



SCREENING OF BLOOD DONORS FOR VIRAL AND BACTERIAL INFECTIONS BY SEROLOGICAL METHODS AT A MATERNITY HEALTH CENTER

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ABSTRACT

Transfusion transmitted infections (TTI) are still prevalent in our country, even in 21st century. The aim of this study was to identify the infections in blood donors. **Material and methods:** Blood samples from blood donors collected for over a period of 3 years were screened for Human Immuno-deficiency (HIV) antibodies, Hepatitis B Virus (HBV) antigen, Hepatitis C Virus (HCV) antibodies and Treponema antibodies. Details of donors were noted. Results: Total of 4168 blood donors were screened among which there was predominance of replacement donation (90.21%) and male sex (93.64%). In this study, Infection rate of HIV was 0.34% HBV was 1.92%, HCV was 0.10% and Syphilis was 0%. **Conclusion:** In this study, total infection rate was 2.35%. Hence, strict screening of Blood for viruses and bacteria is required to prevent the recipient from getting infected.

KEYWORDS : TTI, HBV, HCV, HIV

Introduction:

Blood transfusion saves lives and improves health of human beings, but many patients requiring transfusion do not have timely access to safe blood^{1,2}. Safe blood transfusion is of utmost importance, as an unsafe blood transfusion bears lot of burden on human health and economy. Apparently healthy donor can transmit an infection during asymptomatic phase, further increasing the prevalence of various infections in general population^{3,4}. Providing safe and adequate blood should be an integral part of every country's national health care policy and infrastructure¹.

Blood transfusion is a source of transfusion transmissible infections (TTIs) especially caused by bacteria or viruses. These are transmitted through transfusion of different blood products from blood donors to recipients. Blood should be screened for the presence of disease-causing viruses, bacteria, or other microorganisms, or for the presence of antibodies produced against these agents. Not all infectious agents can be detected directly in donated blood, but is often screened for previous infections by looking for the presence of specific antibodies raised against the infectious agent². Transfusion-associated infections, mainly Hepatitis B virus (HBV), Hepatitis C virus (HCV), Human immunodeficiency virus (HIV) and Syphilis among blood donors are of public health concern and also because of their prolonged viraemia and carrier or latent state^{3,5}. The degree of the transfusion transmitted infections differs in each country on the basis of population rate. It was analyzed that 1–2 per 1000 recipients were at risk of getting infected by viral, bacterial or parasitic agents through contaminated blood^{6,7}.

HBV is transmitted through percutaneous or parenteral contact with infected blood, body fluids and by sexual intercourse^{5,6}. Hepatitis C virus is a major cause of liver disease worldwide. HCV is parenterally transmitted especially in transfusion recipients; up to 1% of blood units might contain the responsible virus. Transmission occurs by percutaneous exposure to contaminated blood and plasma derivatives^{6,7,8}. In spite of all precautions, transmission of HIV via blood and components transfusion is still present. This is mostly due to collection of blood during window phase^{9,10}.

Syphilis is caused by *Treponema Pallidum*. Syphilis is usually transmitted by sexual contact but can also be transmitted by transfusion of blood or blood components from donors suffering from active syphilis¹¹.

WHO recommends that all blood donations should be screened for infections prior to use. Screening should be mandatory for HIV, hepatitis B, hepatitis C and syphilis. Blood screening should be performed according to the quality system requirements¹.

This study is aimed to identify the infections in blood donors donating at Government Maternity hospital, Hyderabad.

Material and Methods:

Between January 2018 and December 2020, 4168 blood donations were done at Government Maternity hospital, Hyderabad. The close family, extended family members, friends were considered for replacement donation. Donors who don't expect any benefit and not related to patient in any way were considered as voluntary donors. Donors with history of febrile illness in the recent past, weight loss, uncontrolled diarrhea, recent jaundice, liver disease, cardiovascular disease, pulmonary disease, malignancy, epilepsy, malaria, unusual or excessive bleeding, recent donation of blood, recent receipt of blood, alcohol consumption and taking contraindicated drugs were excluded. Weight, pulse, blood pressure and temperature were recorded for each donor.

Physical examination of the donor was performed. Screening for anemia was done clinically. Inspection was made for any marks of drug abuse or any skin lesions/ infections at the vene-puncture site. Donors will be approved based on the institute guidelines. A written informed consent was taken from each donor before the blood donation. Proper sterilization and other precautions were taken during the blood collection by trained personnel and blood units were stored following appropriate methods.

The donated blood was screened for viral and bacterial infections. Among the viral infections- Hepatitis C Virus (HCV) antibodies were tested by ELISA kit (J. Mithra), Hepatitis B Virus (HBV) antigen was tested by ELISA kit (J. Mithra) and Human Immunodeficiency Virus (HIV) antibodies were tested by ELISA 3rd gen Kit (J. Mithra). Among the bacterial infections- Treponemal antibodies were tested by VDRL kit (VDRL).

All positive donors (Donors diagnosed with Infection/s) were informed about their positive status and counseled after which they were advised to follow up with the clinicians at General Medicine OP for HBV and HCV, at Antiretroviral treatment center for HIV and Sexually Transmitted Disease clinic for Syphilis.

All blood donations negative for the 4 infections were allowed for transfusion to patients.

Results:

A total 4168 donors were screened. Among which, 3760(90.21%) were replacement donations and 408(9.71%) were voluntary donations.

Among 4168 donors, 3903(93.64%) were males and 265(6.36%) were females.

Total infection rate at this center was 2.35% (98 infections). Among the viral infections, 14 donors (0.34%) had HIV antibodies, 4 donors

(0.10%) had anti HCV antibodies, 80 donors (1.82%) had HBV antigen (HBs Ag). All of the donors had only single infection. All the donors were negative for syphilis.

Chart 1: Number of donations per year and type of Donations

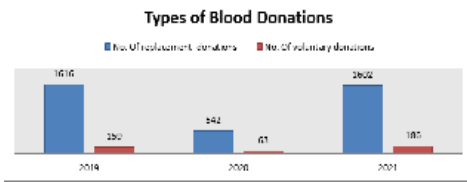


Table 2: HIV, HBV, HCV, Syphilis infections

Year	No of donors	No of HIV positive donors	HIV positive percentage	Number of HBV positive donors	HBV positive percentage	Number of HCV positive donors	HCV positive percentage	No of Syphilis positive donors
2019	1775	4	0.23 %	36	2.03 %	2	0.11 %	0
2020	605	0	0 %	5	0.83 %	1	0.17 %	0
2021	1788	10	0.56 %	39	2.18 %	1	0.06 %	0
Total	4168	14	0.34 %	80	1.92 %	4	0.10 %	0

Discussion:

This study was done over a period of 3 years from 2019 to 2021. A total of 4168 blood donations were done in this center. The numbers of donations were less in the year 2020 due to the emergence of COVID-19 pandemic. In the present study, 90.21% were replacement donations which was in line with the studies of Singh et al¹² (82.4%), Yadav et al³ (92%), Kakkar et al.¹³ (94.7%), and Pahuja et al.¹⁴ (99.48%). However, in study conducted by Dhar et al⁹, 16.6% were replacement donations and in study of Nirali shah et al¹⁵ 33.07% were replacement donations. The centers where these studies were done are practicing to encourage voluntary donation when compared to replacement donations to prevent TTI's.

Male predominance (93.64%) was observed in this study which was in line with the studies of varsha G et al¹⁶ (98%), Rao et al¹⁷, Swapan et al¹⁸ (90.36%), Kumar et al¹⁹ (77.79%), Nirali shah et al¹⁵ (97.11%).

Table 3: Comparison with other studies

S.no	Study	Area	Infect ion rate	Rate of HIV infect ion	Rate of HBV infect ion	Rate of HCV infect ion	Rate of Syphi lis infect ion	Other infect ions
1	Present study	Hyderabad	2.35 %	0.34 %	1.92 %	0.10 %	0%	-
2	Nirali et al. ¹⁵	Ahmedabad	1.48 %	0.16 %	0.97 %	0.10 %	0.234 %	-
3	Chandekar et al ²⁰	Mumbai	2.1%	0.26 %	1.30 %	0.25 %	0.28 %	-
4	Jitendra et al ²¹	Anwarpur	2.25 %	0.05 %	0.97 %	0.63 %	0.15 %	Malaria
5	Kumar et al ¹⁹	Central India	2.57 %	0.53 %	1.76 %	0.20 %	0.07 %	Malaria 0%
6	Khattri et al ¹⁶	Moradabad	3.8%	0.03 %	1.17 %	2.06 %	-	-
7	Parveen et al ¹²	Mumbai	5.97 %	1.30 %	3.05 %	1.04 %	0.57 %	-
8	Swapan et al ¹⁸	Kolkata	5.83 %	0.64 %	2.27 %	1.62 %	1.13 %	-
9	Radhiga et al ²²	Chennai	0.86 %	0.01 %	0.74 %	0.08 %	0.03 %	-
10	Varsha et al ¹⁶	Maharashtra	-	0.9%	3.2%	0.35 %	0.04 %	-
11	Amit et al ⁸	Rajkot	1.06 %	0.09 %	0.75 %	0.17 %	0.04 %	Malaria 0%

12	Sehgal et al ¹¹	Haryana	0.45 %	0.21 %	-	-	0.24 %	-
13	Dhar G et al ⁹	West Bengal	0.01 %	0.08 %	0.75 %	0.11 %	0.15 %	-
14	Yadav et al ³	Madhya pradesh	2.05 %	0.14 %	1.77 %	0.09 %	-	-
15	Suhail et al ²³	Jammu	0.63 %	0.12 %	0.51 %	-	-	-
16	Ajugwo et al ²⁴	Nigeria	12.9 %	5.6%	4.6%	0.9%	0	-
17	Salawu et al ²⁵	Nigeria	10.03 %	0.96 %	6.32 %	0.83 %	1.92 %	-
18	Tessema et al ²⁶	Northwest Ethiopia	9.5%	3.8%	4.7%	0.7%	1.3%	-
19	Shasanka et al ²⁷	Bangladesh	2.65 %	0.06 %	2.19 %	0.25 %	0.15 %	-
20	Mavenyengwa et al ⁵	Namibia	1.3%	0.3%	0.6%	0.1%	0.3%	-
21	Ting Xu et al ²⁸	China	2.39 % to 1.98 %	0.29 % to 0.23 %	0.6% to 0.5%	0.31 % to 0.42 %	1.19 % to 0.84 %	-

Co-infection was not seen in this study. Whereas, study of Salawu et al¹⁹ showed significant number of donors had co-infection. In the study conducted by Alok et al¹² 1 donor had HIV and HBV co-infection. In the study of Parveen et al³ 0.26% of donors had co-infection of HIV, HBV, HIV and syphilis.

Conclusion:

This study has shown that TTI agents are still prevalent in the blood donors in our center. Seroprevalence of 2.35% of TTI over a period of 3 years was observed. Most of the donations were replacement donations with male predominance. Among the infections, HBV was the most common. Strict selection of blood donors and comprehensive screening of donor's blood using standard methods is highly recommended to ensure the safety of blood for recipient.

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