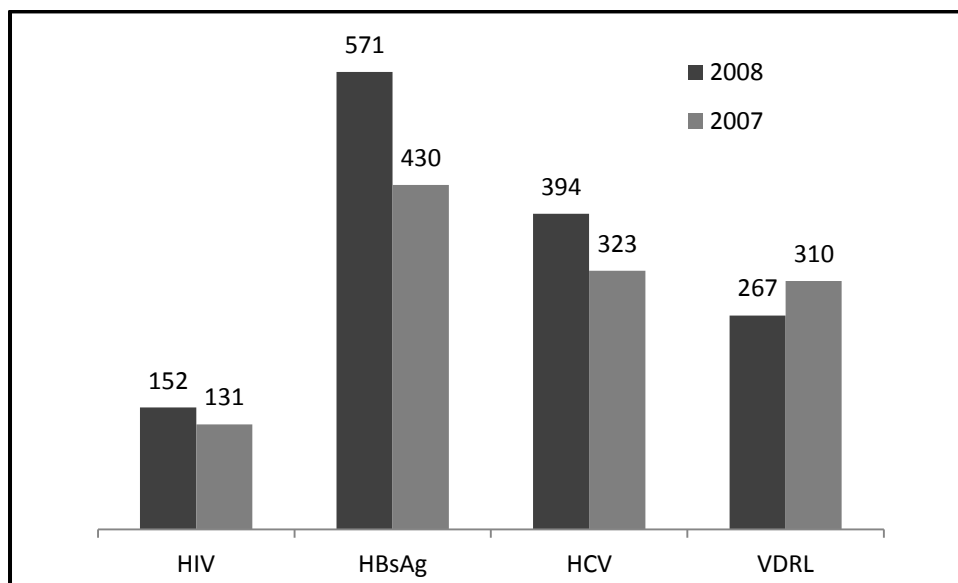


Figure 3: Gender Specific prevalence of TTI in 2007 and 2008

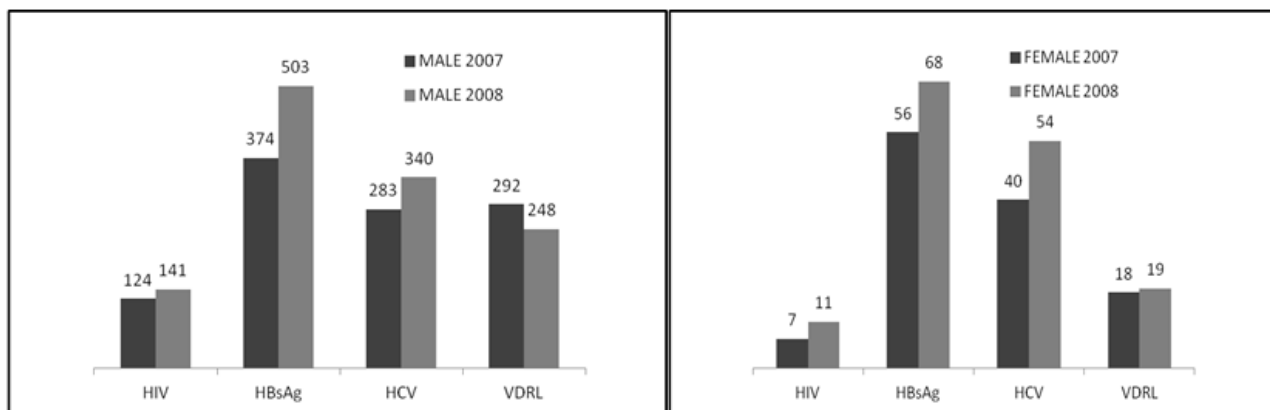


Table a	No of samples reactive for male population		Statistical Analysis	
Disease	2007	2008	RR Value with 95% Confidence Interval	P value
HBsAg	374 (1.97%)	503 (2.43%)	1.23 (1.08-1.41)	0.0018*
Syphilis	292 (1.54%)	248 (1.2%)	0.78 (0.66-0.92)	0.0037*

Table b	No of samples reactive in Total Male Population for HBsAg		Statistical Analysis	
Age Group	2007	2008	RR Value with 95% Confidence Interval	P value
18-30 years	92	105	0.97 (0.74-1.29)	0.85
30-45 years	176	235	1.37 (1.13-1.66)	0.0015*
45-60 years	106	163	1.36 (1.07-1.73)	0.012*

Table c	No of samples reactive in Total Male Population for Syphilis		Statistical Analysis	
Age Group	2007	2008	RR Value with 95% Confidence Interval	P value
18-30 years	51	61	1.01 (0.7-1.48)	0.91
30-45 years	130	98	0.77 (0.59-1.00)	0.0506 ⁺
45-60 years	111	89	0.70 (0.54-0.93)	0.0145*

Table 3: a) Male population based differences in the prevalence of HBsAg and Syphilis. b) Age distribution specific differences in the prevalence of HBsAg. c) Age distribution specific differences in the prevalence of Syphilis. (* approaching significant)

DISCUSSION

Most of the donors, who were recruited in this study, came from public awareness. It was to be noted that maximum number of donors came from age group 18-30 years. It may reflect proper awareness among the young population about

blood donation. Percentages of female donors have been low for both the years. Similar trend has been noted in earlier reports also [3, 6]. Efforts should be made to improve the numbers of female donors. More awareness among female population by holding camps in women's colleges, training and recruiting more female stuffs and an

improvement in privacy of these blood camps should be done to encourage more females to donate blood. Apart from recruiting new donors, measures should be taken to retain previous donors.

In case of HBsAg there was a statistically significant increase in the prevalence (p Value 0.0027) and there was a decrease in the trend for the prevalence of syphilis (p value 0.0033). But it is very important to take care about sex and age distribution of these infections. When we stratified the data on the basis of sex and age we found that for HBsAg the prevalence rate was statistically significant only for male population above 30 years of age. Similar trend was present in the syphilis also. No statistically significant difference was there among female population even among different age groups. ([Supplementary Tables](#)). This data suggests we have to be more careful about the prevalence of HBsAg in male population over 30 years. On the other hand, it was an encouraging sign that prevalence of Syphilis decreased in the same population.

A total number of 2578 units of blood were discarded due to presence of infection from the above viruses. More stringent criteria for proper donor selection may help to cut down the wastage.

Testing the blood serum for various antibodies and more conservative guidelines for blood transfusion have been effective and have successfully brought down the transmission rate. Inability of the serological tests to detect the diseases in their window period and virus immunological variants is a major drawback in making the preventive approaches more effective. Earlier studies have shown that even HBsAg negative bloods may be anti-HBc/ HBV DNA positive and may retain the capacity to transmit infection [7]. Presence of occult HBV infection has also been reported from various parts of India [8, 9, 10, 11]. As a result TTI still remains a concern

for both the patient and the physician.

Previous studies have reported that prevalence of an infection among the donors reflects the disease burden in the society [12]. The prevalence rate obtained from this study found to be a bit higher from various previous reports [10, 13, 14]. This may be due to variation in the population or may reflect an increased burden of infection in the community. Increased prevalence of HBV among the donors underscores the concern about growing infection of this disease in the community. In India transfusion associated HBV is estimated to be approximately 50% or more in multiple transfused patients and approximately 1.5% in post surgical recipients [15]. Thus the absence of HBsAg in the blood of apparently healthy individuals may not be sufficient to ensure lack of circulating HBV. More appropriate methods need to be applied to find out the exact scenario.

CONCLUSION

Prevalence of HIV, HBV, HCV and Syphilis among donors blood in 2007-2008, detected the increase in HBV prevalence, especially among male above 30 years of age, and poor women participation in blood donation activities. Aptly taken measures may decrease TTI and improve the ratio of women donors.

ABBREVIATIONS

CMV – Cyto Megalo Virus

ELISA – Enzyme-Linked Immunosorbent Assay

HBV – Hepatitis B

HCV – Hepatitis C

HIV – Human Immuno Deficiency Virus

TTI – Transfusion Transmissible Infections

CONFLICT OF INTEREST

There was no conflict of interest to declare.

REFERENCES

- [1] Widmann FK, editor. Technical manual American Associations of Blood Banks. Anglington USA: 1985; 325-44.
- [2] Screening Donated Bloods for Transfusion-Transmissible-Infections, World Health Organization,

(<http://www.who.int/bloodsafety/ScreeningTTI.pdf>).

- [3] Rose D, Sudarsanam A, Padankatti T, Babu PG, John TJ. Increasing Prevalence of HIV antibody among blood donors monitored over 9 years in

- blood donors monitored over 9 years in blood banks. *Indian J Med Res.* **1998**; 108: 42-4.
- [4] Prevention of Hepatitis B in India; An Overview, World Health Organization, Regional Office for South-East Asia, New Delhi, August **2002**. (http://whqlibdoc.who.int/searo/2002/SEA_Hepatitis-5.pdf)
- [5] Annual Report to the people on Health, Government of India, Ministry of Health and Family Welfare, September, **2010**. (<http://mohfw.nic.in/WriteReadData/l892s/9457038092AnnualReportHealth.pdf>)
- [6] Rao P, Annapurna K. HIV status of blood donors and patients admitted in KEM hospital Pune. *Indian J Hemat Blood Transf.* **1994**; 12: 174-6.
- [7] Hennig H, Puchta I, Luhm J, Schlenke P, Goerg S, Kirchner H. Frequency and load of hepatitis B virus DNA in first-time blood donors with antibodies to hepatitis B core antigen. *Blood.* **2002**; 100: 2637-41.
- [8] Chaudhuri V, Nanu A, Panda SK, Chand P. Evaluation of serologic screening of blood donors in India reveals a lack of correlation between anti-HBc titre and PCR-amplified HBV DNA. *Transfusion.* **2003**; 43: 1442-8.
- [9] Duseja A, Sharma S, Subramanian PG, Agnihotri SK, Chakraborti A, Chawla Y. Occult hepatitis B virus (HBV) infection in healthy blood donors. *Indian J Pathol Microbiol.* **2003**; 46: 690-2.
- [10] Bhattacharya P, Chandra PK, Datta S, Banerjee A, Chakraborty S, Rajendran K, Basu SK, Bhattacharya SK, Chakravarty R. 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.* **2007**; 13: 3730-3.
- [11] Behzad-Behbahani A, Mafi-Nejad A, Tabei SZ, Lankarani KB, Torab A, Moaddeb A. Anti-HBc & HBV-DNA detection in blood donors negative for hepatitis B virus surface antigen in reducing risk of transfusion associated HBV infection. *Indian J Med Res.* **2006**; 123: 37-42.
- [12] Shukla RS, Bhuyan KK. Can Data on HIV Seroreactivity among Blood Donors Provide an Insight into HIV Prevalence in the General Population?. *Indian J Public Health.* **2007**; 51: 14-21.
- [13] Srikrishna A, Sitalakshmi S, Damodar P. How safe are ours safe donors? *Indian J Pathol Microbiol.* **1999**; 42: 411-6.
- [14] Arora D, Arora B, Khetarpal A. Seroprevalence of HIV, HBV, HCV and Syphilis in blood donors in Southern Haryana. *Indian J Pathol Microbiol.* **2010**; 53: 308-9.
- [15] Saraswat S, Banerjee K, Chaudhury N, Mahant T, Khandekar P, Gupta RK, Naik S. Post-transfusion hepatitis type B following multiple transfusions of HBsAg-negative blood. *J Hepatol.* **1996**; 25: 639-43.



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