Research Article

Evaluation of seroprevalence of HbsAg infection among blood donors in a tertiary-care hospital

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Abstract

Background: Hepatitis B infection is a serious global and public health problem. Hepatitis B is one among the transfusion-transmissible infections. Hepatitis B virus (HBV) is a DNA virus that causes acute and chronic liver diseases. Transmission of infection occurs through blood transfusion, needles, body fluids, and sexual intercourse. The clinical diagnosis of carrier state of HBV is commonly done by the detection of hepatitis B surface antigen (HBsAg) in the serum.The prevalence of this infection differs across the globe. The preventive strategies can be accomplished by analyzing the trends in seroprevalence.

Objective: To assess the seroprevalence of HBsAg among blood donors attending the blood bank of a tertiary-care hospital.

Materials and Methods: The study was conducted at the blood bank of Hassan Institute of Medical Sciences (a tertiary-care hospital), Hassan, Karnataka, India. In this retrospective study, healthy blood donors, over a period of 3 years from 2011 to 2013, were assessed. The blood donors were categorized as voluntary and replacement donors. Blood samples from donors were subjected to serological tests for the detection of HBsAg through ELISA-based assay.

Result: A total of 11,894 blood donors were studied. Seventy-four (0.62%) cases were positive, which comes under the "low prevalence (<2%) zone" as per World Health Organization (WHO) guidelines. Male blood donors showed significantly higher seropositivity when compared with female donors. The χ^2-test was used to calculate the significance of difference between the sex groups.

Conclusion: This study endorses the fact that extensive screening through routine and specialized tests is mandatory, and definite criteria are to be given for the selection of donor to minimize the spread of HbsAg infection through transmission.

KEY WORDS: HBsAg, seroprevalence, blood donors, hepatitis B virus

Introduction

It is a well-known fact that transfusion of blood and blood components as a specialized modality of patient management has been saving millions of lives worldwide each year. A careful pretransfusion testing and screening is significant, especially for transfusion-transmitting infections.[1] Hepatitis B is a major public health problem worldwide. Roughly, about 2 billion (30%) of the world's population present serological evidence of either a present or past infection with hepatitis B virus (HBV).[2] India is the second most populated country in the world. The Indian subcontinent is listed under intermediate HBV infection zone with 2%–7% of hepatitis B surface antigen (HbsAg) carriers. HBV occurs as the second most important cause of acute, subacute, and fulminant hepatitis in India.[3] The seroprevalence of HBsAg among blood donors is a major global and public health issue. HBV infection is one of the transfusion-transmissible infections; hence, it is essential to test all the blood donors for HBsAg. Serosurveys are

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one among the predominant methods to determine the prevalence of HbsAg.[4]

In this retrospective study, we evaluated the seroprevalence of HBV among blood donors in a tertiary-care hospital. The study also aimed to determine the pattern in HBV infection.

Materials and Methods

The study was conducted at the blood bank of Hassan Institute of Medical Sciences, Hassan (a tertiary-care hospital), Karnataka, India. In this retrospective study, we reviewed 11,894 healthy blood donors over a period of 3 years from January 2011 to December 2013. The blood donors were categorized as voluntary and replacement donors.

They were carefully selected for blood donation by trained personnel after a complete physical examination and satisfactorily answering the donor's questionnaire. The family members, friends, or relatives of the patients were categorized as replacement donors. People who donate blood without expecting any favor in return or in voluntary blood donation camps were classified as voluntary blood donors. At the end of the blood collection, donor samples were obtained for serological testing.

The test for detecting HBV infection involves ELISA-based assay of HBsAg. Sera were checked for the presence of HBsAg using ELISA test according to manufacturer's instructions. Sensitivity and specificity are 100% according to the manufacturer's manual. Data regarding the HbsAg positivity and negativity of the respective blood donor were taken from records available in the blood bank of Hassan Institute of Medical Sciences, Hassan.

Result

Of the 11,894 blood donors, 8,574 (72%) of donors were voluntary blood donors and 3,320 (28%) replacement blood donors. Seventy-six (0.62%) samples tested positive for HbsAg in a study period of 3 years. Prevalence of HbsAg for the years 2011, 2012, and 2013 were 22 (0.65%), 25 (0.60%), and 29 (0.66%), respectively [Table 1].

Table 1: Distribution of blood donors with hepatitis B seropositivity

Years	Blood donation		Total	HbsAg positive, *N* (%)
	Voluntary blood donors	Replacement blood donors		
2011	2,589	772	3,361	22 (0.65)
2012	2,879	1,269	4,148	25 (0.6)
2013	3,106	1,279	4,385	29 (0.66)
Total	8,574	3,320	11,894	76 (0.62)

Of the 11,894 blood donors, 11,332 (95.03%) were male and 562 (4.7%) female subjects. Among 76 HbsAg-positive cases, 74 (0.65%) were male and 2 (0.35%) female subjects. The pattern of seroprevalence during the study period is shown in Table 2.

A higher seroprevalence rate was observed among male blood donors than in female blood donors (0.65% vs. 0.35%, respectively), and the difference is statistically significant ($p = 0.034$) [Table 3].

Table 3: Comparison of seroprevalence among male and female blood donors

Blood donors	HbsAg positive	Prevalence (%)	*p*
Male subjects	74	0.65	<0.034
Female subjects	2	0.35	

Discussion

The seroprevalence of HBsAg of 0.62% was observed in our study. According to the WHO classification, this result qualifies as a low-prevalence area (less than 2%), which correlated well with a similar study done by Sood and Malvankar.[5] The prevalence rate of viral hepatitis was found to be a little lesser by Singh et al., in 2009.[4] The prevalence of the infection is different in every place and is based upon a complex combination of behavioral, environmental, and host factors.[5,6] In comparison with other parts of India, this study shows low seroprevalence of HBV infection.

The seroprevalence of hepatitis B also varies among male and female subjects. In our study, male subjects showed a higher prevalence of 0.65%, while female subjects showed a prevalence of 0.35%.

Seroprevalence was significantly high in male donors when compared with female donors. It is to be noted that the majority of our study population was male subjects. A significantly higher HBsAg seroprevalence in male subjects than in female subjects is also reported in other studies.[7–9] No plausible explanation has yet been given for the higher prevalence in male subjects in the general population, but probably female subjects clear the HBV more efficiently when compared with male subjects.

Table 2: Sex distribution of blood donors with hepatitis B seropositivity

Year	Blood donors		HbsAg positive	
	Male subjects	Female subjects	Male subjects, *N* (%)	Female subjects, *N* (%)
2011	3,216	145	22 (0.68)	0 (0)
2012	3,959	189	24 (0.60)	1 (0.53)
2013	4,157	228	28 (0.67)	1 (0.44)
Total	11,332	562	74 (0.65)	2 (0.35)

The hospital-based study data on the seroprevalence of HbsAg infection presented here is likely to improve our understanding in disease transmission.

The possible limitations of our study could be the better reflection of the seroprevalence of HBV infection in the community, which should be studied in the samples that are not prescreened. The absence of HbsAg in blood donors may not be sufficient to ensure the lack of circulating HBV, and, hence, there are chances of missing occult HBV infection.

Conclusion

Ensuring the safety of patients by reducing the residual risk of transfusion-transmitted hepatitis is the concern of every transfusion center. Features such as public awareness and educational, motivational, and mass immunization programs aid in reducing the infection. Predonation counseling and donor self-exclusion will ensure 100% voluntary blood donation, which will be effective in decreasing the HBV infection rate. This stresses upon the fact that extensive screening through routine and specialized tests is mandatory, and definite criteria are to be given for donor selection so as to minimize the spread of this disease through transmission.

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