



PREVALENCE OF HEPATITIS B INFECTION AMONG BLOOD DONORS AT A TERTIARY CARE CENTRE IN WESTERN RAJASTHAN

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ABSTRACT

BACKGROUND & OBJECTIVES: Transfusion transmitted infections are a cause of concern in the provision of safe blood and Hepatitis B virus (HBV) is among the most infectious agent. India is an intermediate endemicity nation for HBV; therefore our study was to estimate the seroprevalence among blood donors at our blood centre in western Rajasthan and to compare it with other regions of India. **MATERIALS AND METHODS:** A retrospective study of all donations from January 2021 to December 2021 was conducted for the prevalence of HBV among the blood donors. A total of 37291 donations were analyzed for seropositivity, data was collected in excel data sheet and analyzed using statistical calculations by IBM SPSS statistical software platform version 26. Prevalence rate was calculated, chi square test was applied to test the significance. A p value of <0.05 was considered significant. **RESULTS:** The seropositivity for HBsAg among voluntary donors was 0.35% while it was 1.26% among replacement donors which was statistically significant ($\chi^2=101.343$, $p < 0.0001$). The overall seropositivity for HBsAg was 0.76%. **CONCLUSION:** The prevalence of transfusion transmitted infections can be decreased by stringent blood donor screening, motivating people to donate blood voluntarily on regular intervals and universal vaccination against hepatitis B. Our goal of 100% voluntary non-remunerated blood donations in India is undoubtedly a tough exercise but is still achievable if we aware the masses in the hinterland where the larger population of India lives the benefits of blood donation.

KEYWORDS : Hepatitis B, HBsAg, prevalence, seropositivity, transfusion transmitted infections

INTRODUCTION

Blood is a remedy and an essential drug, but it comes with a risk. Transfusion transmitted infections have long been an issue of serious concern which haunts the healthcare establishments and the authorities concerned to make stricter rules and regulations to ensure a safe blood supply. Hepatitis B virus (HBV) is 50-100 times more infectious than Human Immunodeficiency Virus (HIV) and mainly spreads via blood and other body fluids. WHO estimates that 296 million people globally were living with chronic hepatitis B infection in 2019.² According to WHO more than 820,000 people died in 2019 due to complications of hepatitis B infection.² The prevalence of HBsAg in India is 3-4.2% with above 40 million HBV carriers.² India falls under intermediate endemicity category for hepatitis B.¹ The Seroprevalence of hepatitis B among blood donors in India is 0.92%.^{3,4}

This study was carried out keeping in mind the above background to estimate the prevalence of HBsAg among blood donors at a blood centre attached to a tertiary care hospital in western Rajasthan. The study also aimed at comparing the prevalence of HBsAg with that of other regions of India.

MATERIALS AND METHODS

A retrospective study was conducted at the Blood Centre of Sardar Patel Medical College and Associated Group of Hospitals. The study analysed all donations made between January 2021 and December 2021. All blood donors were screened and examined by a medical doctor. The donors were given a questionnaire and asked to give their responses, and when found fit were allowed to donate blood.

The selection and deferral of blood donors were done on the guidelines issued by NACO and the Ministry of Health and Family Welfare of India. Donors with a body weight of > 45 kgs, Hb >/= 12.5 g/dl and belonging to the age group of 18 - 60 yrs were allowed to donate blood. 'High risk behaviour' donors were not allowed to donate blood. A total of 37291 donations were made during the study period of one year. Replacement

and voluntary donations in camp and at the blood centre contributed to the above figure. Replacement donors are friends or relatives of the patient whereas voluntary donors are self motivated and non-remunerated. About 2 ml of blood donor samples were collected in ethylene diamine tetra acetic acid (EDTA) vials for serology screening.

The samples were screened for HBsAg using Merilisa HBsAg ELISA kits (Meril Diagnostics Ltd.) or Oscar HBsAg ELISA kits (Oscar Diagnostics Ltd.). The test is based on solid phase microplate direct ELISA (Sandwich ELISA) technique. The samples found positive for HBsAg were retested and if found positive in the repeat test were discarded. Seropositive donors were contacted via telephone and letters were sent to them and were asked to come to our hospital and consult in the medicine OPD or to consult any local physician or visit any hospital for further evaluation and treatment.

Data was collected in excel data sheet and analyzed using statistical calculations by IBM SPSS statistical software platform version 26. Prevalence rate was calculated, chi square test was applied to test the significance. A p value of <0.05 was considered significant.

RESULTS

A total of 37291 units of blood were collected during the study period from January 2021 to December 2021. Majority of the donors i.e. 36819 were male accounting to 98.73% of the total number of donors and only 472 donors were female i.e. 1.26% of 37291 donors.

Replacement donors were 17019 i.e. 45.64% while voluntary donations accounted to 20272 i.e. 54.36% of the total number of donations (Table 1). Most of the donors belonged to 18-40 years age group demonstrating the young demography of the region and greater involvement of the younger generation in blood donation (Table 1). This study also demonstrates the frequency of ABO and Rh blood group among the blood donors. The maximum donors possessed blood group B followed by O then by A and the least number of donors were

AB. Approximately ninety one percent of the donors were Rhesus positive and only nine percent of the donors were negative for D antigen (Table 2).

The seropositivity for HBsAg among voluntary donors was 0.35% while it was 1.26% among replacement donors which was statistically significant ($\chi^2=101.343, p < 0.0001$) (Table 3). The overall seropositivity for HBsAg was 0.76%. The age wise distribution of seropositive donations and age specific prevalence is shown in Table 4.

The majority of seropositive donations were from 26-40 age group donors and the least from the extreme age group of 51-60 years. The highest age specific prevalence was in the 41-50 years age group i.e. 1.48% whereas the least prevalence i.e. 0.45% was in the 18-25 years age group.

Table 1: Age wise distribution of voluntary and replacement donors

| Age group(in years) | Voluntary Donors | Replacement Donors |
|---------------------|------------------|--------------------|
| 18-25 | 7709 | 6000 |
| 26-40 | 10592 | 9282 |
| 41-50 | 1686 | 1488 |
| 51-60 | 285 | 249 |
| Total | 20272 | 17019 |

Table 2: ABO and Rh frequency among blood donors

| ABO Group | Rh Positive | Rh Negative |
|-----------|-------------|-------------|
| A | 7463 | 744 |
| B | 12557 | 1230 |
| AB | 3067 | 272 |
| O | 10702 | 1256 |
| Total | 33789 | 3502 |

Table 3: HBsAg seropositivity among voluntary and replacement donors

| HBsAg status | Voluntary | Replacement | Total |
|--------------|-----------|-------------|-----------|
| Positive (%) | 71(0.35) | 215(1.26) | 286(0.76) |
| Negative | 20201 | 16804 | 37005 |
| Total | 20272 | 17019 | 37291 |

Table 4: Age specific HBsAg positive donors and prevalence rate

| Age Group(years) | HBsAg Positive | Prevalence (%) |
|------------------|----------------|----------------|
| 18-25 | 62/13709 | 0.45 |
| 26-40 | 171/19874 | 0.86 |
| 41-50 | 47/3174 | 1.48 |
| 51-60 | 6/534 | 1.12 |
| Total | 286/37291 | 0.76 |

DISCUSSION

Blood transfusion is life saving but is not risk free. Transfusion transmitted infections (TTIs) pose a great risk to blood safety. Hepatitis B virus (HBV) was one of the earliest TTI to be screened before transfusion of blood to a patient. HBV is 50-100 times more infectious than human immunodeficiency virus (HIV).²

WHO estimates that around 300 million people worldwide are chronically infected with hepatitis B and 890,000 people died due to hepatitis B related liver cirrhosis and hepatocellular carcinoma.⁵ India has an intermediate prevalence of hepatitis B surface antigen (HBsAg) and so is the north-western state Rajasthan where this study has been done.

The prevalence of HBsAg in our present study for the year 2021 has been 0.76% which is the lower margin of the interquartile range for the prevalence of HBV among lower-middle income countries.⁶ The prevalence of HBsAg has significantly declined from 2.11% in 2010 to 0.76% in 2021 at our centre which is evident by analyzing a previous paper done by Arya et al⁷ on

the seroprevalence of TTIs at our centre over a period of 5 years from 2010-2015.⁵

The reason for such a successive decline in seropositivity very much corresponds to the successive increase in the proportion of voluntary non-remunerated blood donations in camps and at the blood centre. The seroprevalence of HBV among blood donors in India according to NACO is 0.92 %.³ In a study done at AIIMS Delhi, Meena et al⁸ reported the prevalence of HBsAg among blood donors at their centre at 1.43% which is higher than that found in our study, they also reported higher prevalence among replacement donors i.e. up to 1.47% and only 0.29% prevalence rate in voluntary donors.⁸

Similarly in many studies done all across India the prevalence of HBsAg is found higher than that found at our centre and all the studies that we have looked upon reports higher prevalence of transfusion transmitted infections (TTIs) among replacement donors as compared to voluntary donors.^{9,10,11,13,15}

In a study conducted by Akhter et al¹² in southern Punjab, Pakistan they found the seroprevalence of HBsAg at 1.26% which shares a shared demography due to neighbouring location to western Rajasthan. But the studies conducted in the coastal Karnataka by Singh et al¹⁴ and similarly in Uttarakhnad by Acharya et al¹⁶ have reported a lower seroprevalence of 0.62 and 0.72 % respectively which corresponds to our study prevalence of HBsAg of 0.76%. In India the majority of donors are male more than 95% and a very small contribution by females. We also found the highest prevalence of seropositivity among the age group 41-50 years similar to Meena et al⁸.

Table 5: Comparison with various studies

| Studies | HBsAg % | References |
|---------------------------------|---------|------------|
| Singh et al. (2009), Karnataka | 0.62 | (14) |
| Meena et al. (2011), Delhi | 1.43 | (8) |
| Jadeja et al. (2014), Udaipur | 1.32 | (9) |
| Sharma et al. (2014), Gwalior | 3.51 | (15) |
| Arya et al. (2016), Bikaner | 1.60 | (7) |
| Chandekar et al. (2017), Mumbai | 1.30 | (13) |
| Rawat et al. (2017), Delhi | 1.61 | (11) |
| Omhare et al. (2018), Kanpur | 1.45 | (10) |
| Akhter et al. (2018), Pakistan | 1.26 | (12) |
| Present study, Bikaner | 0.76 | |

CONCLUSION

The prevalence of transfusion transmitted infections can be decreased by stringent blood donor screening, motivating people to donate blood voluntarily on regular intervals and universal vaccination against hepatitis B. While doing this study we also came across the fact of minimal participation of females in the blood donation drives across India. Increased participation of females towards blood donation would definitely decrease the seroprevalence of infective markers as females are less involved in illicit and high risk behaviour compared to males. Our goal of 100% voluntary non-remunerated blood donations in India is undoubtedly a tough exercise but is still achievable if we aware the masses in the hinterland where the larger population of India lives the benefits of blood donation. We need to counter the misconceptions and misbeliefs associated with blood

donation so as to increase voluntary blood donations.

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