

## Original Research Article

# Seroprevalence and trends of transfusion transmitted infections in blood donors of rural tertiary care hospital blood bank: a 3 year retrospective study in Chamba (HP)

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## ABSTRACT

**Background:** Timely transfusion of blood saves millions of lives, but unsafe transfusion practices puts millions of people at risk of transfusion transmissible infections (TTIs). Blood transfusion carries the risk of transfusion-transmissible infections including human immunodeficiency virus (HIV&II), hepatitis B virus (HBV), hepatitis C virus (HCV), malaria and syphilis. With every unit of blood there are 1% chances of transfusion associated diseases.

**Methods:** This study was conducted over a period of 3 years (1st January 2015-31st December 2017) at hospital blood bank of Pt. Jawaharlal Nehru Government Medical College, Chamba (H.P). The study was conducted on both voluntary and replacement blood donors who came to our blood bank and voluntary blood donation camps in and around Chamba. Statistical analysis used. Collected data was analyzed using appropriate statistical softwares such as EPI-INFO and MS-Excel.

**Results:** In our study, we observed a total of 2616 donors over a period of 3 years. In the present study, 847 (32.37%) were voluntary donors and 1769 (67.62%) were replacement donors. Out of 2616 blood samples, 8 were HBsAg positive, 1 HCV positive.

**Conclusions:** Our study shows that the number of blood donors is increasing every year. In our study, the seroprevalence of HBsAg was 0.3% and Hep C was 0.03% in total blood donors. The knowledge of current infectious disease pattern and trends in donor population can help in planning of future blood transfusion related health challenges.

**Keywords:** Blood bank, Blood donors, Replacement donors, Voluntary donors, Transfusion transmitted infections

## INTRODUCTION

Millions of lives can be saved by timely transfusion of blood while the unsafe transfusion practices puts millions of people at risk of transfusion transmissible infections (TTIs).<sup>1</sup>

Blood transfusion carries the risk of transfusion-transmissible infections including human immunodeficiency virus (HIV&II), hepatitis B virus

(HBV), hepatitis C virus (HCV), malaria and syphilis. Every unit of blood carries 1% chances of transfusion associated diseases.<sup>2</sup> Worldwide an estimated 350 million people are chronically infected with HBV and about 200 million people are infected with HCV.<sup>3</sup> Infection with these viruses might associate with increased mortality rate as these infections may lead to the development of serious liver diseases such as liver cirrhosis, liver failure and hepato-cellular carcinoma (HCC).<sup>4</sup>

Discovery of TTI due to blood transfusion brought a dramatic change in attitude of physicians and patients.<sup>5</sup>

India has approximately 2.5 million human immunodeficiency virus (HIV) positive, 43 million HBV positive and 15 million HCV positive persons. The risk of transfusion related transmission of these viruses may be alarming due to high sero-prevalence of HIV (0.5%), anti-HCV (0.4%), and HBsAg (1.4%) among blood donors.<sup>6</sup>

As per the guidelines of the ministry of health & family welfare (Government of India) under the Drug and Cosmetic Act, 1945 (amended from time to time), all the blood donations are to be screened against the five major infections namely HIV, HBV, HCV, VDRL and malaria.<sup>7</sup> To reduce risk of TTIs, careful selection of donors is needed so that the blood is safe and is not collected from the people who are likely to be carriers of infectious agents.

The quality of safe blood transfusion and the risk of transfusion transmitted infectious diseases (TTIs) and quality of screening procedures in any region especially in rural areas can be estimated by review and analysis of records of blood donors for screening procedures and the prevalence of serological markers of infectious diseases.

The present study was undertaken in the blood bank of our medical college to estimate the seroprevalence of TTI among blood donors in this region and also to see their changing trends in recent times. This study also gave us fair knowledge of disease burden of the society and the basic epidemiology of these infections in the rural community.

## METHODS

This study was conducted over a period of 3 years (1st January 2015-31st December 2017) at hospital blood bank of Pt. Jawaharlal Nehru Government Medical College and Hospital, Chamba (H.P). The study was conducted on both voluntary and replacement blood donors who came to our blood bank and voluntary blood donation camps in and around Chamba. All the blood donors, donating blood in the blood bank were

considered as the study population. The family members, friends or relatives of the patients were categorized as replacement donors. People who donate blood without expecting any favor in return or in voluntary blood donation camps were classified as voluntary blood donors. Donors were screened by the standard criteria for donor fitness. They were carefully selected for donation by trained personnel after medical examination and a detailed pre donation questionnaire form which included the donor register form, information regarding risk factor such as history of surgery, previous illness, hospitalization, and blood transfusion. The donors were included in the study after obtaining informed consent.

### Inclusion criteria

Clinically healthy individuals between 18 and 65 years of age with a body weight of above 45 kg and hemoglobin more than 12.5 g/dl with no significant medical or surgical history were qualified for the donation process.

### Exclusion criteria

Persons belonging to high-risk groups such as patients with chronic diseases, professional blood donors, drug abusers, dialysis patients, pregnant women, patients treated in thalassemia clinics, sexually transmitted disease clinics, and sex workers were excluded from the donation process. After the blood collection, donor samples were obtained for serological testing. TTI screening was done using rapid test kit for all 5 TTI, based on the principle of one step immunoassay. All reactive samples were tested again. Samples showing repeat test reactivity were considered positive and were included for calculation of seroprevalence.

Collected data was then analyzed using appropriate statistical software such as EPI-INFO and MS-Excel.

## RESULTS

In our study, we observed a total of 2616 donors over a period of 3 years. In the present study, 847 (32.37%) were voluntary donors and 1769 (67.62%) were replacement donors (Figure 1).

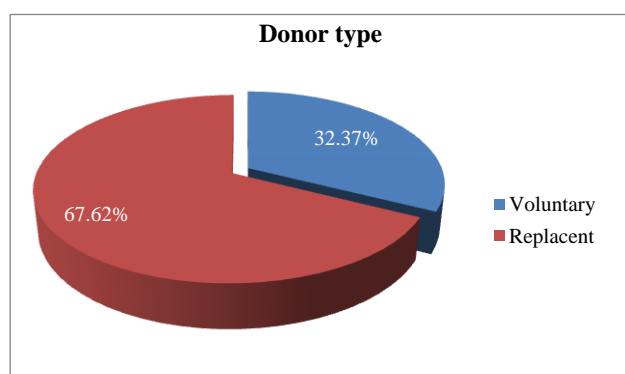
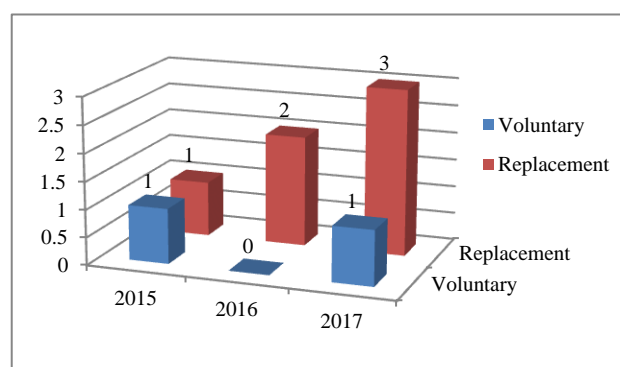
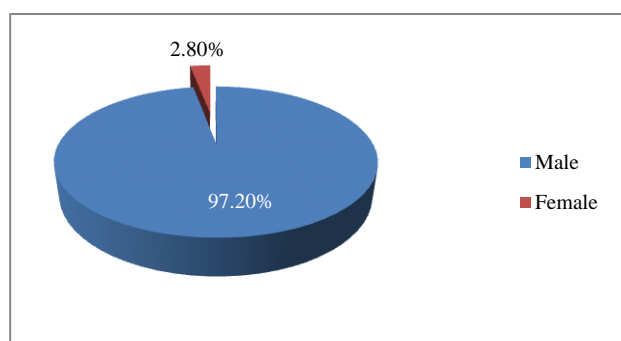
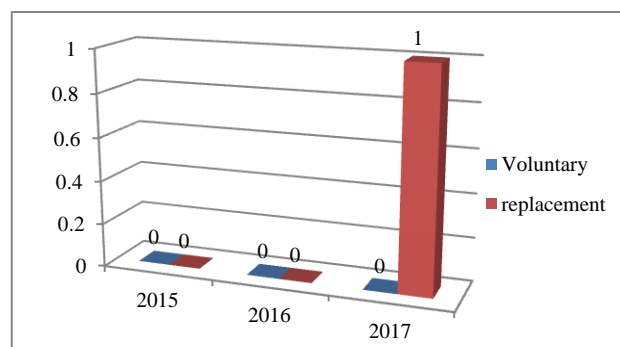
**Table 1: Year wise distribution of blood donors.**

Year	Voluntary donors	Replacement donors	Male donors	Female donors	Total
2015	347	337	670	14	684
2016	241	699	900	40	940
2017	259	733	973	19	992
<b>Total</b>	847 (32.37%)	1769 (67.62%)	2543 (97.2%)	73 (2.8%)	2616

**Table 2: Distribution of sero-positive tti donors.**

Year	Total sero +ve tti donors	Hep B+			HepC			HIV	VDRL	Malaria
		Vol	Rep	Total	Vol	Rep	Total			
2015	2	1	1	2	-	-	-	-	-	-
2016	2	-	2	2	-	-	-	-	-	-
2017	5	1	3	4	-	1	1	-	-	-
<b>Total</b>	<b>9 (0.34%)</b>	<b>2</b>	<b>6</b>	<b>8 (0.3%)</b>	<b>-</b>	<b>1</b>	<b>1 (0.03%)</b>			
<b>Total seropositive voluntary donors</b>		0.07%			Total seropositive replacement donors			0.26%		

Vol=voluntary donors, Rep=Replacement donors

**Figure 1: Pie diagram showing replacement and voluntary donors.****Figure 3: Distribution of Hep B+ among voluntary and replacement donors.****Figure 2: Sex wise distribution of donors.****Figure 4: Distribution of Hep C+ among voluntary and replacement donors.**

Male donors comprised 97.2% of total donors with 2543 donors whereas female donors were 73 only forming 2.79% of total donors (Figure 2). We found that TTI prevalence was higher (0.26%) among replacement donors in comparison with voluntary donors (0.07%). Out of 2616 blood samples, 8 were HBsAg positive, showing a seroprevalence of 0.3%. Out of the 8 HBsAg positive samples, 6 were replacement donors and 2 were voluntary donors. All the eight HBsAg positive samples were male donors. There was 1 replacement donor showing seropositivity for HCV in 2017, comprising 0.03%. No voluntary blood donor was found to be positive for HCV. No female donor in the study period showed seropositivity for any of the 5 transfusion transmitted infection in our testing methods.

## DISCUSSION

The risk of TTI has declined in developed nations over the years, primarily because of extraordinary success in preventing TTI from entering blood supply. In our study, replacement donors accounted for majority of blood donors (67.62%). This finding is similar to many studies done in other parts of India which showed replacement donor predominance, such as study by Kakkar et al (94.7%), Singh et al (84.5%) and Sri Krishna et al (98.5%).<sup>8-10</sup>

The number of voluntary donors in our study was lower (32.37%). Qureshi et al also reported low percentage of voluntary donors (3.1%) in their study.<sup>11</sup> Study done by

Patel PJ showed 95.56% voluntary donors and 4.44% replacement donors.<sup>12</sup> Our study does not match with this study as we have much lower number of voluntary donors. Gupta et al found higher number of voluntary donors, with 61.9%, and 38.1% replacement donors, which is totally opposite of our study, as we had 67.62% replacement donors and 32.37% voluntary donors.<sup>13</sup> This could be due to lack of awareness and motivation among the voluntary donors. There may also be fear of TTI among voluntary donors. These limitations could be overcome through IEC activities at the community level.

Our study had significantly higher number of male donors (97.2%) and very few female donors (2.79%). This is similar to previous studies done elsewhere in India like study by Ahmed et al and Pallavi et al showing 91.8% and 97.84% male donors, respectively.<sup>14,15</sup> The reason for low number of female donors in blood bank can be attributed to social factors like ignorance and social taboo in females about blood donation, high incidence of anemia in menstruating women with most of them being underweight and malnourished. All these factors make females unfit for blood donation.

In our study, the seroprevalence of HBsAg was 0.3% in total blood donors. Study done by Adhikhari et al showed 0.78% HBsAg seroprevalence.<sup>16</sup> Study by Arora et al reported seroprevalence rate of 1.2%, while Bhattacharya et al showed 1.46% HBsAg.<sup>17,18</sup> All these studies show slightly higher HBsAg seroprevalence than our study. The prevalence of HCV was found to be 0.03% in present study. Some other studies done at other places reported little higher HCV prevalence. Study by Garg et al reported HCV seroprevalence of 0.28%.<sup>19</sup> Study in Orissa showed HCV seroprevalence to be 1.98%.<sup>20</sup>

No blood donor in our study was found to be seropositive for HIV 1, 2, VDRL, and malaria. Several other studies showed very few seropositive donors for these 3 TTI. Study by Giri et al showed HIV seroprevalence of 0.07% whereas no donor was seropositive for HIV in our study.<sup>21</sup>

Study done by Chandra et al reported very low syphilis seroprevalence (0.01%), while we had zero prevalence of syphilis in present study.<sup>22</sup>

As is evident in our study, there was no seropositive donor for malaria. Study done in Gujarat by Patel et al also reported no malaria case in his 7 year study, similar to our study.<sup>23</sup>

As can be seen in our study, the number of blood donors is increasing every year. Study by Chandekar et al also showed that the number of blood donors progressively increased in 3 year study period, which coincides with our study.<sup>24</sup> Also there is a rising trend in seroprevalence of both HBV and HCV over a period of 3 years. Bhattacharya et al observed a significant increase in seroprevalence of HBV over a period of 2 years among

blood donors, similar to our study.<sup>17</sup> Similar trend was also seen in study by Kumar et al showing rise in seroprevalence of HCV infection in 4 year study period among blood donors.<sup>25</sup>

In our study, seroprevalence of HBV was higher in replacement donors (0.22%) than in voluntary donors (0.07%). Study by Arora et al also shows higher HBV prevalence in replacement donors (2.61%) than in voluntary donors (0.75%), in agreement to our study.<sup>16</sup>

HCV seroprevalence in our study was found to be 0.03% (in replacement donor) and no voluntary donor was HCV seropositive, somewhat similar to study by Arora et al, who reported higher HCV seroprevalence in replacement donors (1.09%) than in voluntary donors (0.34%).<sup>16</sup>

## CONCLUSION

The seropositivity of all TTIs is lower in our study as compared with studies from other parts of the country and worldwide. Also, seropositivity is lower among voluntary donors than replacement donors. The knowledge of current infectious disease pattern and trends in donor population can help in planning of future blood transfusion related health challenges. Encouraging female population as well as voluntary blood donors for blood donation will increase the number of donors and safe donor pool. With the advent of nucleic acid amplification techniques, western countries have decreased the risk of TTI to a major extent. However, the cost effectiveness is poor. NAT has added benefits but its high financial cost is of concern.

Although immunization being the most effective and economic means of prevention, education of high-risk groups and health-care personnel can also reduce the risk of transmission. Proper pre-donation counseling, donor notification and 100% voluntary blood donation are some of the effective control measures.

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