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Spectrum of Transfusion Transmitted Infections among Blood Donors –A Tertiary Care Centre Based Study

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ABSTRACT

Transfusion of blood and its components is lifesaving, however the patients are at a significant risk of contracting transfusiontransmitted infections (TTIs). The aim of the present study was to find out prevalence of TTIs in voluntary and replacement donors in a tertiary care hospital. This study was done in the Blood Transfusion Department, PGIMS Rohtak Haryana, a tertiary care centre in North India from January 2016- June 2018. Blood was collected from apparently healthy individuals following donor selection criteria after detailed history and examination. A total of 104090 donors were screened over the study period. TTIs testing were done with 3rd generation ELISA for HBV and HCV and HIV1 and 2 testing was done with 4th generation ELISA. Testing for malaria parasite was done by card test based on malarial (pLDH) antigen based principle. VDRL testing was done for syphillis. The total number of donors, who were found positive for TTIs, was 1806 (1.7%). The prevalence of HIV, HBV, HCV, syphilis infections among donors was 0.17%, 0.93%, 0.59% and 0.04% respectively. Prevalence of hepatitis infection (0.93%) formed the majority of the total TTI's. No blood donors were found positive for malaria parasite. The present study shows lower prevalence of TTIs as compared to other studies because of higher proportion of voluntary blood donation and stringent donor screening. Avoiding unnecessary blood transfusion and use of highly sensitive tests including nucleic acid testing can help to further reduce the risk of TTIs in this scenario.

Keywords: Transfusion transmitted infections, ELISA, Blood donors, Voluntary.

INTRODUCTION

Transfusion of blood and its components is lifesaving; however the patients are at a significant risk of contracting transfusion-transmitted infections which have many (TTIs) life threatening complications and impose serious challenges to the medical personnel to ensure availability of safe and affordable blood products. There is 1% chance of transfusion associated problems including TTIs with every unit of blood transfused ^{[1].} Many blood donors are asymptomatic carriers of TTI's, and transmission of infections during the window period from such blood donors can pose serious threat to the safety of the collected donations^[2]. The risk of acquiring TTIs is even higher in multiple transfused patients. Most common TTIs are human immunodeficiency virus

(HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis and malaria. WHO recommendations to improve blood transfusion safety include establishment of well-organized blood transfusion services, prioritization of blood donation from voluntary non-remunerated donors, screening of donated blood for at least the four major transfusion-transmissible infections with quality-assured assays, rational use of blood and implementation of effective quality control systems ^[3]. According to the National AIDS Control Organization (NACO) guidelines it is mandatory to screen donated blood for HIV 1 and 2, hepatitis B, hepatitis C, syphilis and malaria^[4]. These strategies have been extremely effective but transmission of diseases still occurs, primarily

because of the inability of the test to detect the disease in the pre-seroconversion or 'window' phase of their infection, high cost of screening, a lack of funds and trained personnel, immunologically variant inadvertent viruses. and laboratory testing errors^[5]. Thus it is essential to evaluate prevalence of TTIs to assess the safety of blood supply and monitoring the efficiency of currently employed screening procedures^[6]. An effective donor screening protocol and counselling of donor, sensitive screening tests and proper discarding techniques for reactive units can ensure a reduction in the risk of acquiring TTIs^[7]. The aim of the present study was to find out prevalence and trends of TTIs in voluntary and replacement donors in a tertiary care hospital.

Material & Methods:

This retrospective study was done in the Blood Transfusion Department, PGIMS Rohtak Haryana, a tertiary care centre in North India from January 2016 – June 2018. Blood was collected from apparently healthy individuals following donor selection criteria after detailed history and examination, aged 18–65 years with weight >45 kg with hemoglobin concentration >12.5gm%.The donor blood samples were later screened for mandatory tests [Malaria,

Venereal Disease and Research Laboratory (V.D.R.L), Hepatitis B antigen (HBsAg), Anti HCV & Anti HIV 1&2)]. Testing for malaria parasite was done by card test based on malarial (pLDH) antigen based principle. VDRL testing was based on TPHA (Treponema Palladium Haemagglutination Antibody) based principle. Testing for Hepatitis B, Hepatitis C awere based on 3rdgeneration ELISA techniques and HIV 1 and 2 by 4th generation ELISA. All samples with reactive results were repeat tested before labelling as reactive and respective blood units were discarded.

Results:

A total of 104090 donors were screened over study period (January 2016 – June 2018). Majority of them were voluntary donors. Out of 104090 blood donors 103756 (99.68%) were males and 334 (0.32%) females (Table 1). The total number of donors, who were found positive for TTIs, was 1086 (1.7%). The prevalence of HIV, HBV, HCV, syphilis infections among donors was 0.17%, 0.93%, 0.59% and 0.04% respectively (Table2). Prevalence of hepatitis infection (0.93%) formed the majority of the total TTI's over the study period (Fig 1). No blood donors were found positive for malaria parasite.

Table 1 Total blood collection and sex distribution of donors

Year	Total donation	Males	Females
2016	40293	40185	108
2017	42417	42288	129
2018	21380	21283	97
Total	104090	103756	334

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Table 2 Prevalence	OI OI HIV, HBSAg	, HCV and syphilis	in blood donors

Year	Total	HIV	HbsAg	HCV	VDRL	Malaria	
	donation						
2016	40293	78	368	248	3	0	
2017	42417	74	398	263	16	0	
2018	21380	32	199	104	23	0	
Total	104090	184(0.17%)	965(0.93%)	615(0.59%)	42(0.04%)	0	



Fig 1: Comparison of transfusion transmitted infections

Discussion:

Blood transfusion service (BTS) is an integral and indispensable component of the healthcare system with primary objective to ensure safety, adequacy, accessibility and efficiency of blood supply at all levels ^[8]. Transfusion of blood and blood products is although a lifesaving procedure but can cause acute and delayed complications and contributes to a significant the risk of transmitting TTI's. Inspite of having effective donor screening and testing practices, risk of transmitting infections (TTI's) still remains ^[9]. With the development of more sensitive methods to detect markers of TTI's, the risk still persists because of inability of test to detect the disease in 'window period', false negative results, asymptomatic carriers, genetic prevalence of variability in viral strains and technical errors ^[10].The present study was done at PGI Rohtak blood transfusion department determine to the seroprevalence of HIV, HBV, HCV, malaria and syphilis among healthy blood donors. A total of 104090 donors were screened over the study period (January 2016 – June2018). The total number of donors, who were found positive for TTIs, was 1086 (1.7%) comparable to studies done by Agarwal N et al and Leena M S et al (0.87% and 1.35%

respectively) while lower than the studies done by Kotwal U et al and Kumar R et al 3.02% and 4.57% respectively^[11-14]. In our study lower prevalance of TTIs might be because most of the blood collection was from voluntary donors with stringent donor screening criteria. Among replacement donors there is a compulsion to donate blood to get blood for their patients and hence there is a possibility of concealing some information regarding high risk behavior or past illnesses. In our study the prevalence of HIV, HBV, HCV, syphilis infections among donors was 0.17%, 0.93%, 0.59% and 0.04% respectively which is comparable with other studies done by Adhikari et al,^[15] Bhattacharya et al ^[16]. No blood donors tested showed positive for malarial parasite. This can be attributed to better pre donation screening and good knowledge of malaria related symptoms in blood The present study showed higher donors. seroprevelance of HBV and HCV among the blood donors as compared to other TTI's. Hepatitis B and C positivity indicates a carrier state or an active infection and are recognised as a major public health problem in developing countries. Individuals with chronic infection have a high risk of developing liver [17] cirrhosis and hepatocellular carcinoma Seroprevelance of HBsAg in various Indian studies

has shown to range between 1.86%-4% and of HCV ranging from 0.4%-1.09%^[18].which is comparable to our study. The residual transmission risk of HBV infection through a transfusion is higher due to a long window period between initial HBV infection and HBsAg detection ^[19]. For HIV, Up to 3% of HIV infections worldwide are transmitted through the transfusion of contaminated blood and blood products^[20]. In our study, HIV seropostitivity was seen in 0.17 per cent donors which was comparable to other studies^[21,22] from India, whereas some studies reported a lower prevalence of 0.1^[23] and 0.08 per cent^[24]. WHO report states that the viral dose in HIV transmission through blood is so large that one HIV positive transfusion leads to death, on an average, after 2 years in children and after three to 5 years in adults^[25] Sexually transmitted infections are widespread in developing countries. Individuals exposed to syphilis may also have other sexually transmitted diseases and are associated with increased risk of HIV infection.[26] Thus syphilis screening of donated blood has been considered as a 'lifestyle' indicator and it serves primarily as a surrogate test to identify donors with potentially high risk behavior. Our study shows prevalence of Syphilis was 0.04%, which is lower as compared to other studies^[12,24]. Replacement donors carry relatively higher risk of transfusion transmitted infections Hence blood from replacement donors should be accepted only in cases of dire emergencies The present study has limitation of use of ELISA test for TTIs screening.Study done by Schreiber GB et al, showed that donors whose units passed all screening tests, the risks during an infectious window period were estimated as follows: for HIV, 1 in 4, 93,000; for HCV, 1 in 1, 03,000; and for HBV, 1 in 63.000^[27]. The majorities of the problems are due to the prevalence of asymptomatic carriers in the society, as well as blood donations during the window period of infections also poses a great threat to safe blood supply. In our study, HBV was the most prevalent TTI indicating a need for an organized programme for hepatitis B vaccination and use of a highly sensitive technique for its detection like nucleic acid amplification technique (NAT) which can uncover latent infections in the window period The NAT has added benefits but its high financial cost is of concern, especially in economically restricted countries. This implies that screening for TTIs needs

to be upgraded across blood banks in India. To lower the seroprevalence, there should be stringent donor selection criteria, blood donation by regular volunteer donors, effective donor education, counseling of seropositive donors and judicious use of blood and blood components.

Conclusion:

The present study shows lower prevalence of TTIs as compared to other studies. The reasons behind this finding may be better health status of the blood donors, better life style, and higher proportion of voluntary blood donation with stringent donor screening. HBV was the most prevalent TTI among all. With the implementation of strict donor selection criteria, getting voluntary donations, avoiding unnecessary blood transfusion and using highly sensitive screening testsit may be possible to further reduce the incidence of TTI thus ensuring safe blood supply to the recipients.

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