

Prevalence of blood transmitted infections among the blood donors: A study in a tertiary care unit in Telangana

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Abstract

Introduction: Diseases that can be caused through transfusion are by Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Malarial parasites and *Treponema pallidum*. All blood samples must be routinely checked for all the above diseases. This study was undertaken to study the prevalence of these transfusion transmitted infections in our geographical area among the voluntary and replacement blood donors.

Materials and Method: The sera of all the donors were tested for antibodies to HIV-1 and HIV-2, HBsAg, HCV, for syphilis and malaria parasites. MP were also detected by regular microscopy method.

Results: The male gender was predominant (98%) among the blood donors, whether voluntary or replacement. About 0.036% of the total samples had transfusible transmitted diseases. HBsAg was the most common with 0.02% samples being positive while malaria was the least with only 4 samples in the past 4 years. In the year 2015, there were no cases of malaria among the blood donors. HIV was 0.007% and HCV 0.003%.

Conclusion: Availability of safe blood is important in transfusion for the patient as well the community. This is obtained by regular screening of the blood donated before transfusion for these transfusible diseases.

Keywords: Transfusion Transmitted Diseases, Voluntary Blood Donors, Replacement Blood Donors, Prevalence.

Introduction

Blood transfusion is a common event in a hospital to save lives, but this event is not without hazards. It is said that with every unit of blood, there is 1% chance of problems associated with transfusion, including transfusion transmitted diseases.⁽¹⁾ A well-organized Blood transfusion system is of utmost importance in the service of the healthcare delivery system anywhere in the world. The strategy for this system is to deliver safe and adequate blood to the people without any of the transfusion transmitted diseases.⁽²⁾

Diseases that can be caused through transfusion are by Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Malarial parasites and *Treponema pallidum*. According to the guidelines laid by National AIDS control Organization (NACO), all blood samples must be routinely checked for all the above diseases. Any donor with a history of HIV, HBV or HCV should be permanently deferred. Donors with malaria can be accepted after 3 months.⁽³⁾

India is the second most populous country of the world. Our subcontinent is classified as an intermediate endemic zone for Hepatitis B Virus with the HBsAg carriage being 2-7% of chronic HBV infections.⁽⁴⁾ The population of India is more than 1.2 billion, with more than 2.5 million infected with HIV, 4 million with HBV and 15 million with HCV. Hence the risk of transmission of these agents through blood donors may be alarmingly high. The prevalence of them is estimated to be 0.5% for HIV, 0.4% for HCV and 1.4% for HBsAg.⁽⁵⁾

These strategies have been extremely effective but still, the transmission of these infections do occur. This could be due to the fact that they are generally undetected

in the 'window period' or the pre-seroconversion phase of the infection, high cost of screening, a lack of funds and trained personnel, immunologically variant viruses, non-seroconverting chronic or immuno silent carriers and inadvertent laboratory testing errors. Thus transfusion transmitted diseases still remain a major concern to the patients and physicians who wish to see a risk free blood supply.⁽⁶⁾

This study was undertaken to study the prevalence of these transfusion transmitted infections in our geographical area among the voluntary and replacement blood donors.

Materials and Method

The present study was conducted by the department of pathology at Mallareddy institute of medical sciences over a period of two years. The sera of the donors of different age groups, who were either family or friends of the patients or walk-in donors and all of whom lived in the nearby locality were taken into consideration.

All the donors were counseled regarding the risk behavior and a registration form was filled wherein basic information regarding age, sex, body weight, occupation, number of previous donations was noted. The eligibility criteria for the donors was age between 18-60 years, with a minimum weight of 45 kgs, 12 g% haemoglobin level, with no history of HIV, HBV or HCV or any other sexually transmitted infections. Careful physical and clinical history of all the donors was taken according to the blood donors selection criteria by NACO.

All the voluntary donors who did not reside in our geographical area were excluded from the study.

Professional donors, donors with present medications, recent history of having undergone a surgical procedure, serious illness, previous blood transfusions, weight <50 kg, age <18 and >60 years, pregnant and lactating women were also excluded from the study.

5ml of blood was collected from the subjects directly into plain vacutainers with no anticoagulant after obtaining informed consent from them. These samples were then centrifuged to obtain the sera. These sera were tested for antibodies to HIV-1 and HIV-2 by ELISA (J. Mitra) and Tridot method (J. Mitra), HBsAg by sandwich ELISA (J. Mitra), HCV by ELISA (J. Mitra), for syphilis by RPR method (Span Diagnostics) and by strip method (ASPEN) and malaria parasites by strip method (SPAN diagnostics). MP were also detected by regular microscopy method.

The data was entered onto a Microsoft Excel worksheet and analysis was done using chi square and fisher's test.

Results

Out of the 4322 donors, 3285 (76%) were replacement donors and 1037 (24%) were voluntary blood donors (Fig. 1).

■ Voluntary blood donors ■ replacement donors

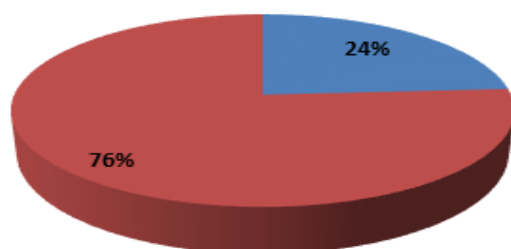


Fig. 1: Voluntary Vs Replacement blood donors

The male gender was predominant (98%) among the blood donors, whether voluntary or replacement (Fig. 2)

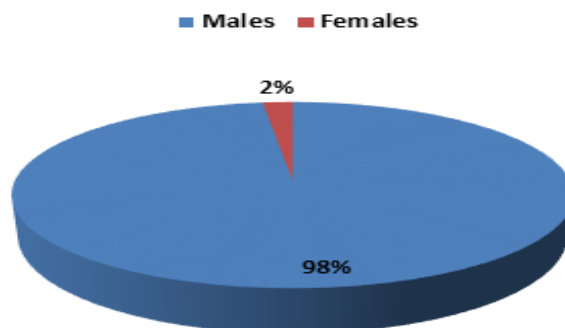


Fig. 2: Gender wise distribution of donors

About 157 (0.036%) of the total samples had transfusible transmitted diseases. HBsAg was the most common with 77 (0.02%) samples being positive while malaria was the least with only 4 samples in the past 4 years. In the year 2015, there were no cases of malaria among the blood donors (Table 1).

Table 1: Prevalence of Transfusion transmissible diseases

	Total donors	HIV (% for year)	HBsAg (% for year)	HCV (% for year)	T. pallidum (% for year)	MP (% for year)	Total (% for year)
2012	962	04 (0.004%)	21 (0.021%)	02 (0.002%)	08 (0.008%)	01 (0.001%)	36 (0.037%)
2013	867	06 (0.007%)	19 (0.022%)	02 (0.002%)	12 (0.014%)	02 (0.002%)	41 (0.047%)
2014	1203	11 (0.009%)	17 (0.014%)	04 (0.003%)	07 (0.006%)	01 (0.0008%)	40 (0.033%)
2015	1290	08 (0.006%)	20 (0.016%)	07 (0.005%)	05 (0.004%)	00	40 (0.031%)
Total	4322	29 (0.007%)	77 (0.02%)	15 (0.003%)	32 (0.007%)	04 (0.0009%)	157 (0.036%)

Out of the positive samples, only two cases were coinfections were observed, one was in 2014 and the other in 2015. Both the coinfections were of HBsAg and syphilis.

Discussion

Blood transfusion is one of the integral part of the life saving procedures of modern medicine, although it carries a risk of transmitting the very dangerous diseases such as HIV, HBV HCV, Syphilis and malaria. Blood transmission is only one of the mode of transmission albeit a potential one, as all of them barring malaria can also be transmitted vide sexual contact, parenteral, and vertical.^(7,8)

We have reported a total of 76% to be replacement donors while 24% were voluntary blood donors, which was concurrent to other studies where replacement donors were more than voluntary donors.⁽⁹⁻¹¹⁾ In a by Gupta et al,⁽¹²⁾ majority of the donors were voluntary rather than replacement. Similar was the case in a study by Fernandez et al,⁽⁶⁾ where in 61% of the donors were voluntary and 39% were replacement blood donors.

The number of males were considerably higher than females with nearly 98%, which was similar to the study by Fernandez et al,⁽⁶⁾ where nearly 97% of the donors were males, by Karmakar et al with 85%.⁽¹³⁾

Among the blood donors in India, it is reported that the prevalence of the transfusible diseases is: HBV – 0.66% to 12%, HCV – 0.5% to 1.5%, HIV– 0.084% to 3.87%, and syphilis – 0.85% to 3% respectively.⁽⁹⁾ The overall transfusion transmitted diseases in our study was 0.036% which was very low compared to many other studies.^(6,12,15)

In our study, we found the prevalence of HIV to be 0.007%, while in a study by Giri et al,⁽¹⁶⁾ the prevalence was found to be 0.07%, while Gupta et al⁽¹²⁾ reported 0.084% and Tiwari et al⁽¹⁷⁾ reported 0.054%, 0.06% by Fernandez et al⁽⁶⁾ which were also higher to our results. Still higher prevalence of 0.26% was reported by Kaur et al⁽¹⁸⁾ and 0.47% by Garg et al.⁽¹⁵⁾ A 0.0% prevalence was reported by Mumtaz et al⁽¹⁹⁾ from a study in Pakistan. Around the world, in the African countries, the prevalence was far higher, with 3.8% in Ethiopia⁽²⁰⁾ and 11.7% in Tanzania.⁽⁹⁾

The present study revealed a seroprevalence of 0.02% prevalence of HBsAg and 0.003% of HCV, which was far less than the study conducted by Giri et al,⁽¹⁶⁾ Chatteraj et al,⁽¹⁴⁾ Kaur et al.⁽¹⁸⁾ and Singh B et al.⁽¹⁰⁾ Variable results of 0.66% by Gupta et al⁽¹²⁾ 2.45% by Choudhary et al,⁽²¹⁾ 3.44% by Garg et al,⁽¹⁵⁾ 5.86% by Mumtaz et al,⁽¹⁹⁾ 25% by Dessie⁽²⁰⁾ have also been reported. Seroprevalence of HBV among blood donors differs. The major route of HBV transmission is parenteral and it is most infective among blood-borne viruses and chronic carrier state is associated with chronic liver disease, cirrhosis and hepatocellular carcinoma.

We had a 0.007% of seroprevalence of syphilis among the donors in our study which was low compared to the study by Giri et al (0.07%),⁽¹⁶⁾ Gupta et al (0.85%)⁽¹²⁾ and Dessie et al (1.2%).⁽²⁰⁾ There were only 4 cases of malaria among the donors in the past 4 years bringing the prevalence to less than 0.001%.

The prevalence of these diseases in general population in our area is considerably higher than those among the blood donors. It has been inferred by the present study as well as general questions asked randomly to the population that there is a great understanding of the hazards of these infections among the general population. So, when known, the people generally refrain from donating the blood even to their near and dear ones.

Conclusion

Availability of safe blood is important in transfusion for the patient as well the community. This is obtained by regular screening of the blood donated before transfusion for these transfusible diseases. Moreover a proper health education program regarding the mode of transport of these diseases should be readily made to the patients within the hospital as well as within the community. We have observed a reduced prevalence of these transfusible diseases, probably showing that the health education programs in this community as taken proper effect. Proper blood donor selection by the blood bank authorities and proper regular screening play a major role in reducing the transmission of the infection.

References

1. Widman FK (ed) (1985) Technical manual. American Association of Blood Banks, Arlington, pp 325–344.
2. National blood policy, 2003. Available from: <http://www.unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN009847.pdf>. [Last accessed on 2012 Jun 15].
3. National AIDS Control Organization. Standards for Blood Banks and Blood Transfusion Services. New Delhi: Ministry of Health and Family Welfare Government of India; 2007.
4. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures: A review. *J Viral Hepat.* 2004;11:97–107.
5. Nancy Singh. NAT: Safe Blood, Safe India. [Last accessed on 2011 Dec 09]. Available from: <http://www.expresshealthcare.in/200810/knowledge02.shtml>.
6. Fernandez H, D'Souza PF, D'Souza PM., Prevalence of Transfusion Transmitted Infections in Voluntary and Replacement Donors. *Indian J Hematol Blood Transfus.* 2010 Sep;26(3):89–91.
7. Irshad M, Peter S. Spectrum of viral hepatitis in thalassemic children receiving multiple blood transfusions. *Indian J Gastroenterol.* 2002;21:183–4.
8. Mollah AH, Nahar N, Siddique MA, Anwar KS, Hassan T, Azam MG. Common transfusion-transmitted infectious agents among thalassaemic children in Bangladesh. *J Health Popul Nutr.* 2003;21:67–71.
9. Matee M, Magesa PM, Lyamuya EF. Seroprevalence of human immunodeficiency virus, Hepatitis B and C viruses and Syphilis infections among blood donors at the Muhimbili National Hospital in Dares Salam, Tanzania. *BMC Public Health.* 2006;6:21.
10. Singh B, Verma M, Verma K. Markers for transfusion associated hepatitis in north Indian blood donors:

- prevalence and trends. *Jpn J Infect Dis.* 2004;57:49–51. [PubMed]
11. Asif N, Kokhar N, Ilahi F. Seroprevalence of HBC, HCV and HIV infection among voluntary non-remunerated and replacement donors in northern Pakistan. *Pak J Med Sci.* 2004;1:24–28.
 12. Gupta N, Vijay Kumar, Kaur A. Seroprevalence of HIV, HBV, HCV, and Syphilis in voluntary blood donors. *Indian J Med Sci.* 2004;58:255–7.
 13. Karmakar PR, Shrivastava P, Ray TG. Seroprevalence of transfusion transmissible infections among blood donors at the blood bank of a Medical College of Kolkata. *Indian J Public Health* 2014;58:61-4.
 14. Chatteraj A, Bhel R, Kataria V. Infectious disease markers in blood donors. *Med J Armed Forces India.*2008;64(1):33–5.
 15. Garg S, Mathur DR, Garg DK. Comparison of seropositivity of HIV, HBsAg, HCV and syphilis in replacement and voluntary blood donors in Western India. *Indian J Pathol Microbiol.* 2001;44:409–12.
 16. Giri PA, Deshpande JD, Phalke DB, Karle LB., Seroprevalence of Transfusion Transmissible Infections Among Voluntary Blood Donors at a Tertiary Care Teaching Hospital in Rural Area of India. *J Family Med Prim Care.* 2012 Jan-Jun; 1(1):48–51.
 17. Tiwari B, Ghimire P, Karkee S, Rajkarnikar M. Seroprevalence of human immunodeficiency Virus in Nepalese blood donors: A study from three regional blood transfusion services. *Asian J Transf Sci.*2008;2:66–8.
 18. Kaur H, Dhanon J, Pawar G. Hepatitis C infection amongst blood donors in Punjab – a six year study. *Indian J Hematol Blood Transfus.* 2001;19:21–2.
 19. Mumtaz S, Rehman MU, Muzaffar M, Hassan MU, Iqbal W. Frequency of seropositive blood donors for hepatitis B, C and HIV viruses in railway hospital, Rawalpindi. *Pak J Med Res.* 2002;41(2):19–2.
 20. Dessie A, Abera B, Fissehawale Seroprevalence of major blood borne infections among blood donors at Felege Hiwot referral hospital, Northwest Ethiopia. *Ethiop J Health Dev.* 2007;21:68–9.
 21. Chaudhary IA, Samiullah, Khan SS, Masood R, Sardar MA, Mallhi AA. Seroprevalence of HBV and C among health donors at Fauji Foundation Hospital, Rawalpindi. *Pak Med J.* 2007;23:64–7.