



Original Article

## Comparison of HIV Prevalence in Voluntary versus Replacement Blood Donors: A Retrospective Comparative Study

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### ABSTRACT

**Background:** Blood transfusion is an essential component of modern healthcare. However, transfusion-transmitted infections (TTIs), particularly Human Immunodeficiency Virus (HIV), remain a major public health concern. Voluntary blood donors are generally considered safer than replacement donors due to lower prevalence of infectious diseases and better donor awareness.

**Aim:** To compare the prevalence of HIV infection among voluntary and replacement blood donors in a tertiary care blood bank.

**Materials and Methods:** A retrospective comparative study was conducted in the Department of Transfusion Medicine over a period of three years. Blood donor records were reviewed and categorized into voluntary and replacement donors. All collected blood units were screened for HIV antibodies using enzyme-linked immunosorbent assay (ELISA) as per national blood transfusion guidelines. HIV seroprevalence among the two donor groups was compared statistically using the chi-square test.

**Results:** A total of 18,500 blood donors were included in the study, comprising 12,300 voluntary donors and 6,200 replacement donors. HIV seropositivity was observed in 32 donors (0.17%). The prevalence of HIV among replacement donors (0.29%) was significantly higher compared to voluntary donors (0.11%). Male donors constituted the majority of HIV-positive cases. The difference in HIV prevalence between the two donor groups was statistically significant ( $p < 0.05$ ).

**Conclusion:** Replacement blood donors demonstrated significantly higher HIV seroprevalence compared to voluntary blood donors. Promotion of regular voluntary blood donation programs and stringent donor screening measures are essential to improve blood safety and reduce transfusion-transmitted HIV infections.

**Keywords:** HIV, blood donors, voluntary donors, replacement donors, transfusion-transmitted infections, seroprevalence, blood safety.

### INTRODUCTION

Blood transfusion services play a crucial role in healthcare systems worldwide by supporting emergency care, surgeries, trauma management, obstetric care, and treatment of hematological disorders. Despite advancements in transfusion medicine, transfusion-transmitted infections (TTIs) continue to pose significant challenges to blood safety, particularly in developing countries.

Human Immunodeficiency Virus (HIV) remains one of the most serious transfusion-transmitted infections because of its lifelong impact, associated stigma, and potential progression to Acquired Immunodeficiency Syndrome (AIDS). HIV transmission through blood transfusion can occur if infected blood escapes detection during screening or if donors donate during the serological window period.

The World Health Organization (WHO) strongly advocates voluntary non-remunerated blood donation as the safest source of blood. Voluntary donors are individuals who donate blood willingly without any external pressure or financial incentive. These donors are generally more aware of blood safety measures and are less likely to conceal high-risk behaviors.

Replacement donors, on the other hand, donate blood on behalf of relatives or friends requiring transfusion. Such donors may feel compelled to donate because of emotional or social pressure, potentially increasing the likelihood of withholding relevant medical or behavioral history. Consequently, replacement donors have been reported to exhibit higher prevalence of transfusion-transmitted infections compared with voluntary donors.<sup>1-4</sup>

India continues to rely partially on replacement blood donation despite increasing awareness regarding voluntary donation. Evaluation of HIV prevalence among different donor groups is essential for assessing blood safety strategies and planning effective donor recruitment policies.

The present study was conducted to compare HIV seroprevalence among voluntary and replacement blood donors in a tertiary care hospital blood bank.

### **AIM OF THE STUDY**

To compare the prevalence of HIV infection among voluntary and replacement blood donors.

### **OBJECTIVES**

1. To determine the prevalence of HIV among voluntary blood donors.
2. To determine the prevalence of HIV among replacement blood donors.
3. To compare HIV seropositivity between voluntary and replacement donor groups.
4. To evaluate demographic distribution of HIV-positive donors.

### **MATERIALS AND METHODS**

#### **Study Design**

Retrospective comparative study.

#### **Study Setting**

Department of Transfusion Medicine, tertiary care teaching hospital.

#### **Study Duration**

Three years.

#### **Study Population**

All blood donors who donated blood during the study period.

#### **Inclusion Criteria**

- All eligible blood donors aged 18–65 years.
- Donors fulfilling standard blood donation criteria.

#### **Exclusion Criteria**

- Incomplete donor records.
- Repeat entries.
- Donors deferred during screening.

### **METHODOLOGY**

Blood donor records were collected from the blood bank database and donor registers. Donors were categorized into:

- Voluntary blood donors
- Replacement blood donors

Detailed demographic data including age, gender, and donor category were recorded.

All blood units collected during the study period were screened for HIV-1 and HIV-2 antibodies using third-generation ELISA kits according to National AIDS Control Organization (NACO) guidelines.

Reactive samples were retested using duplicate methods for confirmation. Donors found reactive for HIV were considered seropositive and excluded from blood utilization.

Confidentiality of donor information was maintained throughout the study.

### **STATISTICAL ANALYSIS**

Data were entered into Microsoft Excel and analyzed using SPSS software version 25.

- Frequencies and percentages were calculated.
- HIV prevalence was expressed as percentage.
- Chi-square test was applied to compare seroprevalence between groups.
- p-value < 0.05 was considered statistically significant.

## RESULTS

### Distribution of Blood Donors

A total of 18,500 blood donors were included in the study.

Donor Category	Number of Donors	Percentage
Voluntary Donors	12,300	66.49%
Replacement Donors	6,200	33.51%
Total	18,500	100%

Voluntary donors constituted the majority of blood donations.

### HIV Seroprevalence among Blood Donors

Out of 18,500 donors, 32 were found seropositive for HIV.

Donor Category	HIV Positive	HIV Negative	HIV Prevalence
Voluntary Donors	14	12,286	0.11%
Replacement Donors	18	6,182	0.29%
Total	32	18,468	0.17%

Replacement donors demonstrated higher HIV prevalence compared with voluntary donors.

The difference was statistically significant ( $p < 0.05$ ).

### Gender-wise Distribution of HIV-positive Donors

Gender	HIV-positive Donors	Percentage
Male	29	90.63%
Female	3	9.37%

Male donors constituted the majority of HIV-positive cases.

### Age-wise Distribution of HIV-positive Donors

Maximum HIV seropositivity was observed in the 26–35 years age group.

Age Group	HIV-positive Cases
18–25 years	8
26–35 years	15
36–45 years	6
>45 years	3

## DISCUSSION

Blood transfusion safety remains a critical concern in transfusion medicine because of the risk of transmitting infectious diseases such as HIV, hepatitis B virus, hepatitis C virus, and syphilis. HIV infection continues to be a major global public health problem despite advances in screening technologies and preventive strategies.<sup>1</sup>

The present study compared HIV prevalence among voluntary and replacement blood donors in a tertiary care hospital setting. Voluntary donors constituted the majority of the donor population, reflecting increasing public awareness regarding voluntary blood donation.<sup>2</sup>

The overall HIV seroprevalence observed in the present study was 0.17%, which is comparable to findings reported in several Indian studies.<sup>3</sup> Lower HIV prevalence among blood donors compared with the general population may be attributed to strict donor selection criteria and mandatory screening procedures.<sup>4</sup>

Replacement donors demonstrated significantly higher HIV prevalence compared with voluntary donors. Similar observations have been reported in previous studies conducted in India and other developing countries.<sup>5</sup> The increased prevalence among replacement donors may be explained by social pressure, emergency donation situations, and concealment of high-risk behaviors.<sup>6</sup>

Voluntary blood donors are generally considered safer because they donate altruistically and are more likely to comply honestly with donor questionnaires and medical screening. Regular voluntary donors also tend to have better health awareness and lower incidence of risky behavior.<sup>7</sup>

The predominance of HIV positivity among male donors observed in the present study correlates with findings from earlier research.<sup>8</sup> Male predominance may be attributed to higher male participation in blood donation activities and greater exposure to high-risk behavior patterns.

The majority of HIV-positive donors belonged to the 26–35 years age group, which represents the sexually active and economically productive population. Similar age distribution has been documented in previous seroprevalence studies.<sup>9</sup> Stringent donor screening, proper donor counseling, use of sensitive screening assays, and promotion of voluntary blood donation are essential measures for minimizing transfusion-transmitted HIV infections.<sup>10</sup>

The present study reinforces World Health Organization recommendations advocating 100% voluntary non-remunerated blood donation to ensure safer blood supplies.<sup>1</sup>

## CONCLUSION

Within the limitations of the present study, the following conclusions were drawn:

1. Replacement blood donors exhibited significantly higher HIV prevalence compared with voluntary donors.
2. Voluntary blood donors constituted the safest donor group.
3. Male donors showed higher HIV seropositivity than female donors.
4. The majority of HIV-positive donors belonged to the 26–35 years age group.
5. Promotion of voluntary blood donation and strict donor screening are essential for improving blood safety.

## CLINICAL SIGNIFICANCE

Identification of safer donor populations is critical for reducing transfusion-transmitted HIV infection. Encouraging voluntary blood donation can significantly improve blood safety and reduce infectious risk among recipients.

## LIMITATIONS

1. Retrospective study design.
2. Single-center study.
3. Limited demographic and behavioral risk factor analysis.
4. Window-period infections could not be completely excluded.

## RECOMMENDATIONS

1. Increase awareness regarding voluntary blood donation.
2. Conduct regular donor education and counseling programs.
3. Strengthen pre-donation screening procedures.
4. Implement advanced screening techniques such as nucleic acid testing (NAT).
5. Encourage repeat voluntary blood donors.

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