http://jmscr.igmpublication.org/home/
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v7i7.07

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Original Article

Seroprevalence of HIV, HbsAg & HCV infections in voluntary blood donors in a hospital based blood bank

Authors
Dr Kavatkar Anita N*, Dr Taksande Rahul V., Dr Agrawal Sugam, Dr Lanjewar D.N.
Blood Bank, Sir J J Hospital and Grant Government Medical College, Mumbai 400008
*Corresponding author
Dr Anita N Kavatkar
Department of Pathology (blood bank), Sir J J Hospital and Grant Medical College, Byculla, Mumbai 400008, India

Abstract
Background: *Transfusion transmitted infections are one of the concerning risks of blood transfusion which must be eliminated as far as possible.*
Aim: *The study was undertaken to find out the prevalence and trends of HIV, HBsAg and HCV infections over 9 years from 2009 to 2017, among voluntary blood donors in a blood bank at a tertiary care hospital.*
Methods: *9 years retrospective study of data from blood bank.*
Inclusion criteria: *All blood units that have tested positive for HIV, HBsAg, HCV.*
Exclusion criteria: All blood units that have tested negative for HIV, HBsAg, HCV.
Data from 2009 to 2017 was studied for prevalence of HIV, HBsAG and HCV infections among voluntary blood donors.
Blood samples were collected from donor blood bags in plain vacutainers and tested for anti HIV, HBsAg and anti HCV for all samples by commercial Enzyme Linked Immunoassay technique (3rd generation Enzyme Linked Immunoassay kits). Percentage of reactive samples for all three markers was calculated.
Results: *Overall positivity for all three markers was 3.67%. HBsAg showed highest average seroprevalence among the three markers (1.81%) followed by anti HCV (1.08%) and anti HIV (0.78%). Anti HIV prevalence increased gradually from 0.58% in 2009 to 1.08% in 2017 except for a peak in 2011 when the prevalence was the highest at 1.5% . The highest prevalence for HBsAg was seen in the year 2012 (2.27%). The prevalence of anti HCV was highest in 2013 (1.77%) and lowest in 2015 (0.08%).*
Conclusions: *A greater average seroprevalence was noted for HBsAg. The levels of HBsAgand anti HCV continue to be high in India.*
Keywords: *Seroprevalence, blood donors, anti HIV, HBsAg, HCV.*

Introduction

Transfusion transmitted infections are one of the concerning risks of blood transfusion which must be eliminated as far as possible. HIV disease acquisition through blood transfusion is an efficient mode of transmission, with rates approaching 100%[1].The first case of transfusion associated AIDS was described in an infant given transfusion for erythroblastosisfoetalis[2]. The Indian National AIDS Control Organisation

reported an HIV prevalence of 0.91%in the general population in India in 2005 and has attributed 2.5% of it to transmission via blood transfusion[3]. Under the ICTC (Integrated Counseling and Testing Centre), government is taking extensive efforts to spread awareness among general population. HCV is another infection transmitted by blood transfusion and has been implicated as an important cause of transfusion associated hepatitis.The prevalence of HCV in Indian blood donors was reported to be 0.12-4%[4]. For HBV infection, a prevalence of 1-5% has been observed in general population in India and hence has been classified as intermediate HBV endemic zone[5]. The seroprevalence of HBV infection in a population is particularly important for two reasons. Firstly, infectivity of HBV is higher than other viruses and secondly a safe and effective vaccine has been available since 1982[6-7]. This implies that this highly transmissible virus can be brought under control even in developing nations by means of effective immunization. This study has been conducted to analyze the trends of HIV, HBV and HCV among voluntary donors in a tertiary care hospital in Maharashtra, India.

Material and Methods

A retrospective study was conducted for a period of 9 years from January 2009 to December 2017 to study the prevalence of transfusion transmitted infections among voluntary blood donors in a tertiary care hospital which provides service to poor and needy patients and is run by the state government.

Inclusion criteria: All blood units that have tested positive for HIV, HBsAg, HCV.

Exclusion criteria: All blood units that have tested negative for HIV, HBsAg, HCV.

The screening of blood donations for anti HIV, HBsAg, anti HCV, malarial parasite and syphilis is mandatory as per Food and Drug Administration guidelines and Drug and Cosmetics Act, 1940. A total of 53317 donations were made in the above mentioned time period. All donations were voluntary and donated in blood donation camps organized over the last 8 years or in the blood bank of the institute. Blood donors were questioned for basic details (like age, sex) and a detailed history of past illness and present health status was elucidated to exclude infectious diseases, as a part of routine blood donation screening. Ethical guidelines were followed for the same. All patients with history of jaundice within past 6 months were deferred. After a general physical examination and written consent, medically fit donors were allowed to donate 350 ml of blood. Blood samples were also collected in plain vacutainers and tested for anti HIV, HBsAg and anti HCV for all samples by commercial Enzyme Linked Immunoassay technique. The kits used were 3rd generation Enzyme Linked Immunoassay. For all the reactive samples, the respective blood units were discarded as per the standard protocol. Percentage of reactive samples for all three markers was calculated.

Results

A nine year retrospective study was performed to study the seroprevalance of anti HIV, HBsAg and anti HCV in voluntary blood donors. Number of reactive samples is expressed as a percentage and has been mentioned in Table 1. As the data suggests, HBsAg showed highest average seroprevalence among the three markers (1.81%), followed by anti HCV (1.08%) and anti HIV (0.78%).

Looking at the trend of seroprevalence over 8 years, anti HIV prevalence increased gradually from 0.58% in 2009 to 1.08% in 2017, except for a peak in 2011when the prevalence was the highest at 1.5%. HBsAg showed highest seroprevalence among all three infectious markers in all these years except in 2013. In 2013, the prevalence of HBsAg was lowest in eight years (0.98%) while that of anti HCV was highest in nine years -ie 1.77%. The highest prevalence for HBsAg was seen in the year 2012 (2.27%). The lowest value for anti HCV was 0.08%.

Table 1 Total number of donations and seroprevalence of HIV, HBsAg and HCV

Year	Number of donations	HIV (%)	HBsAg (%)	HCV (%)
2009	6055	0.58	2.03	1.18
2010	4811	0.70	1.77	0.90
2011	4644	1.50	2.21	0.94
2012	6012	0.63	2.27	1.28
2013	6269	0.35	0.98	1.77
2014	6436	0.49	1.80	1.32
2015	6587	0.81	1.47	0.08
2016	5969	0.93	1.80	1.23
2017	6534	1.08	1.98	1.02
Average	5924	0.78	1.81	1.08

Table 2 Prevalence of anti HIV, HBsAg and Anti HCV

Author	Hospital	State	Number of reactive samples (%)		
			HIV	HBsAg	HCV
Chandra et al	CSM Medical University	Uttar Pradesh	0.23	1.96	0.85
Shah et al	NHL Municipal Medical College	Gujarat	0.154	0.887	0.101
Pahuja et al	Lady Hardinge Medical College	Delhi	0.56	2.23	0.6
Bhattacharya et al	Institute of Blood Transfusion Medicine & Immunohematology	West Bengal	0.29	1.47	0.30
Sidhu et al	Government Medical College, Jammu	Jammu	0	0.5	0.17
Suresh et al	Sri Venkateswara Institute of Medical Sciences	Tamil Nadu	0.36	1.67	0.56
Present study	Tertiary care Hospital	Maharashtra	0.78	1.81	1.08

Discussion

The current study was performed retrospectively for a period of 9 years from January 2009 to December 2017 to study seroprevalence of HIV, HBsAg and HCV among voluntary blood donors (53317 donations).

According to the data in our study, among the three infectious markers, HBsAg showed highest average seroprevalence. This finding has been reported in most other studies conducted in India in blood banks fromvarious geographic areas – Lucknow by Chandra et al, Delhi by Pahuja et al, Jammu by Sidhu et al, Gujarat by Shah et al, West Bengal by Bhattacharya et al and in South India by Suresh et al[8-13] (Table 2). Percentage of HBsAg (1.81%) in our study was closest to the study by Suresh et al in South India (1.67%) and Chandra et al in Uttar Pradesh (1.96%)[8,13]. The highest prevalence was noted by Pahuja et al (2.23%) and lowest by Sidhu et al (0.5%)[9-10]. For anti HIV, the seroprevalence was highest in our study (0.78%) conducted in the state of Maharashtra. The study by Pandey et al on HIV prevalence in India in 2008-09 reports Maharashtra as one of the high prevalence states, others being, Manipur, Mizoram, Nagaland, Karnataka, Andhra Pradesh and Tamil Nadu[14]. All other studies mentioned above, reported a lower prevalence of anti HIV ranging from nil to 0.56% as compared to our study[8-13]. The lowest value of no prevalence in voluntary donors was reported in Jammu while the second highest prevalence (0.56%) was noted in Delhi[9-10]. Similar to anti HIV, anti HCV also was most prevalent in our study (1.08%). Among other studies, Chandra et al in Lucknow reported the closest value of 0.85% and lowest value of 0.101% was reported in Gujarat by Shah et al[8,11]. Overall, the prevalence of all three infectious markers was higher in our study conducted in the state of Maharashtra as compared to other states. Deshpande et al conducted a similar study among blood donors in Latur, Maharashtra and reported 0.38%, 2.82% and 0.22% average seroprevalence for HIV, HBV and HCV respectively[15]. Another study by Chougale et al in Kolhapur, Maharashtra, reported 0.54%, 1.31% and 0.08% for HIV, HBV and HCV respectively[16]. The valuesare comparable to our study for HIV and HBsAg; for HCV our study reports a higher value. On the

contrary, study by Sidhu et al in Jammu reported lowest prevalence for anti HIV and HBsAg and second lowest (higher only than Gujarat) for anti HCV [10-11]. The studies in Delhi by Pahuja et al and South India by Suresh et al also reported values on the higher side[9,13]. Since all these three infections are transmitted by parenteral mode, these differences in various parts of the same country can be attributed to lifestyle variations.

As per WHO recommendations, a donor screened positive for any of the transfusion transmitted infections, must be first tested by a confirmatory method[17]. Donors who test positive for the confirmatory test too must be informed, counseled and permanently deferred. In our setup, we confirm anti HIV positive patients by sending samples to ICTC. The positive donors are first informed and counseled by our specialist counselor and then referred to the integrated testing and counseling center for further management.

In Western nations, nucleic acid amplification (NAT) test has been opted for in order to reduce the window period and minimize transmission of these infections in the asymptomatic period. Routine NAT for HBV was first introduced in Germany in 1997[18].The United States began screening plasma pools for HCV and HIV-1 RNA in 1998[19]. Studies have proved a reduced risk in transmission of these infections as a result of implementation of nucleic acid testing[20]. Schreiber et al published a study in 1996 to estimate prevalence of infection in window period (1 in 493000 for HIV, 1 in 103,000 for HCV and 1 in 63,000 for HBV)[6]. In an international survey in 2008, prevalence of occult blood infections of HBV was estimated to be 8.55 per 1 million donations[21]. Such donors are mostly unaware of their health situation and also tend to hide the history of high risk behavior in this period. As far as developing nations are concerned, implementation of such expensive techniques as a routine procedure is not feasible; hence stringent donor selection criteria must be followed.

It is important to mention that a wide array of infectious agents is responsible for transfusion transmitted infections. These include bacterial agents, parasites (Leishmania, Babesia), viruses (HTLV, parvovirus, West Nile virus, Herpes group of viruses) and prions. Many European countries have opted for pathogen reduction methods. Immunocompromised patients are particularly given CMV seronegative/ leukoreduced products[22]. However, as transfusion transmitted diseasescannot be completely eliminated, an effort must be taken to minimize the problem.

Conclusion

To conclude, a greater averageseroprevalence was noted for HBsAg than anti HIV and anti HCV over the span of nine years. The levels of HBsAg and anti HCV continues to be high in India. Since India is a developing nation, it is far from implementation of advanced techniques like nucleic acid amplification test as a screening test, hence strict donor selection criteria must be followed to exclude donors in the window period and assure greater safety of blood transfusion.

Sources of financial support: Nil
Conflict of interest: Nil
Acknowledgements: Staff in blood bank

References

1. Ward JW, Deppe DA, Samson S, Perkins H, Holland P, Fernando L, *et al*. Risk of HIV infection from blood donors who later developed the acquired immunodeficiency syndrome. Ann Intern Med 1987;106:61-2.
2. Hollan SR, Wagstaff W, Leikola J, Lothe F. Management of blood transfusion services, Geneva: World Health Organization; 1990. p. 131.
3. National AIDS Control Organization, Ministry of Health and Family Welfare, Government of India: HIV/AIDS Epidemi-ological Surveillance & Estimation Report for the year 2005. Available from

<http://www.nacoonline.org/fnlapi06rpt.pdf>

4. Panigrahi AK, Panda SK, Dixit RK. Magnitude of hepatitis C virus infection in India: prevalence in healthy blood donors, acute and chronic liver disease. J Med Virol 1997;5:167–74.
5. Randell RL, HollandPV. Transfusion associated hepatitis. In: SarinSK, HessG, eds. Transfusion Associated Hepatitis: Diagnosis, Treatment and Prevention. CBS Publications: New Delhi, 1997:115–31.
6. Schreiber GB, Busch MP, Kleinman SH, Korelitz JJ. The risk of transfusion-transmitted viral infections.The Retrovirus Epidemiology Donor Study. N Engl J Med 1996; 334: 1685-1690.
7. Kiran V. Hepatitis B vaccine introduction into the routine immunization schedule – Andhra Pradesh experience. Indian J Public Health. 2004;48:63-66.
8. Chandra T, Kumar A, Gupta A (2009) Prevalence of transfusion transmitted infections in blood donors: an Indian experience.TropDoct 39:152–154 Indian J Hematol Blood Transfus (Jan-Mar 2011) ;27(1):1–6 5.
9. Pahuja S, Sharma M, Baitha B, Jain M (2007) Prevalence and trends of markers of hepatitis C virus, hepatitis B virus and human immunodeficiency virus in Delhi blood donors. A hospitalbased study. Jpn J Inf Dis; 60:389–391.
10. Sidhu M, Kotwal U, Kapoor R, Raina T. Seroprevalence of human immunodeficiency virus, hepatitis B virus and hepatitis C virus in blood donors of Jammu Province: A tertiary care centre experience.Asian J Transfus Sci. 2013;7(2)162-3.
11. Shah N, Shah JM, Jhaveri P, Patel K, Shah CK, Shah NR. Seroprevalence of HBV, HCV, HIV and syphilis among blood donors at a tertiary care teaching hospital in Western India. Gujarat Medical Journal. 2013;68(2)35-9.
12. Bhattacharya P, Chandra PK, Datta S, Banerjee A, Chakraborty S, Rajendran K et al. Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004-2005: Exploratory screening reveals high frequency of occult HBV infection. World J Gastroenterol. 2007;13(27):3730-3.
13. Suresh B., Shreedhar KV, Venkataramana B. et al. Burden of transfusion transmissible viral infections among blood donors at a tertiary care referral teaching hospital in South India. Journal of Clinical and Scientific Research. 2016;5(3):160-3.
14. Pandey A, Sahu D, Bakkali T, Reddy D, Venkatesh S, Bhattacharya M et al. Estimate of HIV prevalence and number of people living with HIV in India 2008-2009. Br Med J.2012;2(5).
15. Deshpande R, Bhosale S, Gadgil PA, Sonawane M. Blood donor's status of HIV, HBV, HCV and syphilis in this region of Marathwada, India. Journal of Krishna Institute of Medical Sciences University. 2012;1(2):111-6.
16. Chougale RA, Shinde PJ. Seroprevalence of transfusion transmitted infections among voluntary blood donors at a tertiary care teaching hospital in Kolhapur, India. International Journal of Recent trends in Science and Technology.2017;22(1)01-06.
17. Screening donated blood for transfusion transmissible infections.Geneva:World Health Organisation;2010:67.
18. Roth WK, Weber M, Seifried E. Feasibility and efficacy of routine PCR screening of blood donations for hepatitis C virus, hepatitis B virus, and HIV-1 in a blood-bank setting. Lancet 1999; 353: 359-363.
19. Margaritis AR, Brown SM, Seed CR, Kiely P, D'Agostino B, Keller AJ.

Comparison of two automated nucleic acid testing systems for simultaneous detection of human immunodeficiency virus and hepatitis C virus RNA and hepatitis B virus DNA. Transfusion 2007; 47: 1783-1793.

20. Snyder EL, Dodd RY: Reducing the risk of blood transfusion. Hematology (Am SocHematolEduc Program) 2001:433-442.
21. Seo DH, Whang DH, Song EY, Han KS. Occult hepatitis B virus infection and blood transfusion. World J Hepatol. 2015;7(3):600-06.
22. Bihl F, Castelli D, Marincola F, Dodd R, Brander C. Transfusion transmitted infections. Journal of Translational Medicine. 2007;5:25.