

Seroprevalence of Transfusion Transmitted Infections among Blood Donors in Delhi, India - A 3 Years Retrospective Study.

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ABSTRACT

Background: Transfusion of blood and its components is life saving as well as it has life threatening hazards. Preventing the transmission of infectious diseases through blood transfusion in developing countries is difficult given that the resources required are not always available even when policies and strategies are in place. Objective: The present study was conducted to determine the seroprevalence of transfusion transmitted infections (TTIs) among the blood donors at a tertiary care hospital in Delhi over a period of 3 years. **Methods:** A 3 year retrospective study was conducted at the blood bank of a tertiary care hospital. All data were collected from blood bank records and included records of 1014 voluntary and 5690 replacement donors from January 2014 to December 2016. Screening of blood units was done by enzyme-linked immune sorbent assay (ELISA) method for Human Immune Deficiency Virus (HIV), and hepatitis B virus (HBV) and hepatitis C virus (HCV). Syphilis was tested by rapid plasma resin (RPR) card test. Malaria was tested by antigen rapid diagnostic test. Any sample found reactive was retested for confirmation and seropositive units were discarded. **Results:** Overall TTIs incidence in voluntary donors and replacement donors was found to be 1.97% (20/1014) and 1.44% (82/5690) respectively. Seroprevalence of HIV, HBV, HCV, Syphilis and Malaria was found to be 0.09% (1/1014), 1.18% (12/1014), 0.69% (7/1014), 0.00% and 0.00% in voluntary blood donors as against the figures of 0.28% (16/5690), 0.61% (35/5690), 0.47% (27/5690), 0.05% (3/5690) and 0.01%(1/5690) of replacement blood donors respectively. It is clear from this data that the seroprevalence of HIV, syphilis and malaria is lower in voluntary blood donors as compared to replacement blood donors. However seroprevalence of HBV and HCV is higher in voluntary blood donors as compared to replacement blood donors. The highest seroprevalence of TTI was found to be in the age group of 61-65 followed by 41-50 years age group. **Conclusion:** Prevalence of TTI is more in voluntary blood donors as compared to replacement donors in cases of HBV and HCV and lower in voluntary blood donors as compared to replacement blood donors in case of HIV, syphilis and malaria. Hence, efforts should be made to increase the number of voluntary donors and a strict selection of all blood donors and proper testing of a donor's blood by using standard methods is highly recommended to ensure safety for the recipient.

Keywords: Blood donor, Seroprevalence, Transfusion transmitted infections.

INTRODUCTION

Transfusion of blood and blood components, as a specialized modality of patient management saves millions of lives worldwide each year and reduces morbidity. It is well known that blood transfusion is associated with a large number of complications, some are only trivial and others are potentially life threatening, demanding for meticulous pretransfusion testing and screening. Use of unscreened blood transfusion keep the patient at risk of acquiring many transfusion transmitted infections (TTI) like hepatitis viruses (HBV, HCV), human immune deficiency viruses (HIV), syphilis, malaria

etc. Transfusion departments have always been a major portal to screen, monitor and control infections transmitted by blood transfusion. Blood transfusion departments not only screen TTI but also give clue about the prevalence of these infections in healthy populations.^[1]

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Blood transfusion service (BTS) is an integral and indispensable part of the healthcare system. The priority objective of BTS is to ensure safety,

adequacy, accessibility and efficiency of blood supply at all levels.[2]

Measuring their severity, WHO has recommended pre-transfusion blood test for Human immunodeficiency virus (HIV), Hepatitis B virus (HBV), Hepatitis C Virus (HCV) and Syphilis as mandatory.[3] According to National AIDS Control Organization (NACO) guidelines, all mandatory tests should be carried out on donor's blood samples for HIV, HBV, HCV, syphilis and malaria. The whole blood or components from any unit that tests positive for these should be discarded.[4] Only continuous improvement and implementation of donor selection, sensitive screening tests and effective inactivation procedures can ensure the elimination, or at least reduction of the risk of acquiring TTIs.[5] For this NACO recommended use of 3rd or 4th generation ELISA HIV I & II test kits which are 100% sensitive at blood banks for screening donated blood.[6] Blood transfusion departments not only screen TTIs but also give clue about the prevalence of these infections in healthy populations.[1] Evaluation of data on the incidence of TTIs among blood donors permits an assessment of the accurate estimation of risk of TTIs, which helps in the formulation of long term strategies to improve public health and to prevent spread of disease in local population.[7] The aim of the present study was to find out prevalence of transfusion transmitted infections (TTI) in voluntary and replacement donors in the hospital transfusion service set up. This study also aids in evaluating the safety of the collected donations.

MATERIALS AND METHODS

The study was conducted at a tertiary care hospital in Delhi for a period of 3 year from January 2014 to December 2016. All the information of donors like personal details, demographic details, occupation details and medical history regarding risk factor like history of previous surgery, hospitalization, blood transfusion were recorded by Medical officer in registration form and entered in blood bank records. The donors were then screened according to blood donor selection criteria and guidelines from drug and cosmetic act & NACO.^[8,9] The blood donors who were unfit to donate blood according to standard blood donors selection criteria (As per the Drugs and Cosmetics Act, 1999) were excluded.^[10] Haemoglobin estimation was performed. This screening procedure was very helpful to exclude the professional donors. The total no. of 6704 donors was considered medically fit and accepted for blood donation during the study period. On completion of blood donation, the units were screened for the five commonest TTIs namely HIV I & II, HBV, HCV, syphilis and malaria. All sera were initially tested for Hepatitis B Surface antigen (HbsAg), anti-HIV antibody, anti-HCV antibody by enzyme linked

immuno-sorbent assay (ELISA) test using commercial kits. Syphilis was tested by RPR card test. Malaria was tested by antigen rapid diagnostic test.. The data were recorded on specially formed Performa, tabulated and analyzed. Any sample found reactive was retested for confirmation and seropositive units were discarded.

RESULTS

In the present study, out of 6704 voluntary and replacement donors, 6444 (96.12%) were males and 260(3.87 %) were females which shows predominance of male donors. The most common age group of donors was found to be 21-30 years (46.09 %) as shown in [Table 1].

Highest prevalence of transfusion transmitted infections was within age group of 61-65 years (4.16 %) followed by in 41-50 years (2.12%) as shown in [Table 2].

The overall prevalence of TTI (HIV, HBV, HCV, Syphilis and Malaria) among Voluntary and replacement donors in present study is 1.52 % (102/6704). Out of total 6704 donors, 1014(15.12%) were voluntary donors and 5690(84.87%) were replacement donors. The seroprevalence of HBV is highest, 0.70 % (47/6704) followed by HCV 0.50% (34/6704) in all the donors. The seropositivity for HIV is 0.25 % (17/6704), for syphilis 0.04% (3/6704) and for malaria 0.01 % (1/6704). Results show that sero-positivity for HBS and HCV is significantly high in voluntary donors as compared to replacement. However HIV seropositivity is higher in replacement donors as compared to voluntary blood donors and syphilis and malaria are positive only in replacement blood donors [Table 3].

Table 1: Age wise distribution of blood donors.

Age group in years	Total number	Percentage (%)
18-20	348	5.19
21-30	3090	46.09
31-40	2119	31.60
41-50	895	13.35
51-60	228	3.40
61-65	24	0.35
Total	6704	

DISCUSSION

Transfusion transmitted infections (TTIs) are a great concern of safety for patients. Since the starting of blood transfusion scientifically in early 1940s, various transfusion associated problems have come to the forefront for the scientific community. These include TTI, all immunization to various blood and issues related to cold chain maintenance. TTI was first observed in the process of blood transfusion in late 1940. Till early 1970, blood bank personnel were only concentrating on a few blood borne

infections like syphilis and viral hepatitis despite the constant awareness regarding the presence of

multiple agents. [11].

Table 2: Age wise distribution of HIV, HBV, HCV, Syphilis and Malaria seropositive blood donors.

Age group in years	Total number of blood donors	HIV	HBV	HCV	Syphilis	Malaria	Total number of seropositive blood donors	%
18-20	348	0	1	3	0	0	4	1.14
21-30	3090	9	23	13	2	0	47	1.52
31-40	2119	5	13	8	0	1	27	1.27
41-50	895	1	8	9	1	0	19	2.12
51-60	228	2	1	1	0	0	4	1.75
61-65	24	0	1	0	0	0	1	4.16
Total	6704	17(0.25%)	47(0.70%)	34(0.50%)	3(0.50%)	1(0.01%)	102	1.52

Table 3: Seropositivity of different TTIs in voluntary and replacement blood donors.

TTI	Voluntary blood donors (n=1014) (15.12%)		Replacement blood donors (n=5690) (84.87%)		Total blood donors (n= 6704)	
	Number of seropositive blood donors	% of seropositive blood donors	Number of seropositive blood donors	% of seropositive blood donors	Number of seropositive blood donors	% of seropositive blood donors
HIV	1	0.09	16	0.28	17	0.25
HBV	12	1.18	35	0.61	47	0.70
HCV	7	0.69	27	0.47	34	0.50
Syphilis	0	0	3	0.05	3	0.04
Malaria	0	0	1	0.01	1	0.01
Total	20	1.97	82	1.44	102	1.52

Transfusion Transmitted Infections is still a major concern to patients, physicians and policy makers who wish to see a risk free blood supply.

With every unit of blood, there is 1 % chance of transfusion associated problems including TTI. The risk of TTI has declined dramatically in high income nations over the past two decades, but the same may not hold true for the developing countries. The national policy for blood transfusion services in our country is of recent origin and the transfusion services are hospital based and fragmented. [12]

Voluntary donors (VD) are motivated blood donors who donate blood at regular intervals while replacement donors (RD) are usually one time blood donors who donate blood only when a relative or a friend is in need of the blood. Results of present study are comparable with many other studies done. Seropositivity for HBV was found to be highest among all TTI in this study, which is consistent with results of many other studies. [13-19]

Various studies in India about the seroprevalence of HCV have shown data ranging from the lowest (nil) in the study by Diwan R et al [18] in 2012 to the higher up to 1.09% by Gupta et al, [20] in 2004. A significantly lower prevalence for HCV of 0.50 % (34/6704) has been noted in our study. Sexually transmitted infections are widespread in developing countries and constitute a major public health problem. The antibodies detected for syphilis show reactivity of 0.04 % (3/6704) in our study, which is lowest as compared to other studies but higher than Chandra T et al. [17] HIV prevalence was found to be lower in our study as compared to others except Gupta N et al [20], Chandra T et al [17], Diwan R et al

[18] and Shah N et al. [19] HBV prevalence was found to be lower than other studies except Gupta N et al. [20]

As is apparent from the results of present study, replacement blood donors have significantly lower rates of prevalence for markers of TTIs as compared to voluntary blood donors except in case of HBV and HCV. Voluntary non remunerated blood donation is the source of the safest blood supply to the transfusion service. In the Indian setup where voluntary donations are fewer and poorly structured, safety of blood could still be compromised. The current practice of selection of voluntary donors over replacement donors to meet with the need for blood in a hospital coupled with more numbers of voluntary donor drives in the community as well as availability of better testing reagents (particularly for HIV and HCV infections) is sure to lower down the threats of transmitting TTIs to patients via transfusion of blood and blood products. Awareness of general population about voluntary regular blood donation should be created to minimize the chances of spreading transfusion-transmitted infections. Replacement donors carry a relatively higher risk of transfusion-transmitted infections due to increased chances of donations by professional donors, which may escape detection during donor screening procedures. Hence, blood from replacement donors should be accepted only in cases of dire emergencies when transfusion of blood or blood products would be life saving.

Safe blood is a universal right, which means that blood which will not cause any harm to the recipient and that has been fully screened and is not

contaminated by any blood borne diseases such as HIV, Hepatitis, malaria and syphilis. Unsafe blood remains a major threat for the global spread of TTIs.^[21]

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]

CONCLUSION

The major concern in transfusion services is increased seropositivity among replacement and voluntary blood donors for HCV, HBsAg. A noticeable number of replacement donors harbour HIV, HBV, HCV, Malaria and Syphilis infections. So strict selection of donors and proper testing of donor's blood by using standard method is highly recommended to ensure safety for recipient. With the advent of nucleic acid amplification techniques (NAT), western countries have decreased the risk of TTI to a major extent. But the cost-effectiveness of NAT is poor. Apart from NAT for donor screening, other factors such as public awareness, vigilance of errors, educational and motivational programs for both voluntary and replacement blood donors is sure to help in decreasing the infections. Efforts should be made to increase the number of voluntary donors and reduce replacement donations to a minimum. Motivation of potential local blood donor population would help in effective implementing of voluntary blood donation program in the community.

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