



Original Article

HBsAg Seropositivity Among Blood Donors at a Tertiary Care Hospital in Western India

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ABSTRACT

Background: Hepatitis B virus (HBV) infection remains one of the leading transfusion-transmitted infections worldwide and continues to pose a significant challenge to blood safety. Screening blood donors for hepatitis B surface antigen (HBsAg) is mandatory to reduce the risk of transfusion-transmitted HBV infection. Regular assessment of HBsAg seroprevalence among blood donors offers important epidemiological insights and enables evaluation of the effectiveness of blood donor screening programs.

Objective: To determine the seroprevalence of HBsAg among blood donors at a tertiary care hospital in Western India during the period from May 2025 to April 2026.

Materials and Methods: This retrospective observational study was conducted at the Blood Centre, Department of Pathology, PDU Medical College and Hospital, Rajkot, Gujarat, India. Blood donor records from May 2025 to April 2026 were reviewed. Demographic details, including age, sex, donation site, and HBsAg screening results, were collected. All donor samples were screened using a third-generation enzyme-linked immunosorbent assay (ELISA), and initially reactive samples were retested according to institutional protocols before being considered seropositive.

Results: A total of 21,532 blood donors were included, comprising 20,350 (94.51%) males and 1,182 (5.49%) females. Overall, 65 donors tested positive for HBsAg, resulting in a seroprevalence of 0.30%. Of the seropositive donors, 64 (98.46%) were male and 1 (1.54%) was female. The highest proportion of HBsAg-positive donors was observed in the 31–40-year age group (36.92%), followed by the 21–30-year age group (26.15%).

Conclusion: The present study demonstrates a low prevalence of HBsAg among blood donors, reflecting the effectiveness of donor selection criteria and routine ELISA-based screening. However, the continued detection of HBsAg-positive donors highlights the need for ongoing surveillance, strict donor screening, hepatitis B vaccination, and implementation of advanced screening techniques such as nucleic acid testing (NAT) to further improve blood safety.

Keywords: Blood donors, Hepatitis B virus, HBsAg, Seropositivity, Blood safety, ELISA.

INTRODUCTION

Blood transfusion is an indispensable component of modern healthcare and is frequently required in trauma, surgery, obstetric emergencies, hematological disorders, and severe anaemia. Although blood transfusion is a life-saving procedure, it carries the risk of transmitting infectious agents from donor to recipient. Among transfusion-transmitted infections, hepatitis B virus (HBV) remains a major public health concern.

HBV is a DNA virus belonging to the Hepadnaviridae family and is responsible for acute and chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Hepatitis B surface antigen (HBsAg) is the earliest serological marker of HBV infection and serves as an important indicator for screening blood donors. India is considered an intermediate endemic region for HBV, with an HBsAg prevalence ranging from 2% to 7% in the general population.

Strict donor selection criteria and mandatory screening protocols have considerably reduced the transmission of HBV through blood transfusion. However, asymptomatic carriers continue to contribute to the reservoir of infection. Regular assessment of HBsAg seropositivity among blood donors provides valuable information regarding disease trends and helps strengthen blood safety measures.

MATERIALS AND METHODS

This retrospective observational study was conducted in Blood Centre, Department of Pathology and PDU Medical College and Hospital, Rajkot, Gujarat, India over a period of twelve months. Blood donor records from May 2025 to April 2026 were reviewed. Demographic details including age, sex, donor type, and HBsAg screening results were collected and analyzed. Screening for HBsAg was performed using a third-generation enzyme-linked immunosorbent assay (ELISA). Initially reactive samples were retested according to institutional protocol before being labelled as seropositive

Study Design and setting

This hospital-based retrospective observational study was carried out at the Blood Centre, Department of Pathology, PDU Medical College and Hospital, Rajkot, Gujarat, India, using blood donor records collected between May 2025 and April 2026.

All voluntary blood donation camp and replacement blood donors in blood bank who fulfilled the eligibility criteria for blood donation according to the guidelines of the National Blood Transfusion Council (NBTC) and the Drugs and Cosmetics Act, Government of India, were included in the study. Donor demographic details, including age, sex, and type of donation, were obtained from the donor records. Screening for HBsAg was performed on all donated blood units using approved serological methods, and reactive samples were subjected to repeat testing as per standard operating procedures.

Study population

A total of 21,532 blood donors, including both voluntary and replacement donors, were included in the study. All donors fulfilled the standard donor selection criteria laid down by the National Blood Transfusion Council (NBTC) and the Drugs and Cosmetics Act.

Inclusion Criteria

- All blood donors who donated blood during the study period from May 2025 to April 2026.
- Both voluntary and replacement blood donors fulfilling the eligibility criteria for blood donation.
- Donors aged 18–65 years with acceptable haemoglobin levels and body weight as per standard donor selection criteria.

Exclusion Criteria

- Donor deferred during pre-donation screening due to anemia, medical illness, high risk behaviour, or any contra-indication to blood donation were excluded from the study.

Data Collection

Blood bank records maintained in the blood bank were reviewed retrospectively. Information regarding age, sex, place of donation (in house or blood donation camp), and HBsAg screening results was collected and analysed.

Screening Method

Approximately 2 ml of venous blood was collected from each donor at the time of blood donation. Serum samples obtained from all donated blood units were screened for Hepatitis B surface antigen (HBsAg) as part of routine mandatory screening for transfusion-transmitted infections.

Screening for HBsAg was performed using a commercially available Enzyme-Linked Immunosorbent Assay (ELISA) kit according to the manufacturer's instructions and the standard operating procedures of the blood centre. Initially reactive samples were retested in duplicate. Samples showing repeat reactivity were considered seropositive for HBsAg, and the corresponding blood units were discarded in accordance with the National Blood Transfusion Council (NBTC) guidelines and the Drugs and Cosmetics Rules, Government of India.

RESULTS

This study evaluated HBsAg status in 21,532 blood donors over a one-year period extending from May 2025 to April 2026. Of these, 20,350 (94.51%) were males and 1,182 (5.49%) were females. The majority of donations were collected through camps (17,010; 79.00%), while 4,522 (21.00%) donations were collected in-house.

Among the total donors, 65 were reactive for HBsAg, giving an overall seroprevalence of 0.30%. Of the seropositive donors, 64 (98.46%) were males and 1 (1.54%) was female. The majority of HBsAg seropositive donors belonged to the 31-40 years age group, followed by the 21-30 years age group.

Table 1. Gender – wise distribution of total blood donors:

Gender	Number of Donor	Percentage %
Male	20350	94.51
Female	1182	5.49
Total	21532	100.00

Total blood donors – 21,532

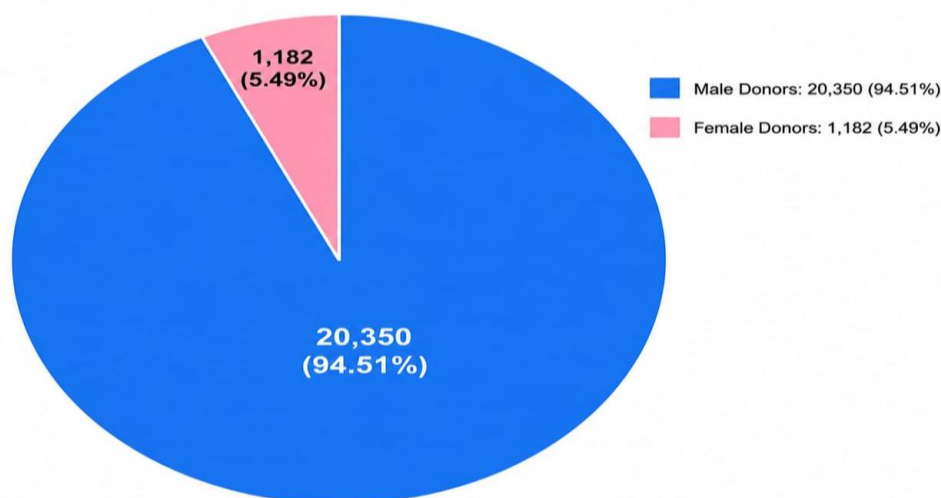


Table 1 showing the gender-wise distribution of blood donors. Male donors accounted for 20,350 (94.51%) and female donors accounted for 1,182 (5.49%) of the total 21,532 blood donors.

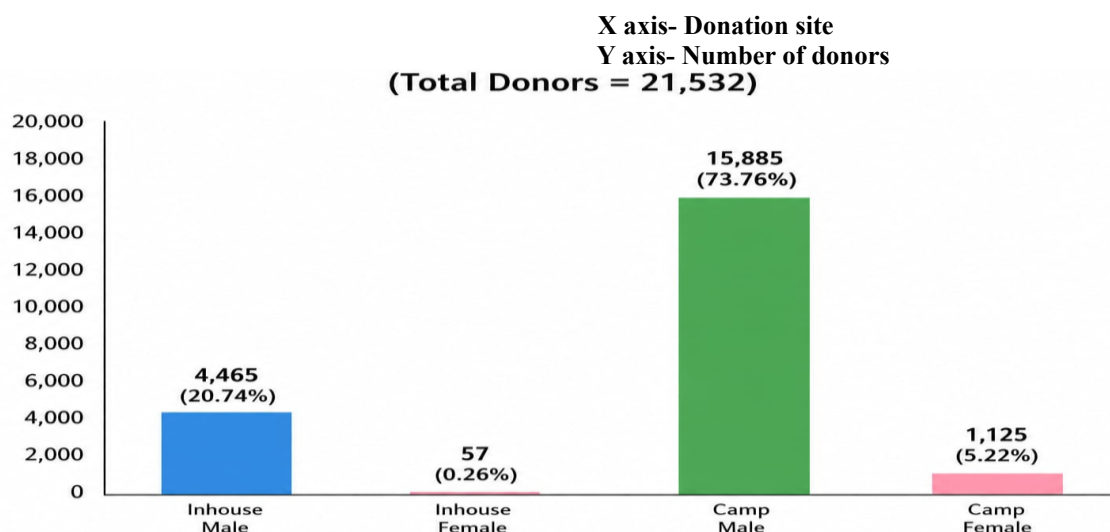


Figure 1: Distribution of blood donations by collection site:

Figure 1 shows that 21,532 blood donors were included in the study. Most donations were from camp sites (17,010; 78.98%), while 4,522 (21.00%) were collected in-house. Male donors predominated at both donation sites, with 15,885 (73.76%) camp donors and 4,465 (20.74%) in-house donors, whereas female participation was comparatively low.

Total blood donors – 21,532

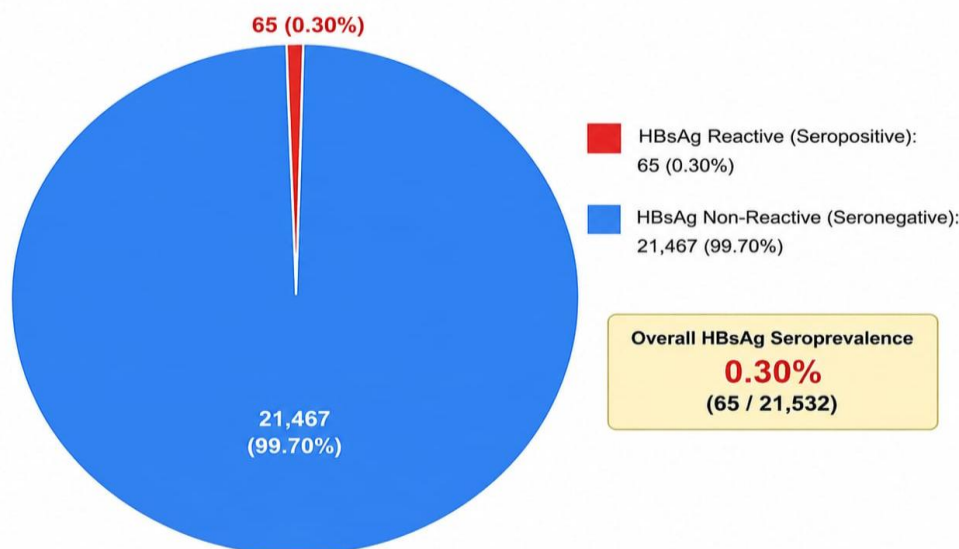


Figure 2: Seroprevalence among blood donors:

Figure 2 illustrates the HBsAg serostatus of the 21,532 blood donors included in the study. Among all donors, 65 (0.30%) tested positive for HBsAg, whereas 21,467 (99.70%) tested negative. The low proportion of HBsAg-reactive donors indicates a very low burden of hepatitis B infection in the donor population. The predominance of seronegative donors reflects effective donor selection and screening practices, supporting the safety and quality of the blood supply.

Table 2 Gender- wise distribution of HBsAg seropositive donors:

Gender	Number of seropositive Donors	Percentage (%)
Male	64	98.46
Female	1	1.54
Total	65	100.00

Table 2 shows the gender-wise distribution of 65 HBsAg seropositive blood donors. Among the seropositive donors, 64 (98.46%) were male, while only 1 (1.54%) was female. These findings indicate that HBsAg seropositivity was overwhelmingly observed among male donors, with very few seropositive female donors during the study period.

Table 3. Age-wise distribution of HBsAg seropositive donors:

Age Groups	Number of HBsAg seropositive donor	Percentage (%)
18-20	2	3.08
21-30	17	26.15
31-40	24	36.92
41-50	13	20.00
>50	9	13.85
Total	65	100.00

Table 3 shows the age-wise distribution of 65 HBsAg seropositive blood donors. The highest number of seropositive donors was observed in the 31–40 years age group (24; 36.92%), followed by 21–30 years (17; 26.15%) and 41–50 years (13; 20.00%). Donors aged >50 years accounted for 9 (13.85%), while the 18–20 years age group had the lowest number of seropositive donors (2; 3.08%). These findings indicate that HBsAg seropositivity was most common among donors aged 31–40 years.

DISCUSSION

Hepatitis B virus (HBV) infection continues to pose a major public health challenge worldwide and remains an important transfusion-transmitted infection. Consequently, routine screening of donated blood for hepatitis B surface antigen (HBsAg) is a fundamental step in ensuring the safety and quality of the blood supply while minimizing the risk of HBV

transmission through transfusion. In the present retrospective study conducted at a tertiary care hospital in Western India, HBsAg positivity was detected in 65 of 21,532 blood donors, resulting in an overall seroprevalence of 0.30%. This low prevalence suggests that HBV infection among the donor population was relatively uncommon and reflects the effectiveness of current donor selection and screening practices.

Table 4: Comparison of HBsAg Seroprevalence in various studies:

Study	Study years	Study Area	Total Blood Donors	HBsAg Positive (%)
Present study	May 2025- April 2026	Western India (Rajkot, Gujarat)	21532	0.30 %
Aora et al.	2010	Haryana	9,909	1.70%
Pahuja et al.	2011	Delhi	36,700	1.70%
Singh et al.	2014	Karnataka	16,706	1.10%
Makroo et al.	2015	Delhi	180,371	0.87%
Bharath et al.	2016	Tamilnadu	6,954	1.30%
Das et al.	2016	Assam	18,450	1.18%
Rathi et al.	2017	Maharashtra	55,124	0.81%
Sharma et al.	2018	Rajasthan	42,350	0.54%
Patel et al.	2019	Gujarat	24,615	0.48%
Praveen Gowda et	2019	Karnataka	25,491	0.42%
Chatterjee et al.	2020	West Bengal	19,875	0.61%
Yashovardhan et al	2021	Andhra Pradesh	31,000	0.36%
Kumar et al	2022	Uttar Pradesh	39,210	0.73%
Kaur et al.	2023	Punjab	27,864	0.44%

Compared with earlier Indian reports, the present study demonstrated a relatively lower prevalence of HBsAg among blood donors. Arora et al. reported an HBsAg seroprevalence of 1.70% among blood donors in Haryana, while Pahuja et al. observed a similar prevalence of 1.70% in Delhi. Bharath et al. from Tamil Nadu reported a prevalence of 1.30%, Singh et al. from Karnataka reported 1.10%, and Makroo et al. from North India documented 0.87%. In contrast, more recent studies have demonstrated declining HBsAg prevalence, including Patel et al. (0.48%) from Gujarat, Praveen Gowda et al. (0.42%) from Karnataka, Yashovardhan et al. (0.36%) from Andhra Pradesh, and Kaur et al. (0.44%) from Punjab. The lower prevalence observed in the present study is consistent with this declining trend and may reflect improvements in donor selection, increased public awareness regarding hepatitis B infection, wider hepatitis B vaccination coverage, and the routine use of sensitive third-generation ELISA assays for donor screening.

The donor population was predominantly male, with men representing 94.51% of all donors, while women contributed 5.49%. A similar gender imbalance has been consistently reported in blood donor studies conducted across India. Social factors, cultural beliefs, lower participation of women in voluntary blood donation programs, pregnancy, lactation, menstrual blood loss, and a higher prevalence of anemia among females contribute to the lower proportion of female donors. Among the 65 HBsAg-seropositive donors, 64 were males and only one was female. Although this finding largely reflects the predominance of male donors, it may also indicate greater occupational and behavioural exposure of males to HBV risk factors.

Age-wise analysis demonstrated that the highest HBsAg seropositivity occurred in donors aged 31–40 years (36.92%), followed by the 21–30 years age group (26.15%). Similar observations have been reported in several Indian studies, where HBV infection was more common among young and middle-aged adults. Individuals in these age groups are generally more socially and economically active and may have greater exposure to occupational hazards, medical procedures, travel, and other behavioural risk factors associated with HBV transmission. The comparatively lower prevalence observed among younger donors may partly reflect the positive impact of childhood hepatitis B vaccination programs implemented over the past two decades.

Most blood donations in the present study were collected through voluntary blood donation camps (approximately 79%), while about 21% were collected in-house. A higher proportion of voluntary donations generally contributes to improved blood safety because voluntary non-remunerated donors are considered to have a lower prevalence of transfusion-transmitted infections compared with replacement donors. This finding highlights the importance of organizing regular voluntary blood donation camps and promoting repeat voluntary blood donation to maintain a safe and adequate blood supply.

Table 5: HBsAg seroprevalence among blood donors in different countries

Country	HBsAg Prevalence%
Present study (Gujarat, Rajkot, India)	0.30

Iran	0.58
Iraq	0.67
China	1.32
Egypt	1.58
Turkey	1.68
Pakistan	2.84
Saudi Arabia	3.02
Yemen	5.05
Africa	6.93

Comparison with international studies also demonstrates the favourable epidemiological status observed in the present study. The HBsAg seroprevalence of 0.30% is lower than that reported among blood donors in Iran (0.58%), Iraq (0.67%), China (1.32%), Egypt (1.58%), Türkiye (1.68%), Pakistan (2.84%), Saudi Arabia (3.02%), Yemen (5.05%), and the pooled prevalence reported from African countries (6.93%). These differences may be attributed to variations in HBV endemicity, vaccination coverage, socioeconomic conditions, public health infrastructure, donor recruitment strategies, and screening methodologies adopted in different regions. The low seroprevalence observed in this study suggests that the existing donor selection criteria and mandatory serological screening protocols are effective in reducing the risk of transfusion-transmitted HBV infection. Nevertheless, the continued detection of HBsAg-positive donors indicates that HBV remains an important concern for transfusion services. Serological screening alone may fail to detect occult HBV infection or donations collected during the serological window period. Therefore, the implementation of nucleic acid testing (NAT), together with high-quality serological screening, can further reduce the residual risk of HBV transmission through blood transfusion.

The present study has certain limitations. Being a single-centre retrospective study, the findings may not represent the HBV epidemiology of the entire population. In addition, only HBsAg screening was performed, and occult HBV infections or window-period infections could not be identified because nucleic acid testing was not routinely available. Future multicenter prospective studies incorporating NAT and long-term surveillance are recommended to provide a more comprehensive assessment of transfusion-transmitted HBV risk in India.

Overall, the findings of this study demonstrate that HBsAg seroprevalence among blood donors at a tertiary care hospital in Western India is low and comparable with the lowest rates reported in recent Indian studies. Continued promotion of voluntary blood donation, strict adherence to donor selection guidelines, expansion of hepatitis B vaccination programs, and gradual implementation of NAT-based screening are essential strategies to further strengthen blood safety and minimize the risk of transfusion-transmitted hepatitis B infection.

Limitations

Single-centre retrospective study.

Findings may not represent the general population.

Nucleic acid testing was not included.

CONCLUSION

The present study demonstrated a low HBsAg seroprevalence (0.30%) among blood donors at a tertiary care hospital in Western India, indicating the effectiveness of current donor selection criteria and routine ELISA-based screening in ensuring blood safety. However, the continued detection of HBsAg-positive donors highlights that hepatitis B remains a persistent transfusion-transmitted infection of public health importance. The predominance of seropositivity among male donors and individuals aged 31–40 years emphasizes the need for targeted awareness, early detection, and preventive strategies in these groups. Strengthening voluntary blood donation programs, maintaining strict donor screening protocols, expanding hepatitis B vaccination coverage, and gradually implementing nucleic acid testing (NAT) can further reduce the residual risk of transfusion-transmitted HBV infection. Multicentre prospective studies with advanced screening methods are recommended to provide a more comprehensive understanding of HBV epidemiology and to support continuous improvement in blood transfusion safety across India.

Conflict of Interest

The authors declare no conflict of interest.

Source of Funding

Nil.

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