

**ANALYSIS OF SCREENING OF BLOOD DONATIONS FOR TRANSFUSION  
TRANSMITTED INFECTIONS OF A BLOOD BANK LOCATED IN TERTIARY CARE  
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**ABSTRACT**

**Background:** Transfusion transmitted infections are preventable by proper screening of blood donations. Even healthy donors are unaware about presence of these infections which points towards hidden burden of a disease in community. **Aims & Objectives:** Analysis of screening report of blood donations of a blood bank of tertiary care hospital for TTIs. **Methods:** Cross-sectional study using hospital records regarding screening of blood donations for TTIs from 1<sup>st</sup> January 2021 to 31<sup>st</sup> December 2021. **Results:** All blood donations were screened for TTIs. Out of total blood donations no case of HIV was reported. Similarly no cases of Malaria and Syphilis were reported among all blood donations which were screened. Among all donations 13 cases of Hepatitis B were reported which accounts for 0.39% of prevalence. Figures for detection of Hepatitis C were 6 out of 3324 units of blood donations, contributing to 0.18% prevalence among all donations. **Conclusions:** There is hidden load of persons dwelling with TTIs in community. In our study we have accidentally come across detection of few cases of Hepatitis B and C which we might have definitely missed. So screening should be promoted not only in case of blood donations but also at community level to prevent further spread and early intervention in course of treatment. Lower or zero prevalence of TTIs in our study is attributed to healthy sexual behavior, higher literacy and better health care services.

**KEYWORDS:** Transfusion, screening, TTIs, HBV, HCV.**INTRODUCTION**

Venesection was widely practiced for a variety of medical conditions from the time of Hippocrates way back more than 430 BC. William Harvey elaborated in detail about blood circulation in 1628.<sup>[1]</sup> The practice of transfusions remained almost dormant until the early 1800s. During that period a lot of advances had been made in understanding anatomy, physiology, blood circulation and the dangers of hemorrhage. English obstetrician James Blundell worked on high mortality associated with postpartum hemorrhage, saw blood transfusion as a means of replacing lost blood. After animal experiments he concluded that only human blood should be transfused into humans and only to treat blood loss, He performed the first human blood transfusion in 1818 to treat a man suffering internal hemorrhage. Though that patient could not survive but after three more failures he transfused a woman with postpartum hemorrhage who survived. Later on he did ten transfusions out of which five survived.<sup>[2]</sup> During 1900, Karl Landsteiner at the University of Vienna, predicted

about the compatibility of ABO blood group system for blood grouping and proved a boon in era of blood transfusion.<sup>[3]</sup> With passage of time the gravity of crossmatch started to establish. With matching compatibilities good results started to come up. World's first hospital blood bank was established on March 15, 1937 in Cook County Hospital of Chicago, U.S.A. India's first blood bank was set up in the School of Tropical Medicine, Calcutta in 1939 by Sir Upendranath Brahmachari, who was Chairman of Bengal Red Cross Society. In 1996 Supreme Court's judgment on blood transfusion and blood banking in India; as a result of which National Blood Transfusion Council and State Blood Transfusion Councils are established for improvement of Blood Banking services in the country.<sup>[4]</sup>

National Blood Transfusion Council (NBTC) is the policy formulating apex body in relation to all matters pertaining to operation of blood centres. The NBTC is the central body that coordinates the State Blood

Transfusion Councils (SBTCs) and also ensures involvement of other Ministries and other health programmes for various activities relate to Blood Transfusion Services (BTS).<sup>[5]</sup>

In order to improve the standards of Blood and its components, the Central Govt. through Drugs Controller General of India, has formulated a comprehensive legislation to ensure better quality control system on collection, storage, testing and distribution of blood and its components. Government of India published in the year 2002 the National Blood Policy. The objective of the policy is to provide safe, adequate quantity of blood, blood components and products. The main aim of the policy is to procure non remunerated regular blood donors by the blood banks. The policy also addresses various issues with regard to technical personnel, research, and development and to eliminate profiteering by the blood banks by selling blood. The policy also envisages that fresh licenses to stand alone blood banks in private sector shall not be granted and renewal of such blood banks shall be subjected to thorough scrutiny.<sup>[6]</sup> Screening of all blood donations should be mandatory for screening of either a combination of HIVn antigen-antibody or HIV antibodies, screening for hepatitis B surface antigen (HBsAg), screening for HCV antigen or antibody, screening for specific treponemal antibody using as markers in accordance to WHO transfusion guidelines. Screening of donations for other infections, such as those causing malaria or chagas disease, should be based on local epidemiological evidence.<sup>[7]</sup>

#### MATERIAL AND METHIODS

**Study area:** Analysis of screening of blood donations of a blood bank of tertiary care hospital of North India located at Zonal Hospital Mandi in Himachal Pradesh, India.

**Study design:** cross-sectional study.

**Study Period:** 1<sup>st</sup> January 2021 to 31<sup>st</sup> December 2021.

**Sampling Technique:** Analysis of all blood donations for a year was done. All blood donations of the year were included in study. Screening reports for various TTIs were evaluated.

**Study Tools:** Data was collected from blood bank records.

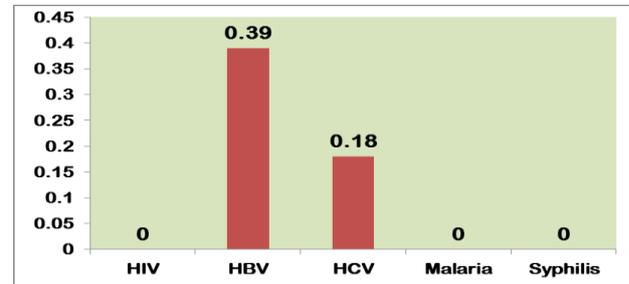
**Statistical Analysis:** Data collected was analyzed with the help of Statistical Methods.

#### RESULTS

**Table 1: Detection of TTIs out of total blood donations in a year.**

Total blood donations w.e.f 1 <sup>st</sup> January to 31 <sup>st</sup> December 2021(N= 3324)			
S. No.	TTI agent	n	%
1.	HIV	0	0
2.	HBV	13	0.39
3.	HCV	6	0.18
4.	Malaria	0	0
5.	Syphilis	0	0

Table 1/Fig. 1 depicts that there had been 3324 blood donations from 1<sup>st</sup> January 2021 to 31<sup>st</sup> December 2021. All blood donations were screened for TTIs. Out of total blood donations no case of HIV was reported. Similarly no cases of Malaria and Syphilis were reported among all blood donations which were screened. Among all donations 13 cases of Hepatitis B were reported which accounts for 0.39% of prevalence. Figures for detection of Hepatitis C were 6 out of 3324 units of blood donations, contributing to 0.18% prevalence among all donations.



**Fig. 1: Percentage of detection of TTIs out of total blood donations in a year.**

#### DISSCUTION

Although in our study of blood donations over a year we didn't come across any positive case of HIV, which further can be due to lesser prevalence in community. Makroo *et al*: A total of 506 (0.247%) donors were found to be repeat reactive for HIV out of 2,04,677 people were screened for the presence of HIV infection over the 11 year period (1999 to 2009). The prevalence of HIV was 0.249 per cent among blood donors of north India.<sup>[8]</sup> Tiwari BR *et al*; did a study on overall seroprevalence of HIV among the total blood donors in Neolal and in Central Blood Transfusion Service (CBTS), Kathmandu through the six years of review (from 2001-2007). Its prevalence was 0.33% and 0.4% respectively. A significant decreasing trend in HIV seroprevalence was observed both in nationwide and in Central Blood Transfusion Service, Kathmandu. The analysis of trends in HIV seroprevalence among blood donors through the year 2001- 2007 showed a significantly decreasing trend, probably due to the cumulative effect of increasing awareness of HIV and improved screening system for safe blood donation.<sup>[9]</sup>

In our study detection of HBV among all blood donations is 0.39%. In a similar study done by Yadav U *et al*; on blood donations where blood from 2404582 apparently healthy donors aging 18-65 years was collected during the study period. Out of screened donors, 32372(1.34%) were reactive and 2372210 (98.66%) were non-reactive for HbsAg. Prevalence of HBV in their study was 1.34%. They concluded that low prevalence of HBV (1.34%) was reported in the study amongst the blood donors in Madhya Pradesh. It may be due to better health services in the state,<sup>[10]</sup> Similarly low prevalence of HBV in our study can also be attributed to better health care services as well.

Bhasker *et al.*; evaluated 183(1.07%) donors with reactive screening test results, i.e., 106(57.9%) HBV, 38(20.7%) HCV, 29(15.8%) HIV, and 11(0.6%) were syphilis reactive and all (100%) were from replacement blood donations. Only 58.4%(107) of donors could be personally communicated over telephone and only 49 (45.79%) of them returned for counseling. Three (6.1%) among the reactive donors knew their results earlier and 11(22.4%) donors had history of high-risk behavior. They concluded that in spite of strict donor screening and self-exclusion option, donors conceal their high risk behaviors or their reactive status and continue to donate blood. It reflects the need to implement thorough pre donation counseling to extract the history of high-risk factors from the donors.<sup>[11]</sup> Yogendra Madan, *et al.*; conducted a study to determine the prevalence of Hepatitis- C virus (HCV) among voluntary and replacement blood donors in Blood Bank of Jhalawar Hospital & Medical College Society, Jhalawar, Rajasthan. In their study a retrospective review of donors record covering the period between Jan 2017 to Dec 2017. The blood collections were taken from the voluntary donors at total 69 blood donation camp and as well as from replacement donors and voluntary donors at blood bank. The blood samples were then obtained by standard procedures of venipuncture. Total 16495 blood donors screened over the period of one year. Antibodies to Hepatitis C virus in serum/plasma were detected by rapid test kit. 34 out of 16495 donor populations were positive for Hepatitis C (Prevalence 0.2%). They concluded that replacement donors were higher prevalence than the voluntary donors and motivating voluntary blood donors by conducting voluntary blood donation camp was the most effective way of ensuring adequate supplies of safe blood and blood components for transfusion.<sup>[12]</sup>

Area under our study is not endemic for malaria, so we didn't come across any case of malaria among all donations throughout the year. In a similar study conducted by Antwi-Baffour S, *et al.*; where a total of 1,500 samples from donors were examined using microscopy, rapid diagnostic test (RDT), and molecular method for malaria parasites. Malaria parasites were detected in forty-eight (48), 49 and 47 of the blood samples using microscopy, RDT, and molecular method respectively. An average prevalence of malaria was 3.2%.<sup>[13]</sup>

Among all donations during year of our study we didn't detect any case of syphilis. Liu S, *et al.*; conducted a similar study where serological epidemic for syphilis among blood donors in Chengdu showed an upward trend from 2005 to 2017. *Treponema pallidum* positive blood donors were more likely to have multiple sexual partners and commercial sex workers.<sup>[14]</sup> Leibovici Vera *et al.* conducted a study with the help of data of 1,290,222 volunteer blood donors, in a 5-year period, which was analyzed for prevalence and incidence of syphilis. Subsequent testing of donations positive in

*Treponema pallidum* hemagglutination assay included Venereal Disease Research Laboratory and fluorescent *Treponema* antibody absorption. Stepwise logistic regression model was used to identify positive syphilis serology. Prevalence of syphilis was 47: 100,000, similar in men and women.<sup>[15]</sup> But in our study there was zero prevalence of syphilis which further depicts healthy sexual behavior in society.

Prajapati DR, *et al.*; did study on 6633 registered blood donors, 6360 were accepted including 6246 males (98.2%) and 114 females (1.8%) with 5597 voluntary (88%) and 763 Replacement (12%) donors. Out of 6360, total 48 donors (0.75%) were found seroreactive for syphilis including 45 males (0.72%) and 3 females (2.63%) with 39 voluntary (0.70%) and 9 replacement (1.18%) donors. Prevalence of Syphilis is comparatively high among age group of 46-55 years. Co-infection of Syphilis with HBV was 2.08%, while any co-infection with HIV, HCV and Malaria was not found.<sup>[16]</sup> Yadav U, *et al.*; in their five years (1st January 2012 to 31st December 2016) retrospective analysis of one million three hundred thirty-six thousand one hundred fifty-six (1,336,156) blood donor's record at Madhya Pradesh Aids Control Society (MPSACS) Bhopal; donors donated their blood at National Aids Control Organization (NACO) supported blood banks, Madhya Pradesh, India. With the permission of MPSACS, donor's data was collected, retrieved, tabulated, summarized and compared statistically by frequency distribution and percentage proportion. In their study 91.1% were voluntary blood donors and rested 8.9% replacement blood, donors. Male to female ratio of blood donors were male 94% and female 6%. TTIs prevalence in their study was 1.75 % ( $p < 0.001$ ) while individual infections prevalence was; HbsAg 1.16, Syphilis 0.37%, HCV 0.09%, HIV 0.08%, and Malaria 0.04%. They concluded that low prevalence of TTIs was reported in the present study, so hereby we have concluded that a healthy transfusion service is must for the health care system of the state/country. 100% voluntary blood donation by regular, voluntary, non-remunerated blood donors from low-risk populations and careful TTIs testing.<sup>[17]</sup>

Saini PA, *et al.*; conducted a study to estimate the prevalence of transfusion transmitted infections in voluntary and replacement donors at a tertiary care teaching hospital in Indore, Madhya Pradesh, Central India. It study was a 4 year retrospective study from 2015 to 2018. Data was analyzed from blood bank records, pertaining to all donors who were screened for HBsAg, Hepatitis C virus and HIV by using appropriate methods. They found that out of 45,704 voluntary & replacement donors were screened, out of which 44,663 (97.72%) were males & 1041 (2.27%) were females. The overall seroprevalence of HBV & HCV was 1.29% & 0.072% respectively, while the prevalence of HIV was 0.076%. The prevalence rate was highest for HBV followed by HIV and HCV in decreasing order. The

overall seroprevalence of various TTI's among the studied donors was 1.43%. They concluded that blood was still one of the main sources of transmission of infections like HIV, Hepatitis B and Hepatitis C. Extensive donor selection and screening<sup>[18]</sup> Chaurasia R, et al; did a study between January 2011 and December 2013, where 113,014 donations at Main Blood Bank, All India Institute of Medical Sciences, New Delhi, were screened by ELISA. Total of 113,014 donors were evaluated comprising 85.4% replacement and 14.6% voluntary donors. The majority of the donors (97%) donated blood for the first time. The demographic details of donor's total of 2838 (2.51%) donors tested reactive for TTI. Prevalence of TTI was 1.38% for HBV, 0.54% for HCV, 0.27% for HIV, and 0.32% for syphilis. Of all the donors who were notified of their reactive status only 662 (23.3%) donors reported back to transfusion facility. The response among voluntary donors was better as compared to the replacement donors (43.6% versus 21.2%), Donors residing in the urban nearby areas responded better than those who lived in rural or far-off areas. Donor notification using telephone was more beneficial as more donors turned up to transfusion facility. Only 373 (56.3%) responsive donors followed their first attendance at referral specialties. Over six months, 176 of 662 (26.6%) responsive donors were undergoing treatment.<sup>[19]</sup>

## CONCLUSIONS

There is huge load of persons dwelling with TTIs in community. Zero prevalence of HIV and Syphilis is an outcome of healthy sexual behaviors in society. Low prevalence of HBV & C in our study can also be attributed to better health care services and higher literacy levels. Area under our study is not endemic for malaria, so prevalence of malaria as TTIs is less likely to be transmitted. In our study we have accidentally come across detection of few cases of Hepatitis B and C which we might have definitely missed. So screening should be promoted at higher level to prevent further spread and early intervention in course of treatment. Lower or zero prevalence of TTIs in our study is attributed to healthy sexual behavior in community, higher literacy and better health care services.

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