

Seroprevalence of Transfusion Transmitted Infections in blood donors at a rural based tertiary care teaching hospital in India

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Abstract: The present retrospective study was carried out at JIU's Indian Institute of Medical Science and Research, a tertiary care teaching Hospital in Warudi, Jalna, a rural area in Marathwada region of Maharashtra. The study was designed for a period of two years, three months, between June 2013 to August 2015. Medical reports of the donors were accessed from the Hospital records and analyzed. A total of 1173 blood donations were accepted during the period on voluntary donation basis through blood donation camps and from the blood donations in blood bank; HBV, HCV and HIV were tested by ELISA methods approved by NACO in voluntary as well as replacement blood donors. RPR was carried out for screening of syphilis. On screening the blood for TTIs, 47 (4%) donors (44 males & 3 females) were found positive for one of the TTIs. Amongst the TTIs Positive cases, highest prevalence was for HBV (26 cases, 55.32 %) followed by HCV (13 cases, 27.66%), HIV (6 cases, 12.76%) and syphilis (2 cases, 4.25%). None of the donor was found positive for malaria. Blood transfusion is still one of the main sources of transmission of infections in our region of Marathwada, a rural region of India.

Keywords: HIV, HBV, HCV, Syphilis, TTIs

I. Introduction

Blood is one of the most precious commodities - that's why we keep it banked. Transfusion of blood and blood components are a specialized modality of patient management which has been saving millions of lives worldwide each year. Amongst the blood transfusion complications, transmission of certain infections (TTIs) like HIV, Hepatitis B & C and syphilis are most significant for the long term detrimental side effects. Meticulous pre-transfusion testing and screening particularly for transfusion transmissible infections (TTI) is the need of the hour^[1].

Wake and Cutting^[2] have postulated that the demand for blood and its components is likely to increase in the future. Invention of newer sophisticated medical and surgical procedures such as transplant surgery, heart surgery and trauma or cancer treatment depends highly on blood transfusions in each country. Moreover, blood transfusion improves the quality of life of multi-transfused patients like thalassemia, hemophilia.

India has a population of more than 1.2 billion with 5.7 (reduced to 2.5) million Human Immunodeficiency Virus (HIV) positive, 43 million HBV positive and 15 million HCV positive persons. The risk of transfusion transmission of these viruses may be alarming due to high seroprevalence of HIV, HCV and HBV (0.5%, 0.4%, and 1.4 % respectively) among the blood donors^[3].

The quality of safe blood transfusion and the risk of transfusion transmitted infectious diseases (TTIs) and quality of screening procedures in any region especially in rural areas can be estimated by review and analysis of records of blood donors for screening procedures and the prevalence of serological markers of infectious diseases. Blood transfusion has been used since 1930 for various indications^[4].

Blood transfusion services (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^[5]. After the introduction of the blood banks and better storage techniques; it becomes more widely used^[7]. Blood is one of the major sources of transmission of Hepatitis B, hepatitis C, HIV, Syphilis, and many other diseases^[6, 8]. Discovery of these hazards brought a dramatic change in attitude of physicians and patients about blood transfusion^[9].

As per the guidelines of the ministry of health & family welfare (Government of India) under The Drug and Cosmetic Act, 1945 (amended from time to time), all the blood donations are to be screened against the five major infections namely HIV, HBV, HCV, VDRL and malaria.^[10]

NACO recommended 3rd or 4th generation ELISA HIV I & II test kits which are 100% sensitive should be preferred for use at blood banks for screening donated blood^[11]. The objective of this study is to stimulate the seroprevalence of Transfusion transmitted infections among voluntary and replacement blood donors at a rural tertiary healthcare teaching hospital in Marathwada region of Maharashtra.

The present retrospective study was aimed at identifying the status of transfusion transmitted diseases among healthy voluntary donors at our rural blood bank over a period of almost 2 years, 3 months (June 2013 to August 2015) so as to heighten the awareness of infectious complications of blood transfusion.

II. Materials And Methods

The present retrospective study is based on hospital record at the blood bank of a rural tertiary care teaching hospital and rural medical college, Warudi, Jalna of Marathwada region of Maharashtra, India.

Data was collected for a period of about 2 years 3 months from June 2013 to August 2015. The blood collections were carried out from the voluntary donors at blood donation camps and in blood bank. The donors were first required to fill up a registration form which carried all the information like personal details, demographic details, occupation details and medical history regarding risk factor like history of previous surgery, hospitalization, blood transfusion, tattoo mark, etc. Next step was pre-donation counseling which included explanation of the procedure of blood donation, post donation care and the outcome of the donation i.e. TTIs test. They were also counseled about high risk behavior to make sure that the donor is not engaged in any such type of activities. The donors were then screened by a doctor according to blood donor selection criteria and guideline from drug and cosmetic act and NACO. Hemoglobin estimation was performed. This screening procedure was very helpful to exclude the professional donors.

Total 1173 donors were considered medically fit and accepted for blood donation during the study period. On completion of blood donation, the units were screened for five commonest TTIs namely HIV, HBV, HCV syphilis and malaria. The reactive sample was retested in duplicate before considering it seropositive. Seropositive bags were discarded as per the standard norms of FDA.

III. Results

It can be seen from table no.1, a total of 1173 blood donations were collected during three year period from June 2013 to August 2015. Out of them, 1164 (99.23 %) were males and 9 (0.77 %) were females, which shows predominance of males as compared to females for the three year study period. This is because of the fact that developing country like India, because of social taboo and cultural habits, number of female donors were very less. Other reason is that a large number of females from the menstruating age group are anemic, so declared unfit for blood donation and eliminated by the pre-donation screening and counseling.

In the present study distribution of sero-reactive donors with reference to sero-markers of HBV, HCV, HIV, Syphilis and Malaria among the blood donors is shown in Table 2. The overall seroprevalence of HBV and HCV was 2.21% and 1.11% respectively. While the prevalence of Syphilis and HIV was 0.17% and 0.51% respectively. According to Mann J et al (1992), developing countries account to more than 90% of all new HIV cases^[12]. In contrast, the HIV positive donors in present study are far less compared to HBV and HCV. None of the donors were found positive for malarial parasite on peripheral blood smear, and confirmed by Rapid Diagnostic Kit –MAL CARD; this is because of the fact that infection with malarial parasite results in development of fever and weakness. Because of the prominent signs and symptoms majority of the infected persons will not visit blood donation center and even if they come, will be readily excluded by medical fitness examination and counseling. Srikrishna^[13] (Bangalore, 1999) has also not found any of the 8617 donors positive for malaria.

In Table no.3, distribution of blood donors with TTIs according to the age, the highest prevalence (48.93%) was within the age group 21-30 years; followed by (36.17%) within the age group 31-40 years followed by (10.63%) below the age group of 20 years, with the lowest prevalence (4.25%) was observed in the age group 41-50 years. The difference of the prevalence of transfusion transmitted diseases among different age group was statistically not significant [p>0.05]

As mentioned in table no.4 that the prevalence of Hepatitis B was higher among males (56.82%) as compared to females (33.33%). While for hepatitis it was highest among females (33.33%) as compared to males (27.27%). Prevalence of HIV in males (11.36%) is less as compared to (33.33%) in females. Syphilis was seen only in males (4.54%) as compared to females (0.0%). The difference of prevalence was statistically significant [p<0.05]

Table I: Year and Gender wise break-up of blood donors in the study population.

Year	Total	Male	Female
2013	318	314 (98.74 %)	4 (1.26 %)
2014	485	482 (99.38%)	3 (0.62 %)
2015	370	368 (99.46 %)	2 (0.54 %)
Total	1173	1164 (99.23 %)	9 (0.77 %)

Table II: Year wise Trends of seroprevalence of TTIs

Year	HBV	HCV	HIV	VDRL	MP	Donors screened
2013	6 (1.89%)	3 (0.94%)	2 (0.62%)	1 (0.31%)	0 (0%)	318
2014	11 (2.27%)	3 (0.62%)	3 (0.62%)	0 (0%)	0 (0%)	485
2015	9 (2.43%)	7 (1.89%)	1 (0.27%)	1 (0.27%)	0 (0%)	370
Total	26 (2.21%)	13 (1.11%)	6 (0.51%)	2 (0.17%)	0 (0%)	1173

Table III: Distribution of blood donors with transfusion transmitted infections according to the age

Age (Years)	HBsAg		HCV		Syphilis		HIV		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
18-20	4	80	1	20.00	0	0	0	0	5	10.63
21-30	14	60.86	6	26.08	1	4.34	2	8.69	23	48.93
31-40	7	46.66	6	35.29	1	5.88	3	17.64	17	36.17
41-50	1	50.0	0	0.0	0	0.0	1	50.0	2	4.25
>50	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	26		13		2		6		47	100

Table IV: Distribution of blood donors with TTIs according to the sex

Sex	Hepatitis B*		Hepatitis C**		Syphilis***		HIV****		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Male	25	56.82	12	27.27	2	4.54	5	11.36	44	93.62
Female	1	33.33	1	33.33	0	0.0	1	33.33	3	6.38
Total	26	55.32	13	27.66	2	4.25	6	12.76	47	100

IV. Discussion

Preventing the transmission of infectious diseases through blood transfusion in developing countries like India is difficult given that the resources required are not always available even when policies and strategies are in place. Even when these strategies have been extremely effective, the transmission of diseases still occurs. It is primarily because of the inability of the test to detect the diseases in the pre-seroconversion or 'window' phase of their infection, high cost of screening, a lack of funds and trained personal, immunologically variant viruses and non-seroconverting chronic or immune-silent carriers. Transfusion transmitted infections is still a major concern to patient, physicians and policy makers who wish to see a risk free blood supply.

Though blood transfusion is lifesaving procedure in modern medicine but it carries the risk of transmitting the life threatening transfusion transmissible infections. Hepatitis B, Hepatitis C, HIV is major public health problems in developing countries. They are transmitted parenterally, vertically, or through high risk sexual behavior and can cause fatal acute and chronic life threatening disorders. Blood transfusion is a potential route of transmission of these TTIs^[14-15].

The present study revealed seroprevalence of HBV at 2.21% among the donors which is similar to findings by Chatterajetal^[16], Kaur et al^[17], and Singh B et al^[18]. The major route of HBV transmission is parenteral and it is most infective among bleed-borne viruses and chronic carries state is associated with chronic liver disease, cirrhosis and hepatocellular carcinoma.

HCV infection is an evolving public health problem globally. For hepatitis C, the estimated prevalence in this study was 1.11%, which is similar to that reported by the other studies 0.79%^[16], and 0.88%^[19]. Transmission of HCV is primarily through exposure and majority of the infected people progress to the chronic infection and chance of cirrhosis and hepatocellular carcinoma is more as compared to HBV. Blood is one of the main sources of transmission of Hepatitis C.

The prevalence of HIV was found to be 0.51% in the present study. Similar finding by Gupta et al^[20] 0.084% has been reported. And for syphilis the VDRL reactivity in our study was 0.17% which was lower than reported by other studies 0.85%^[20], and 1.2%^[21].

The current practice of selection of voluntary donors over replacement donors to meet with the need for the bleed in a general 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 patient via transfusion of blood and blood products. As is apparent from the results of present study the results of which are comparable to other studies in India, voluntary blood donors have significantly lower replacement blood donors. Awareness of general population about voluntary regular blood donation should be created to minimize the chances of spreading transfusion transmitted infections.

Females comprised of only 0.77 % in total donors. Hence only male donors were included to find out % of the TTIs.

V. Limitations

Most of the previous studies were from urban areas; this report is first of its kind from rural area of Marathwada, Maharashtra, India. The major limitation of the study is that there is no previous data available from this rural area for comparison and analysis of trends. Hence, we hereby recommend for future studies to look into trends for TTIs from this area.

VI. Conclusion

As is apparent from the result of the present study blood is still one of the main sources of transmission of Hepatitis B, Hepatitis C, HIV and syphilis. With the advent of nucleic acid amplification techniques (NAT), western countries have decreased the risk of TTIs to a major extent. But the cost-effectiveness of NAT is poor.

The NAT has added benefits but its high financial cost is of concern, especially in underdeveloped countries like India. Apart from NAT for donor screening, other factors such as public awareness, vigilance of errors, educational and motivational programs is sure to help in decreasing the Transfusion transmitted infectious diseases.

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