

Original Research Article

# Serosurveillance of Blood Donors

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## Abstract

**Background:** The evaluation of data of prevalence of Transfusion Transmitted Infections (TTIS) among blood donors permits an assessment of infections in donor population and consequently the safety of collected donations. It also gives an idea of the epidemiology of these infections in the community.

**Aim:** To find out the seroprevalence of transfusion transmissible infections, namely HIV, HBV and HCV, among voluntary and replacement donors, coming to the Department of Transfusion Medicine at Gandhi Hospital.

**Materials and methods:** Total of 16,872 units of blood were collected from voluntary and replacement donors during the study period from January 2014 to December 2015. All blood samples were screened for (HIV) Human Immuno deficiency Virus, (HBV) Hepatitis B Virus and (HCV) Hepatitis C Virus.

**Results:** out of the total of 16,872 units of blood donors, replacement donors were (91.6%) more compared to voluntary donors (8.4%). The seroprevalence of TTI was 1.85% in total donors. The seroprevalence of HIV was 0.18% in total donors. No voluntary donor was found to be reactive for HIV. The seroprevalence for HbsAg was more in replacement donors (1.58%) as compared to voluntary donors (0.04%). The seroprevalence of HCV was 0.10% and no voluntary donors were reactive.

**Conclusion:** The prevalence of TTI was more in replacement donors when compared to voluntary donors. Hence, more emphasis should be given to motivation of voluntary donors.

## Key words

Seroprevalence, Blood donors, HIV, HBV, HCV.

## **Introduction**

Blood transfusion involves transfer of biological material from man to man. Many infectious diseases are likely to be transmitted by blood transfusion [1]. Preventing such transmission presents one of the greatest challenges of transfusion medicine. According to NACO (National AIDS Control Organisation) guidelines, all mandatory tests should be carried out on blood donors' blood samples for (HIV) Human Immuno deficiency Virus, (HBV) Hepatitis B Virus, (HCV) Hepatitis C Virus, Syphilis and Malaria. The whole blood component from any unit that tests positive should be discarded [2].

The evaluation of data of prevalence of Transfusion Transmitted infections (TTIS) permits an assessment of infections in donor population and consequently the safety of collected donations. It also gives an idea of the epidemiology of these infections in the community [3].

Voluntary blood donation is the source of safest blood to transfuse. Infectious agents that pose a serious threat to transfusion recipients [4] are those that persist in circulation of asymptomatic individuals who are healthy enough to donate blood [1].

In 1818 the first blood transfusion took place for the treatment of postpartum haemorrhage by Karl Land Steiner [5]. In 1939 India's first blood bank was set up in Kolkata. Screening for HbsAg was introduced in 1968. The first AIDS (Acquired Immunodeficiency Syndrome) patient due to blood transfusion was reported in 1989.

Blood transfusion is a lifesaving intervention. The establishment of systems ensure that all blood donated is screened before transfusion. There are various screening methods adopted by various blood banks globally, so that the risk of TTIS [6] becoming a life threatening infections is easily prevented.

Today donor evaluation, laboratory screening tests and pathogen inactivation procedures are considered crucial tools to reduce the risk of TTIS but don't completely eliminate the risk. These advances have moved transfusion medicine towards using increasingly safer products [6].

Of the infections transmitted through blood, HIV, HBV and HCV are the main ones. In India it is mandatory to test each blood unit for all of them [1].

### **HIV - Human Immunodeficiency Virus**

The spectrum varies from rapid progression to long term non progression. Once infected the person is infected for life. AIDS is the modern pandemic affecting all countries [7]. HIV was first reported [7, 8, 9] in sex workers in Chennai and AIDS was first reported in Mumbai in India, in 1986. Today there are more than 2.3 million people living with AIDS in India with a male preponderance.

AIDS is caused by HIV 1 and 2 [9], a retrovirus belonging to lentivirus family. It is a icosahedral virion. It has an outer lipid layer, a matrix protein and reverse transcriptase molecule with 2 copies of single stranded genomic RNA.

It expresses high degree of molecular heterogeneity. The common receptors of HIV are CD 4 on macrophages, monocytes, T and B cells, dendritic cells. Of the modes of transmission blood transfusion is the commonest, accounting for about 90 to 95% of the cases.

The disease of HIV goes through 3 phases depending on the immunologic and virologic events in the body. Window period is usually 4-6 weeks in case of infected blood transfusion.

### **HBV- Hepatitis B Virus**

It is the most common case of transfusion associated hepatitis with chronic carrier state. The long term sequel is that it may progress to cirrhosis, liver failure and hepatocellular carcinoma. It was first reported in 1943. In 1969

screening for HbsAg began in blood donors. Over 2 billion people are affected globally, with 350 million chronic carriers. In India the prevalence rate is 1.55%. It is a DNA virus of the hepadnaviridae family. It is a double layered spherical virion with 'Dane Particle'. Incubation period is usually 4 -26 weeks. HbsAg is the first marker to appear in blood even before the onset of illness and is persistent for years in carriers.

### **HCV- Hepatitis C Virus**

It is the most common infection complication of blood transfusion. In 2001 screening for HCV infection of donated blood was made mandatory in India. Prevalence in donors is about 0.4-2%. It belongs to the flavivirus and is a RNA virus. Incubation period is about 2 -26 weeks. It can progress to chronic hepatitis, cirrhosis and hepatocellular carcinoma.

## **Materials and methods**

### **Donor selection**

The donors were selected by detailed history and physical examination. Blood samples were collected from all healthy male and female donors. The selected donors were subjected to phlebotomy.

### **Inclusion criteria**

Healthy voluntary and replacement donors

### **Exclusion criteria**

Those who were unfit to donate blood according to standard blood donation criteria.

### **Sample collection**

2 ml of blood was collected in a labelled tube and centrifuged at 3500 rpm for 5 minutes to obtain clear haemolysed serum. These samples were tested for HIV, HBV and HCV. Testing for HIV, HBV and HCV was done by the ELISA - 3.0 third generation indirect ELISA kit and by using automated ELISA washer and reader. ELISA is the most commonly performed screening assay in blood banks. It is a qualitative assay, easy to perform, sensitive, specific and cost effective. The absorbance of the wells is read with bichromatic spectrometer at 450 nm.

The reading has to be completed within 30 minutes to 1 hour from end of assay.

## **Results**

16,872 donor blood units were screened for HIV, HBV and HCV from January 2014 to December 2015. Type of donors was as per **Table – 1**. Sex distribution of blood donors was as per **Table – 2**. Number of screened and reactive blood units was as per **Table – 3**.

The blood donors were more in the age group of 18 to 25 years of age (76.21%) in both the sex. There were 312 (1.85%) donors who were reactive for HIV, HBV and HCV.

Seroprevalence for HIV, HBV and HCV was 0.18, 1.58 and 0.10 respectively as per **Table – 4**. There were 28 seropositive HIV donors with majority (20) in the age group of 18 to 35 years. All were males. There were 268 seropositive HBV donors with majority (148) in the age group of 26 to 35 years. 264 were males. There were 15 seropositive HCV donors with majority (06) in the age group of 26 to 35 years. All were males.

## **Discussion**

The risk of TTIS has declined due to screening of blood donors, especially in the developed countries.

In the present study it was seen that most of the donors (91.6%) were replacement donors and only (8.4%) were voluntary donors. The age group was from 18 to 60 years and the donors were mostly between 18 to 35 years. The donors were mostly males. It is shown that replacement donors constitute the largest group of blood donors in India reflecting the lack of awareness, misconceptions and fears among the general population. There is also lack of health education. In India the latest estimate of HIV is 0.34% in the general population and 0.28% in blood donors. In our study it was 0.18%. HBV prevalence by WHO is 2.7%, in the present study it was 1.58%. Prevalence of post transfusion

hepatitis due to HCV in India is about 1%. About 70 to 80 % progress to chronic hepatitis and hepatocellular carcinoma. In our study the seroprevalence that was observed is 0.10%.

**Table – 1:** Type of donors.

Type of donor	Number of screened blood units	Percentage
Voluntary	01,416	8.4%
Replacement	15,456	91.6%
<b>Total</b>	<b>16,872</b>	<b>100%</b>

**Table – 2:** Sex distribution of blood donors.

Sex	Number of screened blood units	Percentage
Male	16,451	97.5%
Female	00471	2.5%
<b>TOTAL</b>	<b>16,872</b>	<b>100%</b>

**Table – 3:** Number of screened and reactive blood units.

Type of donor	Number of screened blood units	Number of reactive (Percentage)
Voluntary	01,416	07 (0.04%)
Replacement	15,456	305 (1.81%)
<b>TOTAL</b>	<b>16,872</b>	<b>312 (1.85%)</b>

**Table – 4:** Seroprevalence of HIV, HBV and HCV.

Donors	Number	HIV	HBV	HCV
Voluntary	1416	00 (0%)	07 (0.04%)	00 (0%)
Replacement	15456	28 (0.18%)	261 (1.54%)	15 (0.10%)
Total	16872	28 (0.18%)	268 (1.58%)	15 (0.10%)

## Conclusion

It has been established that the incidence of transfusion transmissible infection (TTIS) decreased considerably after mandatory testing of blood units for HIV, HBV and HCV. However the risk of TTIS cannot be eliminated completely even after testing due to risk of the infections being in the window period. With the advent of NAT (Nucleic Acid Testing) this risk is reduced and the blood units are safer to transfuse. But NAT is not cost effective. In our study the seroprevalence of TTIS is more in replacement than in voluntary donors. So it would be safer to promote voluntary donors. All blood should be tested for TTIS, so as to ensure safe blood supply to the required patients. With the implementation

of strict donor selection criteria, use of sensitive screening test and establishment of strict guidelines for blood transfusion, it may be possible to reduce the incidence of TTIS in India.

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