

# Seroprevalence of human immunodeficiency virus infection among whole blood donors at Sheri Kashmir Institute of Medical Sciences, Soura Srinagar



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## ABSTRACT

**Background:** Blood transfusion has become a specialized modality of patient management and every year saves the millions of lives. However, it is not always safe and may lead to many life threatening complications among which transfusion-transmitted infections (TTIs) such as hepatitis and human immunodeficiency virus (HIV) are most significant and detrimental for the recipients. Hence, an integrated strategy for blood safety is required for the elimination of TTIs and or provision of safe and adequate blood transfusion services to the people. **Aims and Objectives:** To assess the seroprevalence of HIV infections among whole blood donors at Sheri Kashmir Institute of Medical Sciences (SKIMS), Soura, Srinagar. **Materials and Methods:** This was a hospital-based study carried in the postgraduate department of blood transfusion and immunohematology SKIMS, Soura, Srinagar over a period of 7 years from January 2015 to December 2021. All donor samples were screened for HIV by the ELISA method. **Results:** Overall, seroprevalence of HIV was found to be 0.013%. All the positive cases were male donors. Seroprevalence was the highest among replacement donors (0.011%) as compared to voluntary donors (0.001 %). **Conclusion:** It is very important to continue the screening of donated blood with highly sensitive and specific tests and to counsel donors who are reactive to any of the infectious diseases (like HIV, hepatitis B virus, HCV, syphilis, or malaria) and conduct extensive public awareness programs and measures to make transfusion of blood and blood components safe.

**Key words:** Blood transfusion; Transfusion transmitted infections; Seroprevalence

## INTRODUCTION

Blood transfusion is a life-saving intervention and millions of lives are saved each year globally through this procedure.<sup>1</sup> However, blood transfusion is not always safe and may lead to many life-threatening complications among which transfusion transmitted infections (TTIs) such as human immunodeficiency virus (HIV), hepatitis, syphilis, and malaria are most significant and detrimental for the recipients. Less frequently toxoplasmosis, brucellosis, and

some other viral infections such as Epstein–Barr virus, cytomegalovirus, and herpes virus can be transmitted through blood transfusion.

Morbidity and mortality resulting from transfusion of infected blood have far reaching consequences; not only for the recipient, but also for their families, their communities and the wide society.<sup>2,3</sup> Government of India has made it mandatory to screen every unit of donated blood for hepatitis B virus (Since 1971), HIV (since 1989) and HCV

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(since 2001) to prevent spread of TTIs through blood transfusion.<sup>4,5</sup> However, risk of transmission of these infections remains still there because of the inability of the test to detect the disease in the pre-seroconversion or “window” phase of their infection, immunologically variant viruses, non-seroconverting chronic or immunosilent carriers, and inadvertent laboratory testing errors.

TTIs is still a major concern to patients, physicians, and policy-makers who wish to see a risk-free blood supply.<sup>1</sup>

According to the WHO, HIV continues to be a major global public health issue, having claimed 40.1 million (33.6–48.6 million) lives so far. Globally 38.4 million (33.9–43.8 million) people were living with HIV at the end of 2021.<sup>6</sup> Although the HIV burden continues to vary between countries and regions, the WHO African region remains most severely affected with nearly 1 in every 25 adults (3.4%) living with HIV and accounting for more than two thirds of the people living with HIV worldwide.<sup>7</sup> India harbors the third largest number of HIV infected individuals in the world, carrying a burden of 2.27 million of HIV cases.<sup>8,9</sup>

There is no cure for HIV infection, meticulous pretransfusion testing and screening for TTI is the need off the hour. Only continuous improvement and strict implementation of donor selection rules, newer and more sensitive screening tests and effective inactivation procedures can ensure the elimination or at least reduction of the risk of acquiring TTIs.<sup>2</sup>

Therefore, we carried out this study to assess the prevalence of HIV infection among whole blood donors to get the vital information about the safety associated with blood transfusion and to reveal the magnitude of problem of this unnoticeable serious infection in healthy looking members of the general population. Besides, it would help in formulating the strategies for the management of a safe blood supply.

### Aims and objectives

To assess the seroprevalence of HIV infections among whole blood donors at Sheri Kashmir Institute of Medical Sciences (SKIMS), Soura, Srinagar.

## MATERIALS AND METHODS

The present study was carried out in the postgraduate department of blood transfusion and immunohematology at SKIMS, Soura, Srinagar, over a period of 7 years from January 2015 to December 2021.

All allogeneic whole blood donors donating in the blood bank of the Department and in the voluntary

blood donation camps (both in-house and outside) were included in the study. Apheresis collections were not included. No professional donors were selected for donation.

Blood donors included in the study were screened by the medical officer on duty. A preexisting blood donor questionnaire and consent form were filled by each donor or by the donor clinic staff. Strict adherence to departmental standard operating procedures and National Guidelines under Drugs and Cosmetics Act 1945 and National AIDS control organization (NACO), Ministry of Health and Family Welfare. Govt. of India was maintained while screening the blood donors. Donors who did not qualify the guidelines were excluded.

A total of 76,188 donors donated blood during the study period. All samples were tested for presence of seromarkers of TTIs. Till 2020, HIV-1 and 2 antibodies were tested by using the 3<sup>rd</sup> generation Erba Lisa ELISA kits supplied by Transasia Bio-Medicals Ltd. From 2020 onwards, HIV-1 and 2 antibodies were tested by using the 4<sup>th</sup> generation Merilisa HIV ELISA kits supplied by Meril Diagnostics. The kits used were all NACO approved and standard protocols were followed. All the reactive samples were discarded as per standard protocols. Counselling at integrated counselling and testing Centre was given to all the positive (reactive) donors who were advised to start treatment and take precautions by which spreading of infection can stop.

## RESULTS

The present study is a hospital-based study. During this 7-year study period, a total of 76,188 donors donated blood. There were 14.80% (11,277) donors in the year 2015, 14.61% (11,135) donors in the year 2016, 14.98% (11,419) donors in the year 2017, 14.64% (11,158) donors in the year 2018, 13.83% (10,543) donors in the year 2019, 12.31% (9,386) donors in the year 2020, and 14.79% (11,270) donors in the year 2021. The decreasing number of blood donors during the year 2020 was attributed to COVID-19 pandemic.

Among these 76,188 donors, 98.45% (75,011) donors were males and only 1.55% (1,177) were females. Reason for a lesser percentage of female donors can be attributed to ignorance, fear, lack of awareness, and prevalence of anemia in them.

Out of total 76,188 donors, only 30.37% (23,145) were replacement donors and 69.62% (53,043) were voluntary blood donors, as shown in Table 1.

**Table 1: Demographic distribution of blood donors screened for a period of 7 years**

Year	Total no. of blood units collected (%)	No. of male donors (%)	No. of female donors (%)	No. of voluntary donors (%)	No. of replacement donors (%)
2015	11277 (14.80)	111079 (14.57)	170 (0.22)	8916 (11.70)	2361 (3.09)
2016	11135 (14.61)	10938 (14.35)	197 (0.25)	8442 (11.08)	2693 (3.53)
2017	11419 (14.98)	11161 (14.64)	258 (0.33)	7466 (9.79)	3953 (5.18)
2018	11158 (14.64)	10945 (14.36)	213 (0.27)	7058 (9.26)	4100 (5.38)
2019	10543 (13.83)	10420 (13.67)	123 (0.16)	7267 (9.53)	3276 (4.29)
2020	9386 (12.31)	9292 (12.19)	94 (0.12)	6166 (8.09)	3220 (4.22)
2021	11270 (14.79)	11148 (14.63)	122 (0.16)	7728 (10.14)	3542 (3.54)
Total	76188 (100)	75011 (98.45)	1177 (1.55)	53043 (69.62)	23145 (30.37)

**Table 2: Seroprevalence of HIV infection among male and female blood donors screened for a period of 7 year**

Year	Total no. of male donors	HIV-positive male donors (%)	Total no. of female donors	HIV-positive female donors (%)	Total no. of blood units collected	Total no. of HIV-positive cases (%)
2015	111079	00 (00)	170	00 (00)	11277	00
2016	10938	00 (00)	197	00 (00)	11135	00
2017	11161	02 (0.017)	258	00 (00)	11419	02 (0.0175)
2018	10945	02 (0.018)	213	00 (00)	11158	02 (0.0179)
2019	10420	02 (0.019)	123	00 (00)	10543	02 (0.0189)
2020	9292	03 (0.032)	94	00 (00)	9386	03 (0.0319)
2021	11148	01 (0.008)	122	00 (00)	11270	01 (0.008)
Total	75011	10 (0.001)	1177	00 (00)	76188	10 (0.013)

HIV: Human immunodeficiency virus

**Table 3: Seroprevalence of HIV infection among voluntary and replacement blood donors screened for a period of 7 year**

Year	Total no. of voluntary donors	HIV-positive voluntary donors (%)	Total no. of replacement donors	HIV-positive replacement donors (%)	Total no. of blood units collected	Total no. of HIV positive cases (%)
2015	8916	00	2361	00	11277	00
2016	8442	00	2693	00	11135	00
2017	7466	00	3953	02 (0.0505)	11419	02 (0.0175)
2018	7058	00	4100	02 (0.048)	11158	02 (0.0179)
2019	7267	00	3276	02 (0.061)	10543	02 (0.0189)
2020	6166	01 (0.016)	3220	02 (0.062)	9386	03 (0.0319)
2021	7728	00	3542	01 (0.028)	11270	01 (0.008)
Total	53043	01 (0.001)	23145	09 (0.038)	76188	10 (0.013)

HIV: Human immunodeficiency virus

Out of all 76,188 donors who donated blood during these 7 years, 0.013% (10/76,188) donors tested positive for HIV infection.

All the HIV positive or reactive blood donors were of male sex. No female HIV-positive blood donor was encountered during this study, as shown in Table 2.

Highest rate of HIV positivity was observed among replacement donors 0.011% (09/76, 188) as compared to voluntary donors 0.001% (01/76188), as shown in Table 3.

### Limitations of the study

Although the strength lies in the fact that data from a large number of cases is available, but the limitations lies in the fact that it is a hospitalbased study.

## DISCUSSION AND CONCLUSION

Each unit of blood is associated with 1% chance of TTIs and transfusion related complications.<sup>2,10</sup> One of the primary tools to determine the seroprevalence of various TTIs is serosurveys. Evaluation of serosurveys helps in estimating the safety and efficacy of blood and its products and also gives us an idea regarding epidemiology of these diseases in the community.<sup>2,11</sup> Screening for TTIs to exclude blood donations at risk of transmitting infections from donors to recipients is a critical part of the process of ensuring that transfusion is as safe as possible.<sup>2</sup>

WHO recommends an integrated strategy to improve blood transfusion safety by establishment of well-organized

blood transfusion services, blood collection from voluntary nonremunerated donors, screening of blood for at least four major TTIs with quality assured system and rational use of blood.<sup>1,12</sup>

A WHO report states that the viral dose in HIV transmission through blood is so large that one HIV positive transfusion leads to death, on an average, after 2 years in children and after 3–5 years in adults.<sup>13</sup> As per NACO, 3.5% of HIV infection is attributed to blood transfusion.<sup>14</sup>

There is wide variation in seroprevalence of HIV from different parts of India which could be attributed to use of different methods for testing and use of different generation of ELISA test kits, having different sensitivities and specificities. In our blood donor population (who are representatives of Srinagar region of Jammu and Kashmir State, the overall seroprevalence of HIV infection seen was 0.013% which is very less as compared to most of the studies reporting prevalence of HIV between 0 and 3.87%).<sup>15,16</sup> Although very less number of female donors 1.55% donated blood, none of them was found to be HIV positive. Highest rate of HIV positivity was observed among replacement donors (0.011%) compared to voluntary donors (0.001%) which is very encouraging.

In a study by Kaur et al.,<sup>15</sup> reported that the prevalence of HIV in Indian blood donors ranges from 0% to 3.87%.<sup>16</sup> In a report of NACO, India showed that an overall prevalence of HIV 0.91% in 2005, where men were more sufferers.<sup>17</sup> Manjunath and Samaga, found that seroprevalence of HIV were 0.27%.<sup>18</sup> Gupta et al., and Tiwari et al., reported 0.084% and 0.054% prevalence of HIV among blood donors respectively.<sup>3,19</sup> Makroo et al., reported a 0.247% HIV prevalence among their blood donor population.<sup>9</sup>

The prevalence of HIV reported in Indian blood donors ranges from 0.084% to 3.87%.<sup>16</sup> Four major blood banks in the capital jointly reported an overall HIV seroprevalence of 3.1 per thousand donors. HIV-1 constituted the major bulk (89.0%), HIV-2 was detected only in two cases (1.4%) and HIV-1/2 in 9.6% of the samples.<sup>20</sup> According to NACO, more men are HIV positive than women. Nationally, the prevalence rate for adult females is 0.29%, while that for males is 0.43%.<sup>21</sup>

Transmission of TTIs during the serologically window period still poses a threat to blood safety in environments where there is high rate of TTIs. Hence, to ensure the safety of blood for recipients, the recommendation is donor screening using the implementation of strict selection criteria as per the guidelines laid down for blood banks in the gazette notification by the Government of India and use of highly

sensitive and advanced techniques (like NAAT testing) for the detection of TTIs. Furthermore, reduce blood usage at minimum by rational use of blood and blood products and increasing blood donations from voluntary blood donors, it is possible to decrease the incidence of seropositivity of TTIs and improve the blood product safety.

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