



Research Article

COMPARATIVE ANALYSIS OF SEROPREVALENCE OF HBV, HCV AND HIV INFECTIONS IN FIRST TIME AND REPEAT BLOOD DONORS, WITH FURTHER SUBCATEGORISATION OF FIRST TIME BLOOD DONORS, IN A TERTIARY CARE HOSPITAL IN WESTERN UTTAR PRADESH, INDIA

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Abstract- Background: The World Health Organization recommendation necessitates universal screening of blood donations for the major transfusion-transmissible infections (TTIs): Hepatitis B virus (HBV), Hepatitis C virus (HCV), Human immunodeficiency virus (HIV), and syphilis. Blood-borne agents such as the human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV) are among the greatest threats to blood safety for the recipient. This study aimed to determine the seroprevalence of HBV, HCV and HIV infections among first-time blood donors (FD) in a blood bank in tertiary care medical college hospital in Western Uttar Pradesh, Bareilly, India. Methods: This retrospective study was based on the records of all voluntary (VD) and replacement donations (RPD) which were collected from January 2016 to August 2018 in a tertiary care medical college and hospital in Bareilly, Uttar Pradesh, India. Results: Of the total 7908 donations, 2268 (28.6%) were voluntary and 5640 (71.4%) were replacement donation. The first-time donor accounted for 5024 (63.6%), while repeat donors (RD) accounted for remaining 36.4%. The TTIs were more frequently encountered in First Time donors in comparison to Repeat donors. Also, when first time donors were analysed alone, the prevalence of TTIs was more in replacement donors, compared to voluntary donors. Conclusions: The potential risk of TTIs can be truncated to a large extent by increasing in public awareness regarding frequent blood donation and voluntary blood donation, donor screening using stringent criteria, counselling and use of highly sensitive and specific tests.

Keywords- HBV, HCV, HIV, First time Donors, Voluntary Donors, Repeat Donors, Replacement Donors

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Introduction

Blood transfusion is a therapeutic procedure, saving millions of lives. It is estimated that more than 90 million blood units are collected in the world each year [1]. Blood transfusion saves millions of lives each year; however, it also carries risk of many life-threatening complications and transfusion-transmitted infections (TTIs) [2]. Each transfused patient is at risk of acquiring transfusion-transmissible infections (TTIs), principally the human immunodeficiency virus (HIV), hepatitis B and C viruses (HBV and HCV). Transfusion of contaminated blood significantly increases morbidity and mortality due to acquired infections. Worldwide there is high prevalence, about 350 million have chronic hepatitis B virus (HBV) infection and 125 million people and hepatitis C virus (HCV) respectively, putting viral HBV and HCV infection among the world's greatest infectious disease problems and rendering them as target for public health measures aimed at prevention, early diagnosis and treatment [3]. Computation of the prevalence of TTIs, namely HBV, HCV and HIV antibodies or antigen, among blood donors, serve as reliable index of unnoticeable infections and sexually transmitted infections in the community in healthy-looking members of the general population [4, 5]. A higher prevalence of infectious contaminants is found in first-time blood donors compared to repeat donors. Therefore, the evaluation and monitoring of these viruses in first-time blood donors is essential for controlling the potential risk of transfusion-transmissible infections (TTIs) [6]. The present study was conducted to find the prevalence of TTIs in blood donors, making comparative analysis of prevalence in FDs versus RDs and between VDs and RPDs among FDs.

Material & Methods

This present retrospective study was conducted in a tertiary care medical college hospital in Bareilly, Northern India the India, from January 2016 to August 2018, based on the records of all donations done. All records including TTI records, donor registers, completely filled donor forms, which included blood donor details- FD/RD, VD/RPD, the patient's details, pre-donation questionnaire, counselling details and medical examination findings available for each case were analysed. A first-time donor was defined as a donor who had not previously donated blood in the present or any other blood bank. All the blood samples, drawn were screened for HIV 1-2, HBsAg, HCV, syphilis and malaria. Samples were collected and screened for HIV 1-2, HBsAg and HCV by using fourth-generation enzyme-linked immunosorbent assay (ELISA) technique, using kits manufactured by Avant or (BeneSphera, USA) and steps executed as per kit inserts. Samples displaying reactive results were tested in replica before labelling as reactive. All Data were collected for TTI- HBV, HCV and HIV.

Results

A total of 7908 donations were collected during the study period of 2 years 8 months (January 2016-August 2018) and comprised- FD of 5024 (63.6%) and 2884 (36.4%) repeat donations [Table-1]. The overall seroprevalence of TTI in donors was 158 (2.0%) out of total 7908 donations, with prevalence of hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV), were 1.0, 0.8 and 0.1 percent respectively [Table-2].

Table-1 Blood donation year wise

Year	Total donations	VD	RDP	Total first time donations(%)	Total repeat donations(%)
2016	1898	580(30.5%)	1318(69.5%)	1267(66.7%)	631(33.3%)
2017	3404	1144(33.6%)	2260(66.4%)	2137(62.8%)	1267(37.2%)
2018	2606	544(20.8%)	2062(79.2%)	1620(62.2%)	986(37.8%)
Total	7908	2268(28.6%)	5640(71.4%)	5024(63.6%)	2884(36.4%)

VD: Voluntary Donors, RDP: Replacement Donors

Table-2 Prevalence of HIV,HBV,HCV in blood donors

Year	Total donations	HBV-T	HCV-T	HIV-T
2016	1898	26	28	2
2017	3404	36	16	8
2018	2606	20	20	2
Total	7908	82(1%)	64(0.8%)	12(0.1%)
Total Seroreactive units-158(2.0%)				

T: total number of seroreactive unit; HIV- human immunodeficiency virus, HCV- hepatitis C virus, HBV-hepatitis B virus

Table-3 comparison of seroprevalence of HIV, HBV & HCV in first time & repeat donors

Year	HBsAg		HCV		HIV	
	FD	RD	FD	RD	FD	RD
2016	20(1.6%)	6(0.9%)	21(1.6%)	5(0.8%)	2(0.1%)	0
2017	29(1.3%)	7(0.5%)	13(0.6%)	3(0.2%)	6(0.3%)	2(0.1%)
2018	16(1%)	4(0.4%)	15(0.9%)	5(0.5%)	2(0.1%)	0

HIV-human immunodeficiency virus; HCV-hepatitis C virus;HBsAg-hepatitis B virus surface antigen;VD-voluntarydonor;RD-replacementdonors;FD-first time donors.

Table-4 voluntary & replacement donors among first time donors

Year	Total FD	VD		RPD		HBsAg		HCV		HIV	
		VD	RPD	VD	RPD	VD	RPD	VD	RPD	VD	RPD
2016	1267	220(17.4%)	1047 (82.6%)	3(1.3%)	17(1.6%)	2(0.9%)	19(1.8%)	0	2(0.2%)	0	2(0.2%)
2017	2137	380(17.7%)	1757 (82.3%)	3(0.8%)	26(1.5%)	1(0.3%)	12(0.7%)	1(0.3%)	5(0.3%)	1(0.3%)	5(0.3%)
2018	1620	212 (13%)	1408 (87%)	2(0.9%)	14(1%)	1(0.5%)	14(1%)	0	2(0.1%)	0	2(0.1%)
Total	5024	812(16.2%)	4212 (83.8%)								

HIV-human immunodeficiency virus;HCV-hepatitis C virus;HBsAg-hepatitis B virus surface antigen;VD-voluntarydonor;RPD-ReplacementDonorsFD-first time donors.

Further on analysing TTIs amongst FD and RDs as shown in [Table-3], FDs showed higher percentage prevalence of all TTIs, year wise. FDs when further categorised into VDs and RPDs, showed higher prevalence of all TTIs among RPD, compared to VDs.

Discussion

Blood transfusion, though rendered as an effective therapeutic option, is studded with potential risk of transmission of infectious diseases and can be fatal instead of saving life [7,8]. WHO recommends collection of blood from voluntary regular non-remunerated donors who have a lower risk of TTIs compared to family replacement and commercial donors [9-11]. Only 28.6% of donors in our study were voluntary non-remunerated donors. This is in contrast to 80-100% voluntary donations advocated by the WHO. [9]. This higher seroprevalence for HBV, HCV, HIV was noted for first time donors compared to repeat/regular donors. Also, on further categorisation of first-time donors, replacement donors were found to have higher prevalence percentage of HBV, HCV, HIV, compared to voluntary donors. These results, which are in keeping with those of other studies, [12-14] strongly indicate that family replacement donors are less suitable for blood donation. Higher prevalence rates in family replacement donors compared to voluntary donors and first-time donors versus repeat donors, can be explained by the fact that people who voluntarily come for regular blood donation are not associated with high-risk activities such as multiple sex partners, intravenous drug abuse, or unprotected sexual inter-course. On the other side, a proportion of replacement donors, who donate blood because of urgent need, are unaware of risk factors for these infections and are more prone to be infected by these pathogens. Newer and more sensitive techniques, such as nucleic acid testing (NAT) should be introduced to all the centres to facilitate early detection of viraemia, during serological window period. [15] In conclusion, our results showed that TTIs pose a serious threat to safe blood transfusion and were significantly seen in higher proportion of FDs compared to RDs. The proportion of RPD positivity was also significantly higher compared to VD in FDs. As the proportion of VD still falls much lower compared to RPD, there is an urgent need to create public awareness regarding regular voluntary donation and its benefits. Donor selection has to be

done meticulously using stringent criteria and screened for TTIs by highly sensitive and advanced techniques.

Application of research: The blood donors have to be diligently screened for the risk factors associated with various transmissible infections and serological screening done by more sensitive methods. Voluntary blood donation has to be facilitated, as it entails significantly lower risk of infection transmission.

Research Category: Infection analysis

Abbreviations: TTIs: Transfusion-Transmitted Infections

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Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

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