

## Seroprevalence of HIV, HBV, HCV and Syphilis among Blood Donors in Western Maharashtra and a Newer Proposed Donor Screening Algorithm

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Received date: April 25, 2017; Accepted date: June 25, 2017; Publication date: July 4, 2017

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### Abstract

**Background:** Blood is one of the important integral components of body constituents. The transfusion medicine has important role in saving life and also has great public health impact.

**Aim:** This study highlights the seroprevalence of transfusion transmissible infections (TTI) as well as reviews the policies for blood collection from donors by modifying the algorithm of screening tests.

**Materials and methods:** This is retrospective study where total of 33,783 blood units for a period of 3 years January 2012 to December 2014 were tested by ELISA methods approved by National AIDS Control organization (NACO) and RPR was carried out for screening of Syphilis. Results: The seroprevalence of HIV, HBsAg, HCV and syphilis was 0.9%, 3.2%, 0.35%, 0.04% respectively in total donors.

**Conclusion:** The prevalence of transfusion transmissible infections is declining, but there is need to review the donor screening policies to improve the quality of transfusion medicine services.

**Keywords:** Blood donors; Blood transfusion; Transfusion transmissible infection

### Introduction

Blood transfusion is an essential medical and surgical therapeutic procedure [1]. There is no genuine substitution to human blood but unsafe transfusion carries the risk of transfusion transmissible infections (TTI) like HIV, hepatitis B and C, syphilis, malaria and less frequently toxoplasma, brucellosis, some viral infection like EBV, CMV, Herpes, etc. [2].

Clerical errors like release of unsuitable blood units, accidental transfusion of autologous blood to another recipient and errors in testing also contribute to transfusion induced transmission of harmful agents [3].

WHO recommended that all blood donations should be screened for infection prior to use. Globally there are >300 million HBV infected people and 75% of them are Asians [4]. According to NACO, in India there are around 2 to 3 million HIV infected people with the prevalence of 0.31% among adults [5].

With each unit there is 1% risk of transfusion associated complication including TTI [6]. Hence it is extremely essential to be cautious about the possible spread of these diseases in the course of blood transfusion. Along with finding the seroprevalence, this study would also help to identify the increase or decline trend among these infections.

### Material and Methods

#### Study design

This is blood bank based retrospective study conducted in Akshay blood bank in Western Maharashtra run by charitable trust. Data was collected from January 2012 To December 2014 for a period of 3 years.

#### Study population

Total 33,783 units were collected through voluntary blood donations in camps as well as in the blood bank. The male and female donors between the age group of 18 to 60 years having weight more than 45 kg were included while persons having history of hypertension, diabetes, epilepsy were excluded, also donors having treatment for these diseases were excluded. Lactating and pregnant females were excluded.

#### Methods

The blood from voluntary donors was collected according to WHO guidelines [7] and detailed past history of immunization was taken. In the blood bank sera were separated and all the units were screened for HIV, HBV, and HCV by NACO approved ELSA kits using immunochromatographic sandwich assay principle; while for testing of syphilis Rapid plasma Reagin method was used.

All the initial reactive samples were retested, confirmed and these units were discarded as per the WHO guidelines. Validity of test was assured as per given criterion.

### Statistical analysis

The data entry was carried out using Microsoft Office Excel 2007 worksheet and percentage and proportions for each variable was calculated.

### Ethical issues

This study was approved by our institutional authority. The written, informed consent from the donors was taken at the time of donation.

### Limitations

The improved screening and testing of blood donors has significantly reduced transfusion transmitted diseases in most developed countries. This has not been so in developing nations like India because lack of awareness, highly qualified human resources and lack of proper standard operating procedures. With the implementation of strict donor criteria, proper health education and by adapting the newer algorithm for screening tests, it may be possible to reduce the incidence of TTI in the Indian scenario.

### Results

We had collected total 33,783 units of blood during 3 years period of time. (Table 1) The sex wise contribution was elaborated by bar diagram (Figure 1) while the affected numbers of donors were displayed in Pie chart (Figure 2). The year wise seroprevalence of HIV, HBV, HCV and syphilis were summarized in (Table 2) and the sex wise distribution of TTI was explained in (Table 3).

Year	Number of donors
2012	12175
2013	11304
2014	10304
Total	33783

All these donors are voluntary donors, collected in Camps as well as in blood bank

**Table 1:** Number of donors collected over period of 3 years.

Year	HIV (%)	HBsAg (%)	HCV (%)	VDRL (%)
2012	0.61	2.08	0.60	0.18
2013	0.32	1.70	0.39	0.15
2014	0.14	1.59	0.25	0.08
Average	0.35	1.79	0.41	0.13

**Table 2:** Seroprevalence of HIV, HBsAg, HCV and VDRL.

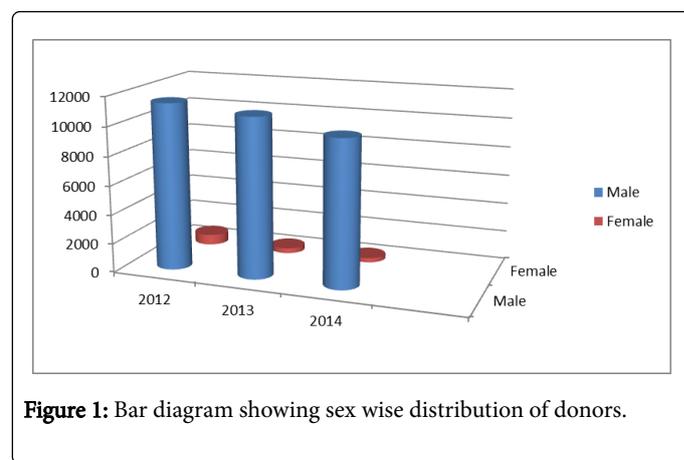
From above table it is evident that seroprevalence of all transfusion transmissible infections went on progressively decreasing from the year 2012 to 2014.

Table 3 shows that out of 33,783 donors 227 cases were positive for HIV. Out of this 227, males were 119 (93.7%) and 8 (6.2%) females. A total of 601 donors were positive for HBsAg, out of these 594 (97.2%) were males and 07 (1.1%) females. Number of HCV positive donors

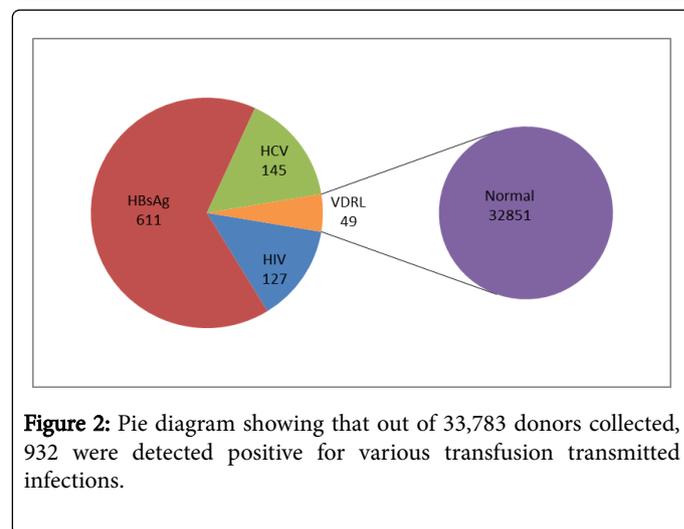
were 145, out of which 141 (97.2%) were males and 04 (2.7%) were females. All VDRL positive donors were males.

Infections	Male	Female
HIV	119 (93.7%)	08 (6.2%)
HBsAg	594 (97.2%)	07 (1.1%)
HCV	141 (97.2%)	04 (2.7%)
VDRL	49 (100%)	00

**Table 3:** Sex wise distribution among transfusion transmissible infections.



**Figure 1:** Bar diagram showing sex wise distribution of donors.



**Figure 2:** Pie diagram showing that out of 33,783 donors collected, 932 were detected positive for various transfusion transmitted infections.

### Discussion

Transfusions of blood and blood components, as a specialized modality of patient management save millions of lives worldwide each year and reduce morbidity. But it is also associated with a large number of complications, some are only trivial and others are potentially life threatening.

Knowledge of the prevalence of the transfusion transmissible infections among the blood donors will guide to develop and implement efficient strategies for ensuring safety in blood donors.

In this study majority of donors were males (98%) which is in accordance with the study by Rao et al. [8] Though the prevalence of HBV in Indian national healthy donor is 4.7% [9,10] in our study it was 1.79% which is lower than older studies [11-13] Hepatitis C infection is an evolving global health problem. In Indian scenario, the prevalence of HCV is higher at Ludhiana [14]. In the present study HCV prevalence is 0.41% which was much lower than other studies [15,16].

In 2010, 2.7 million people were newly infected by HIV [17]. In the present study prevalence of HIV was found to be 0.35% which is lower than previous studies [18, 19]. This decline is attributed to evolving medical education and meticulous donor selection criteria.

Syphilis is a sexually transmitted disease. It can also be transmitted through the blood and blood related products. Nowadays the incidence is drastically decreased. The positive RPR bag should be discarded as such donors are at risk of other STD [18]. We found the prevalence of syphilis as 0.13% which is again lower than other studies [9,19].

Overall there is decline in seroprevalence of transfusion transmissible infections may be due to more public awareness, use of newer generation kits having improved sensitivity and specificity, proper donor selection and education as per NACO guidelines. Blood samples collected in latent period may be infectious despite of negative antibody test [20] so addition of nucleic acid testing (NAT) will help to detect very low levels of viral RNA or DNA present in the blood.

Regarding co-infection, the prevalence of HIV with HBV or HIV with HCV was 0.01% which is in accordance with the results obtained by Laurent et al. [21] and Mbanya et al. [22].

It takes approximately one to one and half hour to complete the set of TTI tests on a single blood unit and costs around 350 to 450 rupees per unit in Indian Currency. Thus carrying TTI screening test on already collected blood units leads to wastage of time with manpower, economic loss as well as loss of the blood. Hence, we hereby suggest new strategies for improving efficiency and blood safety in resource limited settings.

The screening test should be performed before donation only in serial manner. The order will be based on the most prevalent infection in the area than the least one. This will avoid wastage of material reagent and time. It requires small quantity of blood, also minimizes risk for the technical staff while conducting the procedures on these units. The blood from the donor should be collected only if all the tests are negative. This will reduce the workload for processing all the tests. The time saved can be used to improve counselling of infected donors and prepare them for clinical follow up and care.

## Conclusion

Thus the present study concludes that the seroprevalence of transfusion transmissible infection is declining which is good signal for community health. Collecting blood from the donors and carrying out the screening tests later is not sufficient but there is a need to review the screening policies of donors to offer quality health care.

## Acknowledgement

We are thankful to Mr. Sanjaykumar Shinde, Chairman of our blood bank for allowing to conduct this study and also acknowledge to Mrs.

Sunita Madgundi, Senior technician as well as all other staff for supporting in data collection.

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