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## Seroprevalence of HIV among blood donors in KIMS blood bank, Hubballi, Karnataka, a tertiary care hospital

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### Abstract

**Aim:** The aim of our study was to find out the seroprevalence of HIV among the blood donors.

**Materials and Methods:** A 9 years retrospective study was carried out in the blood bank of KIMS, Hubballi, Karnataka, from January 2007 to December 2015.

**Results:** A total of 80312 apparently healthy donors were analyzed for prevalence of HIV of which 50735 (63.17%) were replacement donors and 29577 (36.83%) were voluntary donors. The overall prevalence of HIV among donors was 283(0.35%) cases.

**Conclusion:** Availability of safe blood is a must for the recipients and the community as well. This can be achieved by vigorous screening of donors and proper HIV testing of donor's blood by using standard methods such as Enzyme Linked Immuno-Sorbent Assay (ELISA) and Nucleic Acid Amplification technique (NAT) is highly recommended to ensure safety for recipient.

**Keywords:** Blood donors, HIV, seroprevalence, blood transfusion

### Introduction

Blood transfusion is a medical therapeutic act, but it also creates the risk of blood transmitting infectious agents in recipients despite advances in blood safety. Therefore, it is essential to detect these infectious agents to prevent transmission. Routine screening for Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and Treponema pallidum on all donated blood and blood collection are among the four major elements of the strategy adopted by WHO in blood safety<sup>[1]</sup>.

Increase demanding for blood transfusion facilities may be due to multifactorial causes of anemia such as infection, malnutrition, and traumas associated with acute blood loss. Blood transfusions can save lives and recover the health, but also increases the risk of blood-borne infections especially HIV to the recipients<sup>[2]</sup>.

HIV infection resulting from blood transfusion has been documented repeatedly since the first case report from the United States in late 1982. The problems of transfusion associated acquired immunodeficiency syndrome resulted in a notification in 1989 under the Drugs and Cosmetics Act which made the test for HIV mandatory<sup>[3]</sup>.

According to the United Nations Joint Program on HIV/AIDS (UNAIDS), at the end of 2010, an estimated 34 million people with AIDS living within the world. India harbours the third largest number of HIV infected individuals in the world<sup>[3]</sup>.

Human immunodeficiency virus (HIV) is a Lentivirus, a member of the retrovirus family that can lead to acquired immunodeficiency syndrome (AIDS) a condition in humans in which the immune system begins to fail, leading to life threatening opportunistic infections<sup>[4]</sup>.

The four main routes of transmission of HIV are through blood and blood products, contaminated needles, unprotected sexual intercourse, and mother to child transmission. The virus infects cells bearing the CD4 antigen receptor, the most important being T-lymphocytes. These cells regulate cellular and humoral immunity by interacting with other T lymphocytes, B lymphocytes, macrophages and natural killer cells<sup>[4]</sup>.

In 1981, a new disease was detected. In 1984, it was confirmed to be caused by a unique retrovirus and was confirmed to be the cause of acquired immunodeficiency syndrome in 1985. In 1985- 1986, HIV infection was first reported in India in a commercial sex worker in the erstwhile Madras. In 1989, HIV was reported in an intravenous drug user in Manipur.

There are six high-prevalence states, namely Tamil Nadu, Karnataka, Maharashtra, Andhra Pradesh, Manipur, and Nagaland. High-risk groups include commercial sex workers, intravenous drug users, and men having sex with men. (Pradhan) Several States in India have now reported the presence of HIV-2 after the first case was reported from Mumbai in 1991 [3].

India has a population of over 1 billion. According to a fact sheet 2008 update, the total number of adults and children estimated to be living with human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) is between 1.8 and 3.2 million in India, which is much less than the estimate in 2003, which was over 5 million cases. This decline over time is due to the efforts of both government and non-government organizations, besides a more robust model of estimating the burden of HIV.

The National AIDS Control Organization was set up in 1992 to carry out an HIV/AIDS prevention, control, and surveillance program effectively. The agenda was set up in three phases. The first phase in 1992-1999 concentrated on blood safety, high-risk groups, increasing awareness, and improving surveillance. The second phase, which ended in 2006, concentrated on providing more responsibility to the states for prevention and targeted intervention for high-risk groups and phase 3 of the program involves building on the foundation of phases 1 and 2 toward more effective measures of prevention and control. Commercial sex workers are responsible for the majority of HIV transmission in India.

National AIDS Control Organization (NACO) estimates 86% transmission is due to sexual risk, 2.4% due to intravenous drug users, 2.0% due to blood and blood products, and 3.6% due to perinatal transmission. In 1989, HIV testing was made mandatory in all blood banks in India [5].

Several methods are available for the detection of HIV which detect the presence of anti-HIV antibody or the HIV antigen or both. Recently, nucleic acid based tests which are either PCR or transcription mediated amplification to detect the viral nucleic acid have been introduced for blood donor screening [7]. The specialized rapid assays and the Western blot are two commonly used assays which differentiate between HIV-1 and HIV-2 [4].

**Materials and Methods**

A 9 years retrospective study was carried out in the blood bank of Karnataka Institute of Medical Sciences (KIMS), Hubballi, Karnataka, from January 2007 to December 2015. A detailed pre donation questionnaire was included in the donor registration form. Information regarding occupation, previous surgery, hospitalization, tattoo marks and high risk behaviour was obtained. According to regulations, haemoglobin levels had to be above 12.5 gm%, weight above 45kg, age between 18 to 60 years. A consent was taken from every donor. From the donor's blood units, 5 ml blood samples were obtained for serological testing. All the samples were screened for HIV by ELISA. Kits used for rapid test was Meriscreen HIV 1-2 WB and the tests were done as per the guidelines in the blood bank, Karnataka Institute of Medical Sciences (KIMS), Hubballi, Karnataka.

**Results**

A total of 80312 apparently healthy donors were analyzed for prevalence of HIV of which 50735 (63.17%) were replacement donors and 29577 (36.83%) were voluntary donors. Among them, 77306 (96.26%) were males and 3006 (3.74%) were females as shown in Table 1.

**Table 1:** Year Wise distribution of Voluntary/Replacement and Male/Female donors, from 2007-2015.

Year	Voluntary Donors	Replacement Donors	Male Donors	Female Donors	Total Donors
2007	3402	5058	8089	371	8460
2008	2991	5385	8042	334	8376
2009	2523	7980	10248	255	10503
2010	2454	6063	8251	266	8517
2011	3349	5371	8410	310	8720
2012	5012	4202	8847	367	9214
2013	3258	5167	8078	347	8425
2014	3603	5057	8294	366	8660
2015	2985	6452	9047	390	9437
Total	29577 (36.83%)	50735 (63.17%)	77306 (96.26%)	3006 (3.74%)	80312

**Table 2:** Seroprevalence of HIV among blood donors.

Year	Total tested	HIV +ve (%)
2007	8460	34 (0.4)
2008	8376	33 (0.4)
2009	10503	34 (0.3)
2010	8517	51 (0.6)
2011	8720	32 (0.37)
2012	9214	43 (0.47)
2013	8425	23 (0.27)
2014	8660	21 (0.24)
2015	9437	12 (0.1)
Total	80312	283 (0.35)

The overall seroprevalence of HIV was 283 cases (0.35%) as shown in Table 2.

**Table 3:** Percentage distribution of HIV in Voluntary and Replacement blood donors.

TTI	Voluntary donors (%)	Replacement donors (%)	Total
HIV	56(19.8)	227(80.2)	283

The overall prevalence of HIV was more among replacement donors (227, 80.2%) when compared to voluntary donors (56, 19.8%) as shown in Table 3.

**Table 4:** Percentage distribution of HIV in Male and Female donors

TTI	Male donors (%)	Female donors (%)	Total (%)
HIV	278 (98.3)	5 (1.7)	283

The overall prevalence of HIV was more among male donors compared to female donors as shown in Table 4. Seroprevalence in males was 98.3% as against 1.7% in females, and this difference was statistically significant (P<0.05) as shown in Table 4. The majority of HIV-positive cases were in the age group of 31-40 years; however, the difference in the prevalence of HIV according to age group was not statistically significant (P>0.05).

**Discussion**

Blood transfusion has been used since 1930 for various indication. Screening of blood donors first started in 1947 [6]. Blood transfusion is considered as a potential risk factor for transmission of viruses which are considered to be life-threatening and have a global public health importance such as HIV.

The median prevalence rates of transfusion- transmissible infections in blood donations in high-income countries are considerably lower than in middle- and low-income countries. The median prevalence rate of HIV in blood donations in high- income countries is 0.001% in comparison with 0.06% and 0.5% in middle- and low-income countries respectively [7].

In this study, the overall prevalence of HIV infection was 283 (0.35%) cases but showed a decreasing trend from 2007 to 2015. A decreasing trend in HIV seroprevalence among blood donors was also reported from Kathmandu, Nepal and West African country, Mali [8]. There can be many reasons for it. Over the years, awareness of spread of HIV might have improved among the population, making voluntary blood donors with risk behaviour abstain from donating blood. Secondly, better training and awareness of health workers at blood banks may be effective in screening out those with high risk of HIV by simple questionnaires administered to prospective blood donors. The increase in seroprevalence in some years may be due to the blood donors being from high-risk groups. This implies that the selection of voluntary blood donors from high- risk groups (multiple sex partners, intravenous drug abuse and unprotected sexual intercourse) should be avoided, which

will reduce costs, efforts, and wastage of blood [5].

The seroprevalence of HIV in blood donors from different parts of India and within Karnataka are given in Table 5 and Table 6. The prevalence of HIV is lower when compared to study done by Kamarkar PR *et al.* [7] but higher when compared to studies done by Doley N *et al.* [9], Patel PJ *et al.* [11], Kumari S *et al.* [10], Bindu CB *et al.* [21], Prakash P *et al.* [22]. Such differences in seroprevalence rate among various Indian studies might be due to geographical variation, condition of epidemic, donor selection criteria and by performance characteristics of test kits as well as diagnostic algorithms used in each study [24].

In present study the seroprevalence of HIV infection in replacement donors was higher than voluntary donors. This emphasizes the importance of repeat, non-remunerated, regular voluntary donations. Promotion of voluntary donations would further reduce the risk of both single as well as co-infections. Hence, the emphasis should be to maximize voluntary blood donations so as to minimize the risk of TTI in accordance with the National Blood Policy of India [12].

The seroprevalence of HIV was more in male donors than female donors in this study. Heterosexual promiscuity seems to be the only cause of higher seropositivity in males who usually visit the “hot spots” areas where commercial sex work is common, such as in coastal Andhra Pradesh, Northern Karnataka and Southern Maharashtra . Hence predonation counselling of blood donors and seeking the history of high risk behavior aids in preventing the infective e donors entering the blood donation [22].

**Table 5:** Comparative study showing seroprevalence of HIV in different regions of India.

Regions	Study	HIV	Author	Year
Eastern India	Kolkata	0.60%	Karmakar PR <i>et al.</i> [7]	2014
	Kolkata	0.08%	Doley N <i>et al.</i> [9]	2017
	Jharkhand	0.21%	Kumari S <i>et al.</i> [10]	2017
Western India	Gujarat	0.14%	Patel PJ <i>et al.</i> [11]	2014
	Maharashtra	0.24%	Kalpana RS <i>et al.</i> [12]	2017
	Gujarat	0.095%	Modi GB [13]	2018
Central India	Gwailor	0.13%	Sharma DC <i>et al.</i> [14]	2014
	Jabalpur	0.14%	Yadav BS <i>et al.</i> [15]	2016
Northern India	Bikaner	0.10%	Arya DR <i>et al.</i> [6]	2016
	Shimla	0.08%	Sachdeva A <i>et al.</i> [16]	2016
	Haryana	0.25%	Singh P <i>et al.</i> [17]	2017
	Meerut	0.11%	Swarup D <i>et al.</i> [18]	2018
South India	Madhurai	0.13%	Sundaramurthy R <i>et al.</i> [19]	2017
	Telangana	0.2%	Fathima A <i>et al.</i> [20]	2016
	Hassan	0.11%	Bindu CB <i>et al.</i> [21]	2018
Present study	Hubballi	0.35%	Sujata S Giriyan	2017

**Table 6:** Comparative study showing seroprevalence of TTI in different regions of Karnataka

Regions	HIV	Author	Year
Hassan	0.11%	Bindu CB <i>et al.</i> [21]	2018
Mysuru	0.26%	Prakash P <i>et al.</i> [22]	2016
Mandya	0.2%	Ahmed K <i>et al.</i> [23]	2015
Present study (North Karnataka)	0.35%	Sujata S Giriyan	2017

**Conclusion**

Availability of safe blood is a must for the recipients and the community as well. This can be achieved by vigorous

screening of donors and proper HIV testing of donor’s blood by using standard methods such as Enzyme Linked Immuno- Sorbent Assay (ELISA) and Nucleic Acid Amplification technique (NAT) is highly recommended to ensure safety for recipient. Apart from this for donor screening, other factors such as public awareness, vigilance of errors educational and motivational programs for both voluntary and replacement blood donors is sure to help in decreasing the infections.

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**Conflict of interest:** None declared

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