



ORIGINAL ARTICLE

Seroprevalence of HBV and HCV Among Whole Blood Donors at a Tertiary Care Research Institute in Northern India

Rubiya Ryhan

Abstract

Background: Blood transfusion has become a specialized modality of patient management and every year saves millions of lives. However, it is not always safe and may lead to many life threatening complications amongst which Transfusion Transmitted Infections (TTIs) like HIV, HBV and HCV are most significant and detrimental for the recipients. So, an integrated strategy for blood safety is required for elimination of TTIs and or provision of safe and adequate blood transfusion services to the people. **Aim:** To assess the sero-prevalence of HBV and HCV infections amongst whole blood donors at tertiary care research Institute. **Material and Methods :** It is a hospital based study carried over a period of 7 years from Jan 2015 to Dec 2021. All donor samples were screened for HBV and HCV by ELISA method. **Results :** Seroprevalence of HBV and HCV was found to be 0.26 % (202/76188) and 0.24 % (185/76188) respectively. Sero-prevalence was higher for HBV as compared to HCV. **Conclusion:** It is important to continue screening of donated blood with highly sensitive and specific tests and to counsel donors who are reactive to any of the above infections and conduct extensive public awareness programmes to make transfusion of blood and blood components safe.

Keywords

Blood transfusion, Transfusion Transmitted Infections(TTIs), Sero-prevalence

Introduction

Blood transfusion is a life-saving intervention and millions of lives are saved each year globally through this procedure.^[1] However, blood transfusion is not always safe and may lead to many life threatening complications amongst which Transfusion Transmitted Infections (TTIs) like HBV, HCV and HIV are most significant and detrimental for the recipients. Morbidity and mortality resulting from transfusion of infected blood have far reaching consequences, not only for the recipient, but also for their families, their communities and the wide society.^[2,3] Government of India has made it mandatory to screen every unit of donated blood for HBV (Since 1971) and HCV (since 2001) to prevent spread of TTIs through blood transfusion.^[4,5] However, risk of transmission of these infections remains still there because of the inability of the tests to detect the disease in the preseroconversion or 'window' phase of their

infection, immunologically variant viruses, non-seroconverting chronic or immuno silent carriers and inadvertent laboratory testing errors.

TTIs is still a major concern to patients, physicians and policy makers who wish to see a risk free blood supply¹. Worldwide about 350 million and 125 million people have chronic hepatitis B virus and hepatitis C virus infection respectively, putting viral HBV and HCV infection among the world's greatest infectious disease problems. These diseases are therefore regarded as important candidates for public health measures aimed at prevention, early diagnosis and treatment.^[1,6]

Meticulous pretransfusion testing and screening for TTI is the need of the hour. Only continuous improvement and strict implementation of donor selection rules, newer and more sensitive screening tests and effective inactivation procedures can ensure the elimination or at

Department of Blood Transfusion and Immunohematology, SKIMS, Soura, Srinagar, India.

Correspondence to: Dr Rubiya Ryhan, Asst Professor, Blood Transfusion and Immunohematology, SKIMS, Soura, Srinagar, India.

Manuscript Received: 24.12.2022; Revision Accepted: 28.02.2023

Published Online First: 10 Oct 2023

Open Access at: <https://journal.jkscience.org>

Copyright: © 2023 JK Science. This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, which allows others to remix, transform, and build upon the work, and to copy and redistribute the material in any medium or format non-commercially, provided the original author(s) and source are credited and the new creations are distributed under the same license.

Cite this article as: Ryhan R. Seroprevalence of HBV and HCV Among Whole Blood Donors at a Tertiary Care Research Institute in Northern India. JK Science 2023;25(4):232-5.



least reduction of the risk of acquiring TTIs².

This present hospital based study was undertaken to study the sero-prevalence of HBV and HCV infections amongst whole blood donors in a tertiary care research Institute. This gave vital information about the safety associated with blood transfusion and revealed the magnitude of problem of unnoticeable serious infections in healthy-looking members of the general population and also will help in formulating the strategies for the management of a safe blood supply.

Material and Methods

Patient selection: The present study of "Seroprevalence of HBV and HCV among whole blood donors at a tertiary care research Institute " was carried over a period of seven years from January 2015 to December 2021. All allogeneic whole blood donors donating in the blood bank of the Department & in the voluntary blood donation camps were included in the study. Apheresis collections were not included.

Blood donors included in the study were screened by the medical officer on duty. A preexisting blood donor questionnaire & consent form was filled by each donor or by the donor clinic staff. The study was commenced after obtaining the ethical clearance from the Institutional ethical board. Strict adherence to Departmental SOP & National Guidelines under Drugs & Cosmetics Act 1945 & NACO, Ministry of Health and Family Welfare. Govt. of India; was maintained while screening the blood donors. Donors who did not qualify the guidelines were excluded. A total of 76188 donors donated blood during the study period. All their samples were tested for presence of seromarkers of TTIs. Till 2020 HBsAg and anti-HCV antibody were tested by 3rd generation Trustwell ELISA kits supplied by Athenese-Dx Pvt. Ltd. From 2020 onwards, HBsAg and anti-HCV antibodies were tested by using 4th generation Merilisa HBsAg and Merilisa HCV ELISA kits supplied by Meril Diagnostics. The kits used were all NACO Approved. All the reactive samples were discarded as per standard protocols. Counselling was given to all the reactive (positive) donors who were advised to start treatment and take precautions by which spreading of infection can stop.

Statistical Analysis: Collected data was compiled and entered in spread sheet Microsoft excel and exported to Data editor of SPSS computer software, version 20 (SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as mean \pm standard deviation and categorical variables were summarized as frequency and percentage.

Results

During this 7 year study period, a total of 76188 donors donated blood. There were 14.80 % (11277) donors in

the year 2015, 14.61 % (11135) donors in the year 2016, 14.98 % (11419) donors in the year 2017, 14.64 % (11158) donors in the year 2018, 13.83 % (10543) donors in the year 2019, 12.31 % (9386) donors in the year 2020 and 14.79 % (11270) donors in the year 2021. The decreasing number of blood donors during the year 2020 was attributed to Corona 19 pandemic.

Among these 76188 donors, 98.45 % (75011) donors were males & only 1.55 % (1177) were females. Reason for a lesser percentage of female donors can be attributed to ignorance, fear, lack of awareness & prevalence of anemia in them.

Out of total 76188 donors, only 30.37 % (23145) were replacement donors & 69.62 % (53043) were voluntary blood donors (Table 1).

Out of all 76188 donors who donated blood during these 7 years, 0.26 % (202/76188) and 0.24% (185/76188) donors tested positive for HBV and HCV infection respectively. Sero-prevalence was higher for HBV as compared to HCV. Seroprevalence of HBV infection among male and female blood donors was 0.26 % (199/75011) and 0.25 % (03/1177) respectively. Seroprevalence of HCV infection among male and female blood donors was 0.26 % (202/75011) and 0.42% (05/1177) respectively (Table 2 and 4). Highest rate of HBV and HCV positivity was observed among replacement donors 0.53 % (123/23145) and 0.49 % (114/23145) as compared to voluntary donors 0.14 % (79/53043) and 0.13% (71/53043) respectively (Table 3 and 5).

Discussion

WHO recommends an integrated strategy to improve blood transfusion safety by establishment of well organized blood transfusion services, blood collection from voluntary non-remunerated donors, screening of blood for at least four major TTIs with quality assured system and rational use of blood.^{11,81}

WHO has estimated that more than two billion people in the world have been infected with HBV and about 257 million people are living with HBV infection with majority in developing countries of Asia and Africa.^{15,91} About 3.9 million of people are affected by HCV with increased risk of liver cirrhosis.¹¹⁰¹

In our study, HBV was the most prevalent TTI with a seropositivity of 0.26 % in whole blood donors (apparently healthy) as compared to HCV with a seropositivity of 0.24 %. There is wide variation in seroprevalence of these TTIs from different parts of India which could be attributed to different regional endemicities for these infections, use of different methods for testing and use of different generation of ELISA test kits, having different sensitivities and specificities. Leena M S *et al*¹¹¹¹ found prevalence of HBV and HCV as 0.71 % and 0.14 %

Table 1. Demographic distribution of blood donors

Year	Total no of units collected (%)	No of Male donors (%)	No of Female donors (%)	No of Voluntary donors (%)	No of Replacement donors (%)
2015	11277 (14.80 %)	11107 (14.57%)	170 (0.22 %)	8916 (11.70 %)	2361 (3.09 %)
2016	11135 (14.61 %)	10938 (14.35 %)	197 (0.25 %)	8442 (11.08 %)	2693 (3.53 %)
2017	11419 (14.98 %)	11161 (14.64 %)	258 (0.33 %)	7466(9.79 %)	3953 (5.18 %)
2018	11158 (14.64 %)	10945 (14.36%)	213 (0.27 %)	7058 (9.26 %)	4100 (5.38 %)
2019	10543 (13.83 %)	10420 (13.67 %)	123 (0.16 %)	7267 (9.53 %)	3276 (4.29 %)
2020	9386 (12.31 %)	9292(12.19 %)	94 (0.12 %)	6166 (8.09 %)	3220(4.22 %)
2021	11270 (14.79 %)	11148 (14.63 %)	122 (0.16 %)	7728 (10.14 %)	3542 (3.54 %)
Total	76188 (100%)	75011(98.45%)	1177 (1.55 %)	53043 (69.62 %)	23145 (30.37 %)

Table 2: Seroprevalence of HBV infection among male and female blood donors

Year	Total No of Male donors	HBV positive Male donors (%)	Total No of Female donors	HBV Positive Female donors (%)	Total no of blood units collected	Total No of HBV positive cases (%)
2015	11107	46 (0.41%)	170	00 (00 %)	11277	46 (0.407 %)
2016	10938	34 (0.31 %)	197	00 (00 %)	11135	34 (0.305 %)
2017	11161	34 (0.304%)	258	02 (0.77 %)	11419	36 (0.31 %)
2018	10945	17 (0.15 %)	213	00 (00 %)	11158	17 (0.15 %)
2019	10420	23 (0.22 %)	123	01 (0.81%)	10543	24 (0.22 %)
2020	9292	19 (0.204%)	94	00 (00%)	9386	19 (0.202 %)
2021	11148	26 (0.23 %)	122	00 (01.40%)	11270	26 (0.23 %)
Total	75011	199 (0.26 %)	1177	03 (0.25 %)	76188	202 (0.26 %)

Table 3: Seroprevalence of HBV infection among voluntary and replacement blood donors

Total No of Voluntary donors	HBV Positive Voluntary Donors n (%)	Total No of Replacement donors n (%)	HBV Positive Replacement Donors n (%)	Total no of blood units collected	Total No of HBV positive cases n (%)
8916	20 (0.22 %)	2361	26 (1.10 %)	11277	46 (0.40 %)
8442	14 (0.16 %)	2693	20 (0.74 %)	11135	34 (0.30 %)
7466	16 (0.21 %)	3953	20 (0.50 %)	11419	36 (0.31 %)
7058	05 (0.07 %)	4100	12 (0.29 %)	11158	17 (0.15 %)
7267	08 (0.11 %)	3276	16 (0.48 %)	10543	24 (0.22 %)
6166	06 (0.09 %)	3220	13 (0.40 %)	9386	19 (0.20 %)
7728	10 (0.12 %)	3542	16 (0.45 %)	11270	26 (0.23 %)
53043	79 (0.14 %)	23145	123 (0.53 %)	76188	202 (0.26 %)

Table 4: Seroprevalence of HCV infection among male and female blood donors

Total No of Male donors	HCV positive Male donors n (%)	Total No of Female donors	HCV Positive Female donors n (%)	Total no of blood units collected	Total No of HCV positive cases n (%)
11107	25 (0.22 %)	170	00 (00 %)	11277	25 (0.22%)
10938	27 (0.24 %)	197	01 (0.50 %)	11135	28 (0.25%)
11161	17 (0.15 %)	258	00 (00 %)	11419	17 (0.14 %)
10945	15 (0.13 %)	213	02 (0.93 %)	11158	17(0.15 %)
10420	15(0.14 %)	123	01 (0.81 %)	10543	16 (0.15 %)
9292	38 (0.40 %)	94	00 (00 %)	9386	38 (0.40 %)
11148	43 (0.38 %)	122	01 (00.81 %)	11270	44 (0.39 %)
75011	202 (0.26 %)	1177	05 (0.42 %)	76188	185 (0.24 %)

Table 5: Seroprevalence of HBV infection among voluntary and replacement blood donors

Year	Total No of Voluntary donors	HCV Positive Voluntary Donors n (%)	Total No of Replacement donors	HCV Positive Replacement Donors n (%)	Total no of blood units collected	Total No HCV positive cases (%)
2015	8916	09(0.10 %)	2361	16 (0.67 %)	11277	25 (0.22 %)
2016	8442	10 (0.11 %)	2693	18 (0.66 %)	11135	28 (0.25%)
2017	7466	06 (0.08 %)	3953	11(0.27 %)	11419	17 (0.14%)
2018	7058	07 (0.09 %)	4100	10 (0.24 %)	11158	17 (0.15%)
2019	7267	06 (0.08 %)	3276	10 (0.30 %)	10543	16 (0.15 %)
2020	6166	14(0.22 %)	3220	24 (0.74%)	9386	38 (0.40 %)
2021	7728	19 (0.24%)	3542	25 (0.70 %)	11270	44 (0.39 %)
Total	53043	71 (0.13 %)	23145	114 (0.49 %)	76188	185 (0.24 %)

while Amrutha KB *et al* ^[12] found prevalence of HBV and HCV as 1.17 % and 0.13 % respectively. Mahapatra S *et al* ^[9] found prevalence of HBV and HCV as .0.5 and 0.17 and Panchal A *et al* ^[5] found prevalence of HBV and HCV as 0.56 % and 0.14 % respectively. Kulkarni N ^[13] found prevalence of HBV and HCV as 3.2 % and 0.35 % respectively. Tognon F *et al* ^[14] found the overall prevalence of 10.8% for HBV and 1.2% for HCV. Abebe M ^[15] *et al* in their study found seroprevalence of HBV and HCV as 3.06 % and 0.64 %, respectively

Conclusion

Transmission of TTIs during the serologically window period still poses a threat to blood safety in environments where there is high rate of Transfusion Transmitted Infections. So, to ensure safety of blood for recipients, the recommendation is donor screening using implementation of strict selection criteria as per the guidelines laid down for blood banks in the gazette notification by the Government of India and use of highly sensitive and advanced techniques (like NAT testing) for detection of TTIs. Also, reduce blood usage at minimum by rational use of blood and blood products and increasing blood donations from voluntary blood donors , developing an organized programme for HBV vaccination ,it is possible to decrease the incidence of seropositivity of transfusion transmitted infections and improve the blood product safety.

Financial Support and Sponsorship

Nil.

Conflicts of Interest

There are no conflicts of interest.

References

- Chadha T, Adlekh S. Seroprevalence of HBV, HCV and HIV infections in blood donors in voluntary and replacement donors in a tertiary care hospital in Western Uttar Pradesh, India. *Tropical Journal of Pathology & Microbiology* 2018/ ;4(6): 473-7
- Handoo S, Ryhan R, Reshi R Seroprevalence of Different Transfusion Transmissible Infections among The Voluntary Blood Donors in a Tertiary Care Hospital of Kashmir: A Hospital Based Study. *Int J Med Res Prof* 2018 ; 4(2); 270-2.
- Iiwari B R, Ghimire, Karki PS. Seroprevalence of human immunodeficiency virus in Nepalese blood donors: A study from three regional blood transfusion services. *Asian J Transfus Sci* 2008; 2(2): 66-68
- Ministry of Health and Family Welfare, Government of India: Drugs and Cosmetics Act. The Gazette of India. New Delhi. 1989
- Panchal A, Shah N, Bhalodia J. Trends and seroprevalence of transfusion transmitted infections among blood donors of tertiary care centre: A retrospective study from central MedPulse *International Journal of Pathology* 2022; 21(2) :27-31
- Wasfi OA, Sadek NA. Prevalence of hepatitis B surface antigen and hepatitis C virus antibodies among blood donors in Alexandria, Egypt. *East Mediterr Health J* 2011;17(3):238-42.
- Singh K, Bhat S, Shastry S. Trend in seroprevalence of hepatitis B virus infection among blood donors of coastal Karnataka, India. *J Infect Dev Ctries* 2009;3:376- 9.
- Zaraski JP, Bohn B, Bastie A. Characteristics of patients with dual infection by hepatitis B and C viruses. *J Hepatol* 1998; 28: 27-33.
- Mahapatra S, Ray GK, Panigrahi R. The incidence and spectrum of transfusion transmitted infections among the blood donors. *International Journal of Research in Medical Sciences* 2018 ;6(3):904
- Panda M, Kar K. HIV, hepatitis B and C infection status of the blood donors in a blood bank of a tertiary health care centre of Orissa. *Indian J Public Health* 2008; 52: 43-4
- Leena MS, Shafee M. Trend and prevalence of transfusion transmitted infections among blood donors in rural teaching institute, south India. *Journal of Pathology of Nepal* 2012; 2: 203-6.
- Amrutha KB, Deepa S, Venkatesha D. Blood transfusions: are they life saving or transfusing infections?. *Online Journal of Health and Allied Sciences* 2011 ;10(2):34
- Kulkarni N. Analysis of the Seroprevalence of HIV, HBsAg, HCV and syphilitic infections detected in the pretransfusion blood. A short note. *International Journal of Blood Transfusion and Immunohematology* 2012; 2:2230.
- Tognon F, Sevalie S, Gassimu J, Seroprevalence of hepatitis B and hepatitis C among blood donors in Sierra Leone: A multi-year retrospective study. *International Journal of Infectious Diseases* 2020; 99: 102-10
- Abebe M, Alemnew B, and Sirak Biset S. Prevalence of Hepatitis B Virus and Hepatitis C Virus Among Blood Donors in Nekemte Blood Bank, Western Oromia, Ethiopia: Retrospective 5 Years Study. *J Blood Med* 2020; 11: 543-550.