

Original Research Article

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## Prevalence of HIV, HBV, HCV and Syphilis in Blood Donors at Blood Bank in a Tertiary Hospital in Mandya District, Karnataka, India

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### ABSTRACT

#### Keywords

HIV infection, HBV, HCV, prevalence, Syphilis, transfusion.

#### Article Info

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Blood transfusion saves millions of people worldwide each year, but in developing countries like India, Transfusion Transmitted Infections (TTI's) poses a great problem. With every unit of blood, there is 1% chance of transfusion-associated problems including transfusion-transmitted diseases. Viral infections cause the majority of morbidity and mortality in blood recipients. According to WHO estimate every year, due to lack of effective screening of blood donors results in up to 160,000 new cases of HIV, 16 million new infections with HBV, and 5 million new HCV infections. Therefore Screening of the blood donors is very essential in preventing Transfusion Transmitted Infections (TTI's). Purpose: Study aims to know the prevalence of serological markers for HIV, HBV, HCV and Syphilis among the voluntary and replacement blood donors. Also To know the high risk age group among the blood donors infected with transfusion transmitted infections. A written n informed consent taken. All the blood samples collected from donors with sterile aseptic precautions. Screening blood samples for HIV, HBV, HCV done by ELISA and for Syphilis by RPR test. All the positive samples were retested by rapid Card method. Results: Out of total 14520 blood donors 12432(85.6%) were Voluntary donors and 2088 (14.4%) were replacement donors. A total of 212 samples found to be positive for Transmission transmitted Infections. Study demonstrated prevalence of HBV infections as 1.06%, followed by HIV as 0.2 %, HCV infections as 0.14% and Syphilis as 0.05%. Conclusion: The study demonstrated overall prevalence of Transfusion Transmitted Infections to be low i.e., 1.4%

### Introduction

Blood transfusion history dates back about 200 years. The credit of first successful human to human blood transfusion goes to Dr. James Blundell, an obstetrician, who successfully transfused 8 oz (227 ml) of blood to a patient of postpartum hemorrhage in 1818 (Mahmud, 2009). In developing countries, the prevalence of transfusion-transmitted disease is much higher and far from attaining a “zero risk” level at the

present moment. With every unit of blood, there is 1% chance of transfusion-associated problems including transfusion-transmitted diseases (Widmann *et al.*, 1985). Viral infections cause the major part of mortality and morbidity in blood recipients. The majority of known cases of post-transfusion hepatitis has been caused by hepatitis B (HBV) or hepatitis C virus (HCV) (Mahmud, 2009).

According to WHO estimate the lack of effective screening of blood donors results in up to 16 million new infections with HBV, 5 million new infections with HCV and 160,000 new cases of HIV infections every year. India is the 2<sup>nd</sup> most populous nation in the world. The Indian subcontinent is classified as an intermediate Hepatitis B Virus (HBV) endemic (HBs Ag carriage 2-7%) zone and has the second largest global pool of chronic HBV infections. India has a population of more than 1.2 billion with 5.7 (reduced to 2.5) million Human Immunodeficiency Virus (HIV) positive, 43 million HBV positive and 15 million HCV positive persons.

A recent study by Pahuja *et al.*, in 2007 revealed alarming high prevalence of HIV, anti-HCV, and HBs Ag (0.56%, 0.6%, and 2.23%, respectively) among blood donors of a metropolitan city like Delhi (Giri *et al.*, 2012).

There is significantly reduced transfusion-transmitted diseases in most developed countries because of improved screening and testing of blood donors. But in developing nations, poor health education and lack of awareness result in the reservoir of infections in the population.

The main purpose of this study investigated to know the prevalence of serological markers for HIV, HBV, HCV and Syphilis in blood donors in tertiary hospital blood bank, Mandya District. And also to know the high risk age group among the blood donors infected with transfusion transmitted infections.

## **Materials and Methods**

All apparently healthy adult voluntary donors at blood camps organized by Blood Bank, District Hospital Mandya, Karnataka

and replacement donors were taken into study. Written informed consent was taken. Each donor's Name, Age, Sex, Date of birth, contact number and permanent address were recorded.

A detailed history collected and general physical examination was done. Pulse, blood pressure, temperature and Weight were recorded for each donor. Any donor with history of any acute illness in the recent past, jaundice, pulmonary disease, Tuberculosis, cardiovascular disease, recent liver disease, uncontrolled diarrhea, and malignancy was noted and excluded.

Any donor with history of significant weight loss, malaria, epilepsy, unusual or excessive bleeding and who has recently donated blood within 3 months was excluded. Donors on anti-diabetic, anti-platelet or anti-epileptic drugs were excluded.

Donors below 18 years and above 60 years and women who were menstruating also excluded.

Detailed immunization history was also noted. All donors were screened for anemia and for any skin lesions, marks of drug abuse or any active infections at the venipuncture site was also recorded.

Blood was collected with standard aseptic precautions and stored.

A total of 14,520 blood units collected from healthy voluntary and replacement donors during the period from January 2013 to December 2014.

All donor samples were screened for

- ✓ Hepatitis B surface antigen,
- ✓ HBV and

- ✓ HCV by ELISA, Microlisa-J. Mitra & Co.),
- ✓ RPR test for Syphilis by Span Diagnostics Ltd. and
- ✓ Malaria by rapid card test (Meriscreen by Meril Diagnostics).

All the tests performed according to the manufacturer's guidelines.

All the reactive samples were repeated in different test with different principle before labeling them seropositive.

The donated blood discarded whenever the donor sample was found positive for any TTI.

The statistical analysis was done using the  $\chi^2$  test.

## **Results and Discussion**

Following screening of all blood donors results were tabulated

Table (1) shows Year wise distribution of voluntary blood donors and replacement donors

Out of total (14520) blood donors majority i.e., 85.6% (12432) were voluntary donors and 14.4% (2088) were replacement donors.

Table (2) Shows distribution of Transfusion Transmitted Infections in various age groups

Of the total 14520 blood samples screened, 212(1.4%) samples were positive for Transfusion Transmitted Infections. Overall percentage was 1.4%.

Majority of donors i.e., 48(69.8%) positive samples were from the age group 18-30 years. Next common age group was 31-45 years which were 60(28.3%). Among both

the age groups Hepatitis B infection was predominant.

Table (3) Shows percentage distribution of Transfusion Transmitted Infections in Voluntary blood donors and Replacement donors.

In our study majority of samples were positive for Hepatitis B infections 154(72.6%), followed by HIV infection 29(13.6%), HCV infections 21(10%) and Syphilis 8(3.8%) in that order, out of total 212 positive samples.

In our study overall prevalence of Hepatitis B infections was 1.06%, followed by HIV 0.2%, HCV 0.14% and Syphilis 0.05%, respectively out of total 212 positive samples.

Voluntary donors were positive in 183(86.3%) cases and Replacement donors were positive in 29 (13.7%) cases.

Prevalence of Hepatitis B virus infection was more (86.2%) among replacement donors compared to 70.5% in voluntary donors.

Blood borne infections are serious problems encountered in blood transfusion. Transfusion related infections have been averted in developed countries by reducing unnecessary transfusions. By using only regular voluntary donors and excluding donors with specific risk factors, this problem can be minimized. Systematic screening of all donated blood for infection also helps in addressing transfusion-transmitted infections. In contrast, in many developed countries, these interventions are applied uniformly and the risk of transfusion-transmitted infections found to be low.

In our study out of 14520 blood donors, 85.6% (12432) were voluntary donors and 14.4% (2088) were replacement donors, which is similar to the study done by Dr. Nirali Shah *et al.*, (2013).

We can attribute the increase in voluntary donors to the increasing public awareness and involvement of government bodies like NACO (National AIDS Control Organization) who actively propagate voluntary donation in our country.

But in a study by Arora *et al.*, (2010) and Makroo *et al.*, (1996) replacement donors constitute the largest group of blood donors in India, similar findings were reported by other studies (Bharat Singh *et al.*, 2004; Makroo *et al.*, 2011; Beenu Thakral *et al.*, 2006; Sangeethapahuja *et al.*, 2007; Nalini Gupta *et al.*, 2004).

In our study, 98% donors were males, and 2% were females which are similar to other studies.

In our study, among the positive samples 69.8% belong to the age group of 18-30 years, and 28.3% belong to 31-45 years age group, which was similar to other studies.

In our study, of the 14520 blood samples screened, 212(1.4%) samples were positive for Transfusion Transmitted Infections (TTI's), but in a study by Lathamani *et al.*, it was found to be 0.82% (Lathamani *et al.*, 2013).

In our study, overall prevalence of HBV, HIV, HCV and Syphilis was 1.06%, 0.2%, 0.14% and 0.05% respectively of total 212 positive samples. Prevalence of Hepatitis was commonest among the Transfusion transmitted infections, 70.5% in voluntary and 86.2% in replacement donors.

In a study in Haryana by Dimple Arora *et al.*, seroprevalence of HIV, HBs Ag, HCV

and syphilis was 0.3%, 1.7%, 1.0% and 0.9% respectively. No voluntary donor was found to be HIV positive. The seroprevalence of hepatitis and syphilis were more in replacement donors as compared to voluntary donors.

In a study by Nirali Shah *et al.*, seroprevalence of HIV, HBV, HCV and syphilis was found to be 0.15%, 0.9%, 0.1% and 0.2% respectively. Overall seroprevalence was more in replacement blood donors than that in voluntary blood donors.

Study by Bharath Singh *et al.*, showed prevalence of HBs Ag and anti-HCV antibodies was 1.8% and 0.5% respectively. 83.6% were replacement donors. The prevalence of HBs Ag and anti HCV antibodies ranged between 1.7- 2.2% and 0.25 -0.9%, respectively among the donors.

In their study of HIV infections in blood donors, by Makroo *et al.*, prevalence of HIV was 0.25%. Of the donors that were tested positive for HIV, 97.4% were males and 2.6% were females. A high rate of HIV positivity 54.9% was seen in the age group of 18-30 years and 31-40 years age group showed the second highest rate of HIV positives (27.7%).

Beenu Thakral *et al.*, in her study of seroprevalence of HCV in blood donors, found it to be 0.44%. Interestingly there was no history of blood transfusion in any of these donors. They concluded that HCV-positive donors should be informed about their disease, counseled and referred to Hepatologist, and prevented for future donations permanently.

In a study by Sangeetha Pahuja *et al.*, prevalence of HIV, HBV and HCV was found to be 0.56%, 2.23%, and 0.66%, respectively. Of all the TTI's, they found a

significant decreasing trend for HCV, but not for HIV and HBV infections.

Sonia Garg *et al.*, in their study found prevalence of HIV as 0.44%, HBV as 3.44%, HCV as 0.25% and syphilis as 0.22%.

Jashim *et al.*, in Bangladesh, found the prevalence of HIV as 0.135%, HBV as 1.4%, HCV as 0.13% and syphilis as 0.46%.

Prasun Bhattacharya *et al.*, in their study found the prevalence of HBV as 1.66%, HIV as 0.35%, HCV as 0.35% and syphilis as 0.8%. Serious concerns were raised regarding the safety of the blood supply in the community, even after donor were screened for HBs Ag. Transfusion associated HBV infection in India was estimated to be approximately 50% or more in patients who has received multiple transfusion. They found that, in apparently healthy individuals absence of HBs Ag in the blood may not be sufficient to ensure lack of circulating HBV. Blood containing anti-HBc antibodies with or without detectable presence of HBs Ag might be infectious. They suggest that routine anti-HBc screening of blood donations could prevent some transfusion transmitted HBV infections. Lathamani *et al.*, in their study

found prevalence of HIV as 0.08%, HBV as 0.5%, HCV as 0.098% and syphilis as 0.09%.

Medical history by professional or replacement donors, if concealed pose a great threat to safe blood supply. Asymptomatic carriers in the society, blood donations during the window period, laboratory errors and genetic variability in the viral strains also pose problems (Ekadashi *et al.*, 2009).

**Prevention of transfusion-transmitted infections**

Strategies have been extremely effective but transmission of diseases still occurs, primarily because of the inability of the test to detect the disease in the ‘window’ phase of their infection.

High cost of screening tests,

Lack of funds and trained laboratory personnel, Genetically variant viruses,

Non-seroconverting immune silent or chronic carriers and Laboratory testing errors.

**Table.1** Year wise distribution of Blood donors

Year	Total Blood donors	Voluntary donors (%)	Replacement donors (%)
2013	7398	5908(79.9)	1490(20.1)
2014	7122	6524(91.6)	598(8.4)
Total	14520	12432(85.6)	2088(14.4)

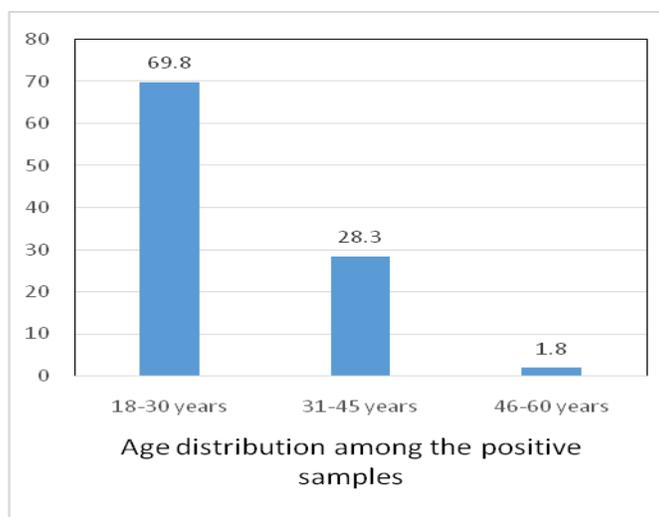
**Table 2** Age wise distribution of Transfusion Transmitted Infections in blood donors

Age group	HIV (%)	HBV (%)	HCV (%)	RPR (%)	Total
18-30 years	23	108	13	4	148(69.8)
31-45 years	6	42	8	4	60(28.3)
46-60 years	-	4	-	-	4(1.8)
Total	29(13.6)	154(72.6)	21(10)	8(3.8)	212

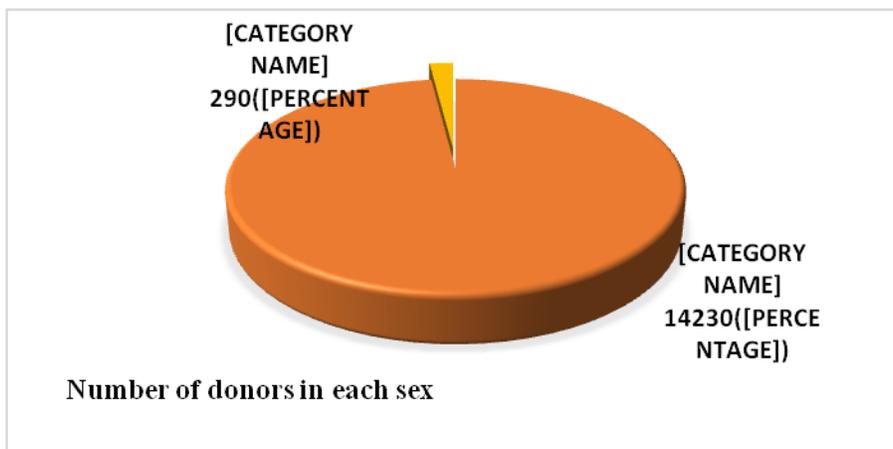
**Table.3** Percentage distribution of Transfusion Transmitted Infections in Voluntary blood donors and Replacement donors

TTI	No of voluntary donors (%)	No of replacement donors (%)	Total (%)
HIV	27(14.8%)	2(6.9%)	29
HBV	129(70.5%)	25(86.2%)	154
HCV	19(10.4%)	2(6.9%)	21
Syphilis	8(4.3%)	0	8
Total	183(100%)	29(100%)	212

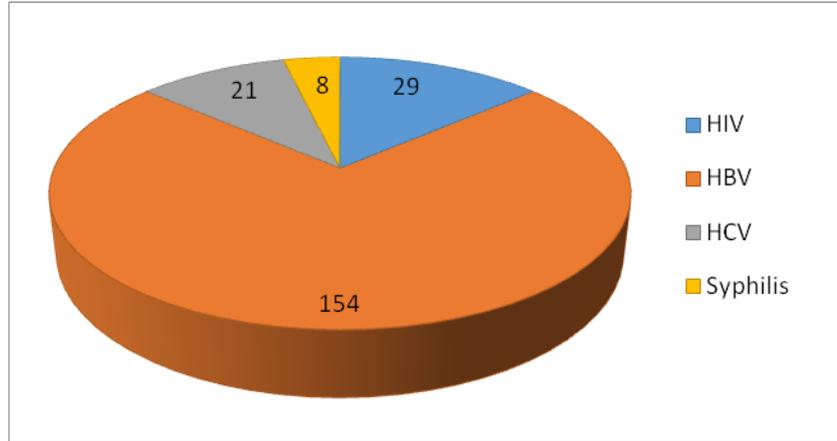
**Fig.1** Percentage distribution positive samples among age groups



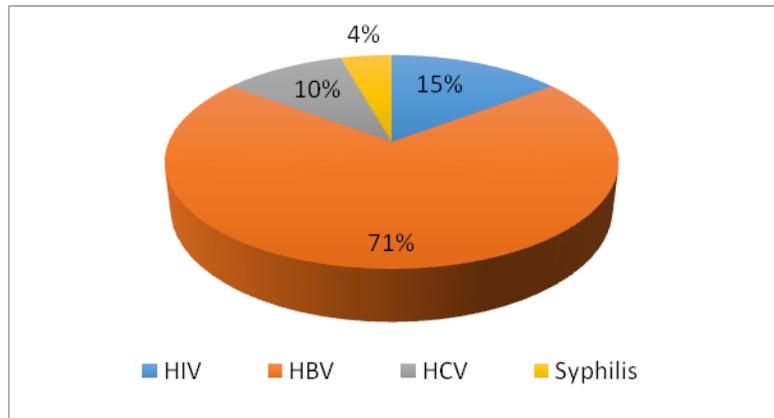
**Fig.2** Percentage distribution of blood donors by Sex



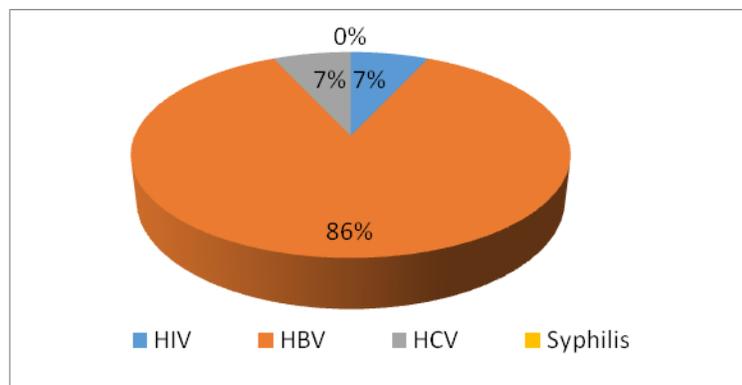
**Fig.3** Distribution of various TTI's in positive samples among blood donors



**Fig.4** Percentage prevalence of Transfusion transmitted infections in Voluntary donors



**Fig.5** Percentage distribution of Transfusion transmitted infections in replacement donors



In conclusion, out of 14520 healthy donor samples, 212 cases screened positive.

Overall prevalence of TTI's was 1.4%. Voluntary donors forms the majority 85.6%

in our study, it shows good awareness among the population. In our study overall prevalence of HBC, HIV, HCV and Syphilis was 1.06%, 0.2%, 0.14% and 0.05% respectively. Among the transfusion transmitted infections, Hepatitis B virus was more common in both voluntary and replacement donors, 70.5% and 86.2%, respectively. Among positives samples 98% were males and 2% females, highest 69.8% were between 18 to 30 years, the second highest 28.3 % were from 31-45 age group. Study proves that many apparently healthy blood donors are not safe donors, so extensive donor selection and screening is mandatory. The present study concludes that motivating voluntary blood donors is the most effective way of ensuring adequate supplies of safe blood on a continuing basis.

### **Recommendations**

To reduce the risk of these infections non-remunerated repeat voluntary donor services need to be instituted.

The emphasis must also be laid on voluntary risk reduction, which will require increased awareness and change in the attitude of people.

Sterile aseptic precautions should be followed by medical staff while collecting and performing tests.

Even though the seroprevalence of blood borne infection is low among voluntary blood donors in Mandya, a larger study to generate more accurate estimates of the magnitude of the transfusion-transmissible infectious diseases would be needed. Thus understanding the demographic data would still reduce the overall burden on health care system.

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