

FREQUENCY OF TRANSFUSION-TRANSMISSIBLE INFECTIOUS DISEASES AMONG BLOOD DONORS AT AKHTER SAEED TRUST HOSPITAL LAHORE, PAKISTAN

Alia Waheed,¹ Abdullah Farooq Khan,² Nosheen Salahuddin,³
Atiqa Arshad,⁴ Ahsan Farooq Khan,⁵ Zainab Yousaf⁶

Abstract

Background & Objectives: Blood transfusion is an essential lifesaving treatment. The unsafe blood transfusion practices are one of the reasons of spreading transfusion-transmissible infections among individuals. It is necessary to screen all donated blood units for HBV, HCV, HIV, VDRL, and MP. The objective of this study was to assess the frequency of transfusion-transmissible infectious diseases among donors in a trust hospital of Lahore.

Methods: It was a cross-sectional study which included 9114 blood donors who attended Akhtar Saeed Trust Hospital Lahore from January 2020 to September 2022. After informed consent, 3-5 ml of venous sample was drawn from donors using aseptic technique. Screening of blood was done by Chemiluminescence immunoassay (Maglumi-800) for HBV, HCV, HIV and VDRL. The MP was confirmed by peripheral blood picture on slide. Positive results of HBV, HCV, HIV and VDRL was calculated using manufacturer's guidelines and cut-off values.

Results: The mean age of participants was 27.8 ± 12.1 years. The number of volunteer and replacement donors were 961 (10.54%) and 8153 (89.45%) respectively. The total number of positive donors for transfusion-transmissible infectious diseases were 591/9114 (6.48%). The sero-positivity was found to be 170/9114 (1.9%) for HBV, 324/9114 (3.7%) for HCV, 33/9114 (0.4%) for HIV, 64/9114 (0.7%) for VDRL, and 0/9114 for MP respectively.

Conclusion: We found a low risk of transfusion-transmissible infectious diseases but the availability of safe blood is contingent on screening tests and appropriate donor selection.

Keywords: Blood transfusion, Blood donors, transfusion-transmissible infectious diseases, HIV, HBV, VDRL, HCV, infections

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Blood transfusion is an important part of the World Health Organization (WHO) list of vital medicines and considers as an essential lifesaving treatment.¹

- 1,4. Department of Pathology, Akhter Saeed Medical & Dental College, Lahore, Pakistan.
2. Department of Orthopedic Surgery, Akhter Saeed Medical & Dental College, Lahore, Pakistan.
3. Department of Obstetrics & Gynecology, Akhter Saeed Medical & Dental college Lahore, Pakistan.
5. Department of Dermatology, Shalamar Hospital, Lahore, Pakistan.
6. Department of Human Genetics & Molecular Biology, University of Health Sciences, Lahore, Pakistan.

Correspondence:

Zainab Yousaf, Department of Human Genetics & Molecular Biology, University of Health Sciences, Lahore, Pakistan.

Email: zainabyousaf00@gmail.com

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The WHO endorses achieving self-sufficiency in order to meet a population's transfusion needs by sustaining a secure supply chain and a harmless supply of blood components through voluntary and replacement donors.¹² Pakistan receives an expected 3.5 million blood donations yearly.³ Patients with chronic transfusion-dependent thalassemia, surgical procedures, pregnancy-related complications, haemorrhage, acute trauma, anaemia caused by poor health conditions are the primary beneficiaries of blood transfusions.^{4,5} The prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) is highest in Pakistan. According to an estimate, 5 to 10 million people were affected by HBV and HCV globally. The uncertain blood transfusion practices are one of the reason of increasing this epi-

demic.⁶ A huge amount of national blood donations (1/4th of the annual blood collections) are just used for the patients having transfusion dependent thalassaemia.⁷ Approximately 7.4 % of the general population is infected with HBV or HCV through blood-borne transmissions.⁸

The widespread prevalence of HBV and HCV infections and the absence of standard donor screening procedures, lower rates of voluntary donations, and partial reporting of transfusion-transmissible infectious diseases are major obstacles to blood transfusion safety in Pakistan. Additionally, although facilities for blood component therapy are developing in urban and tertiary care centers, the majority of Pakistan's blood is transfused as whole blood by blood banks. However, it is extremely difficult to obtain secure blood transfusion products in rural areas. This results in insecure practices, a lack of knowledge about WHO guidelines, and the use of blood that has not been adequately screened. However, such incidents can be minimized by following sound quality control procedures, which begin with the history collection and continue through laboratory procedures.

Due to misunderstanding, restricted access to health facilities, a lack of screening tests, and surveillance systems, the precise numbers of transfusion-transmissible infectious diseases in our population are still unknown.⁹ Furthermore, the voluntary blood donors have been accounted for to be the most secure group of blood donors than the replacement blood donors and their goal is to give blood to an obscure patient out of sympathy.¹⁰ Over 1.5 million units of blood are collected annually in Pakistan. The majority of these donors are replacement donors, typically member of the patient's family or close friends, with the intention of assisting in the majority of cases for transfusion in emergency situations.^{11,12} The accessibility of safe blood products is vital. This necessitates well-trained and educated staff, well-organized infrastructure, and high-quality transfusion services.¹³ In order to estimate the burden of transfusion transmissible infectious diseases caused by blood transfusions; we assessed the frequency of HBV, HCV, HIV, Venereal Disease

Research Laboratory (VDRL) and malarial parasites (MP) in the blood donor population.

METHODS

In this cross-sectional study, we included nine thousand one hundred and fourteen blood donors who attended the Akhtar Saeed Trust Hospital Lahore from January 2020 to September 2022. The informed consent was taken from all the blood donors. The name, age, gender, and profession of blood donors were recorded. The blood units were labelled with unique identification number. We included adult aged 18 to 60 years who donated blood at study area. We excluded donors having age less than 18 years and more than 60 years, blood pressure more than 180/100 mmHg, insulin dependent diabetes mellitus, history of epilepsy, history of malaria, haemoglobin level less than 13g/dl in males, haemoglobin level less than 12g/dl in females, and body weight less than 50 kilogram.

Three to five millilitres (ml) of venous sample was drawn by using aseptic technique from donors on enrolment. Within two hours of collection the sample was centrifuged at four thousand rpm for ten minutes for the separation of serum. The serum was aliquoted (three hundred micro liter (µl) /aliquot), labelled and was analysed. The blood units were screened by Chemiluminescence immunoassay (Maglumi-800) for HBV, HCV, HIV and VDRL. The MP was confirmed by peripheral blood picture (Etheyl-enediamine-tetraacetic acid blood) on slide. We used automation kit manufacturer's guidelines and provided cut-off value to report positivity of HBV, HCV, HIV and VDRL among these donors. Statistical analysis of data was done by using Statistical Package for Social Sciences (SPSS) version 25.0.

RESULTS

The mean age was 27.79+12.13 years (age range: 18 to 60 years). The numbers of volunteer and replacement donors were 961(10.54%) and 8153 (89.45%) respectively. Table 1 shows the distribution of the occupations of blood donors. The total of positive blood donors for transfusion-transmissible infectious diseases were 591/9114 (6.5%). The sero-positivity

was found to be 170/9114 (1.9%) for HBV, 324/9114 (3.7%) for HCV, 33/9114 (0.4%) for HIV, 64/9114 (0.70%) for VDRL, and 0/9114 (0.0%) for MP respectively (Figure 1). Sero-positivity for transfusion-transmissible infectious diseases among blood donors according to age, donor type and occupation is presented in Table 2.

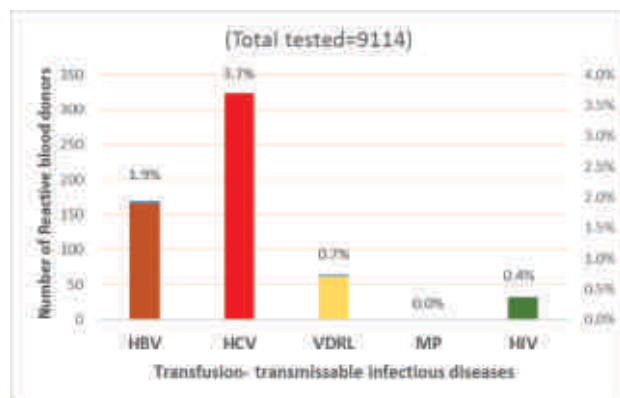


Figure 1: Sero-Positivity of Transfusion-Transmissible Infectious Diseases Among Blood Donors (HBV, Hepatitis B virus; HCV, Hepatitis C virus; HIV, Human Immune Deficiency Virus; MP, Malarial Parasite; VDRL, Venereal Disease Research Laboratory)

DISCUSSION

Pakistan has more than eighteen hundred public (hospital-based) or private blood banks, all of which

Table 1: Distribution of participants based on their occupations (n=9114)

Occupation	Number	Percentage
Private jobs	2397	26.3
Office worker	1405	15.4
Skilled workers*	1323	14.5
Students	1157	12.7
Businessman	1026	11.3
Unskilled workers	999	11.0
Professionals**	807	8.9

*Skilled workers include electrician, factory workers, farmers, mechanics, driver

**professions include lawyers, doctors, teachers, policemen, soldiers

are poorly regulated and driven by demand.^{14,15} These facilities provide transfusion services, including typing, donor screening, cross-matching, blood collection, blood storage, and distribution to patients. Due to inadequate training for blood bank staff, initial donor screening for high-risk behaviours is inadequate.¹⁶ Transfusion-transmissible infectious diseases are also more likely to occur in blood donors whose health and medical issues are not well understood. There is no universal serological screening procedure in Pakistan that guarantees quality. Poor laboratory practices and low-quality, quick, and inexpensive manual screening are prevalent in many blood banks. Only less than 13% of all donations are made through voluntary means. This is because of the general population's cultural beliefs, low educa-

Table 2: Sero-positivity for transfusion-transmissible infectious diseases among blood donors at Akhter Saeed trust hospital Lahore according to age, donor type and occupation (n=9114)

Characteristics	HBV		HCV		HIV		VDRL	
	Reactive/ Non-Reactive	Percent (reactivity)	Reactive/ Non-Reactive	Percent (reactivity)	Reactive/ Non-Reactive	Percent (reactivity)	Reactive/ Non-Reactive	Percent (reactivity)
Age (years)								
18-30	106/6450	1.6%	228/6333	3.6%	30/6521	0.5%	44/6512	0.7%
31-60	64/2494	2.5%	96/2457	3.9%	03/2560	0.1%	20/2538	0.8%
Donor type								
Replacement	166/7987	2.0%	300/7853	3.8%	33/8120	0.4%	54/8099	0.7%
Volunteer	04/957	0.4%	24/937	2.5%	0/961	0	10/951	1.0%
Occupation								
Businessman	27/1000	2.7%	35/991	3.5%	0/1026	0	05/1021	0.5%
Factory worker	30/653	4.6%	73/610	11.9%	06/677	0.9%	03/680	0.4%
Labourer	42/941	4.5%	50/934	5.4%	07/977	0.7%	17/967	1.8%
Office worker	17/1388	1.2%	46/1359	3.4%	0/1405	0	08/1397	0.6%

Footnotes: HBV, Hepatitis B virus; HCV, Hepatitis C virus; HIV, Human immune Deficiency virus; VDRL, Venereal Disease Research Laboratory

tional attainment, and lack of infrastructure.¹⁷

The WHO global status report on blood safety and availability from 2016 states that in Pakistan, 100% of blood donations were tested for transfusion-transmissible infectious diseases, but only 66% were tested for VDRL and MP.⁶ The HBV prevalence in blood donors were 1.55% to 3.76%, HCV from 2.55% to 7.23%, HIV from 0.01% to 0.04%, and VDRL from 0.59% to 1.16%.^{6,14-17} The present study shows the cumulative frequency of 170/9114 (1.9%) for HBV, 324/9114 (3.7%) for HCV, 33/9114 (0.4%) for HIV, 64/9114 (0.7%) for VDRL, and no MP positive among blood donors. Transfusion of blood poses a significant risk of HBV and HCV transmission. With an estimated 2–4% carrier rate and five million people with chronic HBV infection, Pakistan is in a low-intermediate prevalence area. It has the second-largest population worldwide with HCV infection.¹⁸ An estimate puts the number of people living with chronic HCV in the country at almost 10 million, or roughly 5.9% of the population. Chronically haemophilia and transfusion-dependent thalassemia patients have a high prevalence of HCV (48.67%). This high prevalence in the general population and among chronic transfusion recipients may be influenced by the high prevalence of HBV and HCV in blood donors.¹⁹

The number of replacement donors 8153(89.45%) is higher than volunteer donors 961 (10.54%). There were more replacement blood donors than voluntary blood donors over time. However, the percentage of voluntary blood donations has increased to 30.4% over the past few years, indicating a recent trend toward an increase. Strong strategies utilized over the long run to urge blood givers prompted this ascent. Some of the changes that were implemented included improved donor motivation strategies like motivational speeches in educational institutions, promotional materials, films about voluntary blood donation, and phone calls to donors who are registered in the voluntary blood donor database.²⁰

Chattoraj et al. study shows that HCV positivity was found to be lower than in other studies, and there was little difference in reactivity rates between volun-

tary donors and replacement donors. The fact that both of their donor groups were from the armed forces and of the same socioeconomic status have been cited as the cause of these two occurrences.²¹ The various blood banks, different laboratory procedures and reagents may also be the cause of the differences. In blood banks, infectious disease testing is done for screening blood donors. As a result, the reagents that are utilized ought to have a high sensitivity. Fasola et al. also discovered that HCV infections were rising, while HIV and HBV infections were declining.²² Gupta et al., found that voluntary donors now have a lower prevalence of HBsAg. In the case of HCV, voluntary donors had a lower prevalence than replacement donors.²³

In order to guarantee a safe supply of blood, the criteria used to select donors and the screening for infectious diseases needs to be improved. Life can be saved by blood. However, it also has the potential to spread infections that can be fatal. To ensure the safety of blood, a quality assurance system, and screening tests and are necessary. Protocols ought to cover the procedures, equipment, reagents, staff, and maintenance of the laboratory.

Conclusion

In this study, we examined the frequency of transfusion-transmissible infectious diseases among blood donors. We found a low risk of HBV, HCV, HIV and VDRL infections with no MP positive case. Availability of safe blood depends on selecting donors correctly and using screening tests. In order to stop the spread of both established and emerging blood-borne pathogens, continuous improvement and education are crucial to blood safety.

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