

**Seroprevalence of Transfusion Transmitted Infections In Healthy Donors - A Retrospective Study of 2 Years In Blood Bank of Government Doon Hospital, Dehradun.**

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**Abstract**

**Introduction:** Blood safety is of utmost importance in transfusion medicine. Transfusion-transmitted infections (TTIs) are a threat to the safe transfusion practices. Hence proper screening is mandatory of the donors in the blood bank.

**Aim:** This study was undertaken with the aim of determining the seroprevalence of TTI in healthy blood donors in the blood bank of government doon hospital, dehradun..

**Materials And Methods:** A retrospective study was carried out over a period of 2 years from may 2018 to may 2020. Screening was performed at this blood bank for: hepatitis B, with HBsAg ,HBc anti IgG or IgG + IgM (chemiluminescent immunoassay,(Cobas e 411 analyser), hepatitis C, with HCV antibody test ; HIV, with AntiHIV1/2 or anti-HIV 1/2 and p24 antigen

(chemiluminescent, Cobas e 411 analyser ) and also with enzyme linked immunosorbent assay(benesphera microplate reader e 21); syphilis and malaria with card test based on immunochromatographic principle.

**Results:** A total of 14200 healthy donors were included out of which majority of donors were male (91.79%). The overall seroprevalence of HIV, HBsAg and HCV were 0.3%, 1.60%, and 0.2% respectively.

**Conclusion:** Methods to ensure a safe blood supply should be encouraged. For that, screening with a better selection of donors and use of sensitive screening tests including ELISA and chemiluminescence assays should be implemented if advance techniques such as NAT are not available.

**Keywords:** Hepatitis B virus, hepatitis C virus, human immunodeficiency virus, seroprevalence, transfusion transmitted infections

## **Introduction**

Transfusion of blood and its components is one of the most essential lifesaving procedure in the integrated part of health care delivery system. Nevertheless, the risk of blood transfusion transmitted infections (TTIs) poses a serious public health problem if proper screening of donated blood is not done.

Continuous monitoring of TTIs among the donor is vital for risk assessment, and to minimize disease transmission, optimize donor recruitment strategies, and also to know the prevalence of these diseases among blood donors, which reflects the apparent as well as hidden load of these infections in the general population, since blood donors are usually healthy members of the society . Universally the normal procedure is to administer a standard questionnaire, measure the haemoglobin concentration and the weight of the donor. The donor is then bled if found fit based on the selection criteria and asked to leave after a period of rest. The donor units are then separated into various components and stored. A third generation ELISA batch analyzer is used to test samples of corresponding donated units. All those non-reactive for viral markers are appropriately labeled and used for transfusion. Those reactive for any of the TTIs are appropriately discarded, including their respective components.(1)

Hepatitis B virus (HBV), hepatitis C virus (HCV), Human immune deficiency virus (HIV) and syphilis are the most important agents causing transfusion transmitted infections (TTIs) and they constitute large health care burdens worldwide. Because of their latent nature prior to clinical presentation, their incidence rates are difficult to calculate. Every blood transfusion therefore carries a potential risk for transmissible diseases.(2)

Several screening tests/assays have been developed over the years to overcome this threat; Some of these assay techniques used in screening blood/blood products prior to transfusion include immunochromatographic assay, enzyme-linked immunosorbent assay (ELISA) and nucleic acid test (NAT) or polymerase chain reaction (PCR) assay techniques. The effectiveness of all these tests in interdicting contaminated units of blood/blood products depends in part on the point in time when an infected donor provides the unit relative to the individual's exposure to the virus (3)

**Material and methods-**The study was carried out in government doon hospital , dehradun. Our study analysis included all the blood donors (voluntary and replacement) who fulfilled the blood bank donor criteria, and attended our blood bank, during the period of may 2018 - may 2020 spanning over a period of 2 years. Retrospective analysis was carried out by using data collected by a questionnaire regarding age, sex, number of previous donations, type of donation (replacement/ voluntary) /medical or surgical illness /history of previous blood transfusion /known case of tuberculosis /diabetes mellitus /heart disease /jaundice /asthmaand personal habits, antibiotic intake, etc. Blood donors who did not meet the inclusion criteria (< 18 or > 65 years, history of long-term medication use, surgical or medical illness and unwillingness to give oral informed consent were excluded based on questionnaire. Vital signs and weight were recorded. The donors who donated blood repeatedly was counted only once. Baseline complete blood count (CBC) was performed to exclude any donors with anaemia (< 12.5 g/dL) or thrombocytopenia and also inspection was carried out for any marks of drug abuse or skin lesion at the veni-puncture site as a routine practice.

### Serological testing

Screening was performed at this blood bank for: hepatitis B, with HBsAg ,HBc anti IgG or IgG + IgM (chemiluminescent immunoassay,(Cobas e 411 analyser), hepatitis C, with HCV antibody test ; HIV, with AntiHIV1/2 or anti-HIV 1/2 and p24 antigen (chemiluminescent, Cobas e 411 analyser ) and also with enzyme linked immunosorbent assay(benesphera microplate reader e 21); syphilis and malaria with card test based on immunochromatographic principle.

Results were compared by statistical calculation in Microsoft Excel 2007 software.

Table 1: Gender wise distribution of blood donors-

Year	male	Female
2018-2019= 6200	5600	600
2019-2020=8000	7200	800

Table 2: Year wise distribution of donor with positive serology

Year	Positive For HBSAG	Positive For HCV	HIV
2018	18	15	09
2019-2020	58	38	18
2020	09	03	02

Table 3: Year wise distribution of voluntary and replacement donors

	Voluntary donors	Replacement donors
2018- 2019	4800	1400
2019- 2020	6200	1800

Table 4: genderwise distribution of transfusion transmitted diseases.-

	Male	Female	Total
HBSAG	72	13	85
HCV	52	4	56
HIV	26	3	29

### Result

A total of 14200 donors were screened for TTIs during the study period; of these 12800(90.23%) were males and 1400 (9.8%) were females with the mean age of  $27.4 \pm 2$  years (range from 19-58 yrs.). Voluntary blood donors were 77.46% (11000/14200) and 22.53% (3200/14200) were replacement donors (relatives/friends) . Of all donations, 1.19% (170/14200) were reactive for TTIs in the screening assays. Prevalence of TTIs were significantly higher among voluntary donors than replacement donors.

HBV, HCV and HIV all were more prevalent among males than females.(Table 3). All TTI positive results were most commonly seen among the age group of 20-30 years (Figure 1).

Of the 170 ,positive TTIs, 85 (0.42%) were found to be the carriers of HBV (HBsAg), 56 (0.56%) were positive for anti-HCV antibodies, 29 (0.13%) were positive for anti-HIV antibodies .

### Discussion

Safe transfusion practice has been a matter of concern for the health care providers since the commencement of blood transfusion practices and the subsequent discovery of blood transmissible infectious agents [3]. WHO recommends that all blood donations be screened for evidence of infection prior to the release of the blood and its components for clinical or manufacturing use. Screening of all blood donations should be mandatory for HIV, hepatitis B and C and syphilis. [4] Hepatitis B virus (HBV) infection caused nearly a million (~887,000) deaths worldwide in 2015 . Globally, more than 257 million people live with HBV infection . HBV infection could lead to acute and chronic hepatitis, cirrhosis, and hepatocellular carcinoma, posing a tremendous public health burden . According to the US Centers for Disease Control and

Prevention, approximately 3,000 people in the US alone and more than 600,000 people worldwide die from hepatitis B-related liver disease each year. Blood transfusion-related HBV infection remains a major concern in transfusion practice. The high rate of the residual risk of transfusion-transmissible HBV reflects the global epidemiology of the virus. Considering the importance of the prevention of HBV transmission through blood transfusion, comprehensive HBV screening programs of blood donors have been implemented worldwide since the early 1970s [5].

A common and essential screening protocol for blood donor samples is serological detection of the marker HBV surface antigen (HBsAg), which is abundantly produced during active infection. However, there still exists a possibility of HBV transmission during transfusion from HBsAg(-) donors, since the absence of the antigen does not completely exclude the presence of the virus. During the window period of the infection (early acute phase or late chronic phase) or in the case of occult infections where viral antigens are not detectable, the HBsAg serological test may give a “non-reactive” result. Accordingly, an additional seromarker, antibody against HBV core antigen (anti-HBc), is tested. Serological reactivity to anti-HBc can indicate active HBV exposure, chronic infection, or resolving infection.[6]The seroprevalence of our study was 0.4% in 2018,1.04% in 2019 and 1.6% in 2020 as compared to various studies which are 14.5%, 19.08% and 13.3% respectively found in the general populations of Burkina Faso, Togo and Ghana [7-8-9] The prevalence of HBV (1.60%) is lower than other studies except Gupta et al. and Bhawani et al.[10]The prevalence of HCV (0.2%) is lower than other studies. The HIV prevalence of 0.30% over a period of 2 years is lower as compared to other Indian

studies except Gupta et al[11] The risk of TTI for HBV infection continues to remain considerable although it has reduced with the introduction of the hepatitis B surface antigen (HbsAg) testing in the early 1970's. Tests to detect HBV surface antigen (HbsAg), the main screening target are routinely included in the donor screening, but fail to detect the presence of HBV during the 'window period'. Hence, a number of countries have also added the testing for antibodies directed against the HBV core protein (anti-Hbc) and testing HBV NAT in plasma pools to the standard screening in an attempt to detect chronic virus carriers with low level viremia who may not have detectable HBsAg levels.[12,13]

In conclusion, our results showed that still TTIs need to be curbed for safe blood transfusion. Thus, there is a need to increase public awareness regarding voluntary donation and its benefits. Meticulous donor screening and use of highly sensitive techniques for detection of TTIs may help reduce the risk of TTIs.

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