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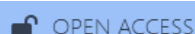
## Seroprevalence of Hepatitis B Virus Infection Among Blood Donors: A Retrospective Study from a Tertiary Care Centre, HIMS Hassan

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### ABSTRACT

**Background:** Hepatitis B virus (HBV) infection is a major public health problem and a cause of transfusion-transmitted infections. Blood donors, though generally healthy, may carry asymptomatic HBV infection, making them an important sentinel population for monitoring disease prevalence and ensuring blood safety.

**Aim:** To determine the seroprevalence of Hepatitis B virus infection among blood donors at a tertiary care centre, Hassan Institute of Medical Sciences (HIMS), Hassan, through a retrospective study.

**Materials and Methods:** A retrospective cross-sectional study was conducted at the blood bank of HIMS, Hassan. Records of all eligible voluntary and replacement donors (n = 12,647) for the year [insert year] were reviewed. Donor eligibility was assessed according to WHO and NACO guidelines. Serum samples were screened for Hepatitis B surface antigen (HBsAg) using ELISA or CLIA kits, with reactive samples re-tested for confirmation. Demographic data including age, gender, and donor type were analyzed. Descriptive statistics and Chi-square tests were applied, with  $p < 0.05$  considered significant.

**Results:** Among 12,647 donors, 152 (1.20%) were seropositive for HBsAg. Seropositivity was higher in male donors (1.28%) than females (0.87%). Age-wise, the 26–35 years group had the highest prevalence (1.53%). Replacement donors (1.47%) had slightly higher positivity than voluntary donors (0.98%). The prevalence aligns with other tertiary care centres, indicating a declining trend but persistent circulation of HBV.

**Conclusion:** Despite routine screening, HBsAg-positive donors pose a risk for transfusion-transmitted HBV infection. Continuous surveillance, sensitive screening, vaccination, and awareness programs are essential to ensure safer transfusions.

**Keywords:** Hepatitis B virus(HBV), HBsAg, Blood donors.

### INTRODUCTION

Hepatitis B virus (HBV) infection remains a **major global public health problem**, affecting millions worldwide and causing chronic liver disease, cirrhosis, and hepatocellular carcinoma [10]. HBV is primarily transmitted via **blood, sexual contact, and perinatal routes**. Despite vaccination programs, HBV continues to pose challenges in low- and middle-income countries [10].

Blood transfusion, though life-saving, is a potential route for HBV transmission, particularly as many infected individuals remain asymptomatic during early infection. Consequently, **blood donors serve as a sentinel population** for monitoring HBV prevalence and evaluating donor screening efficacy [1].

In India, HBV prevalence among donors varies regionally, ranging from 0.91% to 2.5% [1–4]. Male donors and replacement donors generally exhibit higher seropositivity, while young adults (18–35 years) often represent the most

affected age group [3–6]. Screening in India follows **NACO and WHO guidelines**, primarily using HBsAg assays (ELISA/CLIA). While effective, these tests may miss infections in the **window period or occult cases**, and advanced NAT testing is not universally available [7–9].

Hassan Institute of Medical Sciences (HIMS), Hassan, a tertiary care center, handles approximately **12,647 blood donations annually**, yet **local data on HBV prevalence is limited**. Understanding seroprevalence in this population is vital to guide **blood safety policies, donor recruitment strategies, and public health interventions**.

This study aimed to determine the **seroprevalence of HBV among voluntary and replacement blood donors at HIMS, Hassan**, and analyze associations with age, gender, and donor type to inform effective transfusion safety and vaccination strategies.

## METHODS AND METHODOLOGY

### Study Design

This was a **retrospective cross-sectional study** conducted at the blood bank of **Hassan Institute of Medical Sciences (HIMS), Hassan**, to determine the seroprevalence of Hepatitis B virus infection among blood donors.

### Study Period

The study reviewed records of all blood donors from **August 2024 to July 2025**.

### Study Population

The study included **all voluntary and replacement blood donors** who met the **eligibility criteria outlined by WHO and NACO (National AIDS Control Organisation) guidelines**. Donors deferred due to medical conditions, recent infections, high-risk behaviors, or other contraindications were excluded.

The **total number of donors** during the study period was **12,647**.

### Sample Size

As this was a **retrospective study**, the sample size consisted of **all eligible donors** during the study period, in accordance with WHO and NACO guidelines. Therefore, no separate sample size calculation was required.

### Data Collection

Demographic and laboratory data were extracted from blood bank records using a **structured data collection proforma**. Variables collected included:

- Age
- Gender
- Donor type (voluntary or replacement)
- HBsAg test results

### Screening and Testing

All donors had been screened for **Hepatitis B surface antigen (HBsAg)** using **enzyme-linked immunosorbent assay (ELISA)** or **chemiluminescence immunoassay (CLIA)** kits approved by national regulatory authorities. Samples that tested positive were **re-tested for confirmation** as per standard blood bank protocols.

### Data Analysis

Data were entered into **Microsoft Excel** and analyzed using **SPSS version 25.0**.

- **Descriptive statistics:** Used to calculate the frequency and percentage of HBsAg positivity.
- **Inferential statistics:** Chi-square test was used to assess associations between HBV seropositivity and demographic variables (age, gender, donor type).
- A **p-value <0.05** was considered statistically significant.

### Ethical Considerations

The study protocol was approved by the **Institutional Ethics Committee of HIMS, Hassan**.

- Since the study was retrospective, **no direct consent from donors** was required.
- Confidentiality of donor information was strictly maintained, and all data were anonymized for analysis.

## RESULTS

**Table 1. Demographic Distribution of Donors (n = 12,647)**

CHARACTERISTICS	NUMBERS	PERCENTAGE(%)
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Total donors	12,647	100
MALE	10338	81.7
FEMALE	2309	18.3
18-25	3267	25.8
26-35	4067	32.1
36-45	2858	22.6
46-55	1763	13.9
>55	697	5.6

Table 2. Overall Seroprevalence of HBsAg

TOTAL DONOR	HBsAg positive	HBsAg negative	Prevelence(%)
12647	152	12495	1.2

Table 3. Seroprevalence by Gender

Gender	TOTAL	HBsAg positive	Prevelence(%)
Male	10338	132	1.28
female	2309	20	0.87

Table 4. Seroprevalence by Age Group

Age (YRS)	TOTAL	HBsAg positive	Prevelence (%)
18-25	3267	37	1.13
26-35	4067	62	1.53
36-45	2858	34	1.19
46-55	1763	12	0.68
>55	697	7	1.00

Table 5. Seroprevalence by Donor Type

Donor type	TOTAL	HBsAg positive	Prevelence (%)
Voluntary	6845	67	0.98
replacement	5802	85	1.47

## DISCUSSION

This study demonstrates an **HBsAg seroprevalence of 1.20%** among blood donors at HIMS, Hassan, which is consistent with previously reported prevalence in India (0.91%–1.6%) [1–6]. These findings indicate that HBV infection continues to circulate in the population, though the trend appears to be declining due to vaccination and improved screening practices.

**Gender-wise analysis** showed higher seropositivity in males (1.28%) compared to females (0.87%), in line with previous studies from North and Central India [3,4]. This may be attributed to a larger proportion of male donors, higher occupational exposure, and behavioral risk factors. Female donors are fewer in number and often demonstrate lower risk profiles.

**Age distribution** indicated that donors aged 26–35 years had the highest prevalence (1.53%), corroborating findings of Raina et al. and Kaur et al. [5,6]. Young adults may have higher exposure risks due to lifestyle and occupational factors, while the lower prevalence in older age groups might reflect cumulative immunity from vaccination or natural infection.

**Donor type** analysis revealed slightly higher seroprevalence in **replacement donors (1.47%)** compared to voluntary donors (0.98%). Replacement donors often come from family/friend networks and may underreport risk factors, whereas voluntary donors are typically pre-screened and educated about eligibility, as observed in other Indian studies [1,2]. This underscores the importance of promoting voluntary blood donation to enhance transfusion safety.

Despite routine screening, the persistence of HBsAg-positive donors highlights the **residual risk of transfusion-transmitted HBV**. Screening using ELISA/CLIA remains effective but may miss cases in the **window period** or **occult infections** [7–9]. Incorporation of **NAT testing** could further reduce this risk but remains limited by cost and infrastructure.

The study findings reinforce the importance of **continuous surveillance, strengthening donor education, improving vaccination coverage, and employing highly sensitive screening techniques**. Regional data like this also assists policymakers in prioritizing high-risk populations for preventive interventions.

Comparisons with other Indian studies show similar prevalence trends: Sharma et al. reported 1.1% HBsAg positivity in North India [1]; Singh et al. observed 1.3% in Central India [2]; Reddy et al. reported 1.2% in Hyderabad [5]. The findings

from HIMS, Hassan, are thus consistent with the broader Indian context, reflecting effective but ongoing challenges in HBV control.

## CONCLUSION

The **HBsAg seroprevalence among blood donors at HIMS Hassan is 1.20%**, with higher rates in males, young adults, and replacement donors.

Despite stringent screening, **HBV-positive donors pose a continued risk** for transfusion-transmitted infections.

**Limitations:** Retrospective design, single-center data, testing limited to HBsAg without NAT confirmation or assessment of occult infections.

## Future Directions:

- Multicentric studies to assess broader regional prevalence
- Incorporation of NAT and advanced screening for early detection
- Enhanced public awareness, vaccination campaigns, and promotion of voluntary blood donation

Continuous surveillance and preventive strategies are essential to ensure **safe blood transfusions** and reduce HBV transmission in the community [1–10].

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