

## Original Research Article

# A study to evaluate the demographic profile of voluntary and replacement blood donors at tertiary care hospital in Mumbai, India: a 5-year retrospective comparative analysis

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## ABSTRACT

**Background:** Blood donor base is the foundation of any blood transfusion system. Donor screening plays an important role in ensuring the safety of the blood supply.<sup>1</sup> This study was undertaken with the aim to screen the blood donor's demographic profile as male, female voluntary and replacement blood donors and to estimate seroprevalence of HIV, HBV, HCV and VDRL transmissible by blood transfusion in voluntary and replacement male and female blood donors during the last 5 year period.

**Methods:** The present study was conducted over a period of 5 years (2001-2005) and involved 1,53,020 blood donors including both (voluntary, replacement males and females) who were thoroughly screened and selected for blood donation in blood bank at Departments of Pathology, Seth GS Medical College and KEM hospital, Mumbai. We determine among blood donors by their donor type (voluntary and replacement type) and gender wise.

**Results:** The total number of blood donors in five years period was 1,53,020 (100%). Maximum number of voluntary blood donors 1,00,316 (65.55%), followed by replacement blood donors 52,704 (34.33%). The overwhelming majority of donors in entire 5 years period was of male, comprising 1,36,195 (89.0%), while the female donors comprised of 16825 (10.99%).

**Conclusions:** The maximum number of donors are voluntary males (55.69%) followed by replacement males (33.30%). Our results indicate that the number of female blood donors were less in comparison to male blood donors, so proper health education is required for female blood donors.

**Keywords:** Retroperitoneal, Teratoma, Adolescent

## INTRODUCTION

Blood safety begins with a healthy donor. Blood is one of the most complex fluids and equally valuable for the existence, but this blood is also a very efficient means of transmitting infections. Blood transfusions will always carry certain risks, but infection transmission through blood transfusion can virtually be prevented. The high seroprevalence of numerous transfusion-transmitted infectious (TTI) diseases such as human

immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV) and syphilis in India affects the safety of blood for recipients. WHO recommends that all blood donations should be screened for infections prior to use. Screening should be mandatory for HIV, hepatitis B, hepatitis C and syphilis. Blood screening should be performed according to the quality system requirements.<sup>1</sup>

Blood transfusion saves lives and improves health, but many patients requiring transfusion do not have timely

access to safe blood. Blood should be screened for the presence of diseases causing viruses, bacteria, or other microorganisms, or for the presence of antibodies produced against these agents. Screening of blood has to be done before transfusion to prevent from infection into recipient.<sup>2</sup>

Blood transfusion is a key part of modern health care. It is the responsibility of the national blood program to provide an adequate supply of blood for all patients requiring transfusion and to ensure the quality of blood and blood products for clinical use. All products must be safe, clinically effective and of appropriate and consistent quality.<sup>3</sup>

The global burden of disease due to unsafe blood transfusion can be eliminated or substantially reduced through an integrated strategy for blood safety. It is now desirable that blood meant for transfusion is screened for major and important infectious transmissible diseases in order to render safe blood transfusion services to the community. Some countries have made a remarkable improvement in the collection of voluntary and safe blood. China which in 1998 stood at 22% is now 94.5% while Malaysia has jumped from 50% to 99% in three years.<sup>4</sup>

**Aims and Objectives:** To estimate demographic profile of blood donors during 5 years period from 2001-2005. To estimate seroprevalence of selected blood transmissible diseases in groups of blood donors. To compare and evaluate seroprevalence of selected blood transmissible diseases in voluntary and replacement blood donors. To estimate and compare the blood donor's by type of donor and gender wise.

**METHODS**

In this article demographic profile of blood donors as male, female, voluntary and replacement blood donors has been captured and in subsequent publication the data on seroprevalence of HIV, HBV, HCV and syphilis (VDRL positive) and to determine their co-infectivity, if any, will be published.

**Study design and setting**

The present study was conducted over a 5 years period from January 2001 – December 2005, in a blood bank at Departments of Pathology, Seth GS Medical College and KEM hospital, Mumbai. The Data were obtained from January 2001 – December 2005 has been analyzed retrospectively from blood bank resources to find out seroreactivity rates and trends in different groups of blood donors. This is a retrospective study and the data were tabulated annually.

We determined the seroprevalence rate of human immunodeficiency virus (HIV), hepatitis B surface antigen (HBsAg), hepatitis C (HCV) and syphilis among blood donors by their type, gender and to determine association,

if any, in the occurrence of the pathogens. Also to determine the seroprevalence trends with in the 5 year period.

**Study population**

A total of 1,53,020 blood units were screened for HIV 1 and 2 antibodies, anti-HCV, HBsAg, and VDRL. Screening test of blood unit was done, as the primary objective is to ensure safe blood transfusion. The total number of donors were evaluated year wise for a period of 5 years and tabulated and documented year wise and also evaluated for total period of five years.

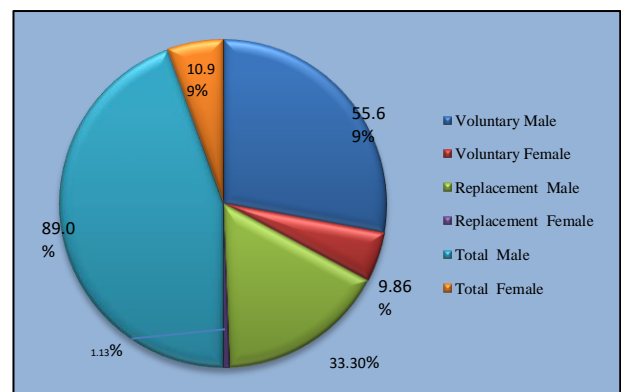
The study population of blood donors was divided in two groups as voluntary donors and replacement donors. A voluntary (non-remunerative) donor is one who is not paid for the donated blood and a replacement donor is again a non-remunerative donor who donates blood for a particular patient admitted in hospital. The replacement donors were family members, friends, or close relatives of the patient. In all these donors seroprevalence of all four diseases were estimated and compared year wise and also sex wise, both the group of donors are further divided into male and female donors. Care was taken to discourage and exclude professional donors and those with the history of jaundice by taking appropriate history and examination.

**Statistical analyses**

The result were analyzed by using SAS package utilizing version 9.1.3 and expressed as frequency, percentage, row percentage, and column percentage. Various statistical tests like chi square test, paired t test, fisher exact test were applied and the results were considered significant when the p value was less than 0.05.

**RESULTS**

Total number of blood donors in 5 years was 1,53,020 (100%). The overwhelming majority of donors in all years were of male, comprising 1,36,195 (89.0%), While the female donors comprised of 16825 (10.99%).



**Figure 1: Distribution of 1,53,020 blood donors by donor type and gender in 5 years.**

**Table 1: Distribution of 1,53,020 blood donors by donor type and gender in 5 years.**

Years	Voluntary donor		Replacement donor		Sub total		Total
	Male N (%)	Female N (%)	Male N (%)	Female N (%)	Male N (%)	Female N (%)	(M+F) N (%)
2001	17138 (55.13)	2634 (8.47)	78*9910960 (35.26)	349 (1.12)	28098 (90.40)	2983 (9.59)	31081 (20.31)
2002	16558 (53.58)	2801 (9.04)	11204 (36.18)	398 (1.28)	27762 (89.66)	3199 (10.33)	30961 (20.23)
2003	16816 (56.14)	3346 (11.17)	9444 (31.53)	343 (1.15)	26260 (87.68)	3689 (12.31)	29949 (19.57)
2004	18199 (57.70)	3167 (10.04)	9884 (31.33)	290 (0.91)	28083 (89.03)	3457 (10.96)	31540 (20.61)
2005	16514 (56.00)	3143 (10.65)	9478 (32.10)	354 (1.20)	25992 (88.14)	3497 (11.85)	29489 (19.27)
<b>Total</b>	85225 (55.69)	15091 (9.86)	50970 (33.30)	1734 (1.13)	136195 (89.0)	16825 (10.99)	1,53,020 (100)

**Table 2: Seroprevalence rates: male versus female blood donors.**

Year	Seropositive donors		Total donors screened	
	Male N (%)	Female N (%)	Male N (%)	Female N (%)
2001-2005	8505 (6.24)	641 (3.80)	1,36,195 (89.0)	16,825 (10.99)

**Table 3: Comparison of voluntary versus replacement blood donors.**

	Voluntary N (%)	Replacement N (%)	Total N (%)
Sonawane <sup>5</sup> Ambajogai (1996-2001)	4527 (36.98)	7713 (63.02)	12,240 (100)
Singh <sup>6</sup> Delhi (2000-2002)	13357 (17.6)	62732 (82.4)	76089 (100)
Garg, Jodhpur <sup>7</sup> Rajasthan (1994-1999)	4666 (9.0)	42,291 (90.1)	46,957 (100)
MUCHS Tanzania <sup>8</sup> (2004-2005)	474 (29.6)	1125 (70.4)	1599 (100)
<b>Our study (Table 1, 2001-2005)</b>	1,00,316 (65.55)	52,704 (34.44)	1,53,020 (100)

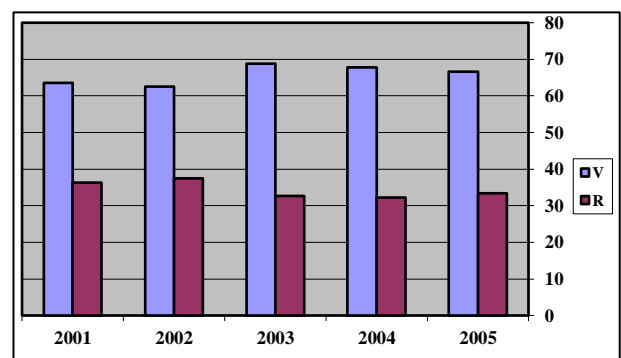
**Table 4: Comparison of male versus female blood donors in five years.**

References	Male donors N (%)	Female donors N (%)	Total N (%)
UCMS, Nepal <sup>9</sup> (2001-2003)	1418 (91.6)	130 (8.4)	1584 (100)
MUCHS Tanzania (2004-2005)	1424 (89.1)	175 (10.9)	1599 (100)
Sonawane, Ambajogai (1996-2001)	11602 (94.78)	638 (5.22)	12,240 (100)
<b>Our study (2001-2005)</b>	1,36,195 (89.00)	16,825 (10.99)	1,53,020 (100)

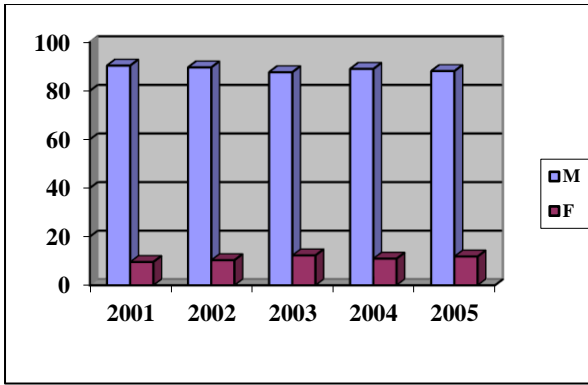
Also, the maximum number of donors were of male voluntary type 85,225 (55.69%) followed by male replacement 50,970 (33.30%). (Table 1)

The number of blood donors in 5 year period, in which male donors shows highest percentage (89.0%), voluntary male donors were 55.69% and females were 9.86%. in replacement blood donors males were 33.30% and females were 1.13%. (Figure 1, 2a, 2b, 3)

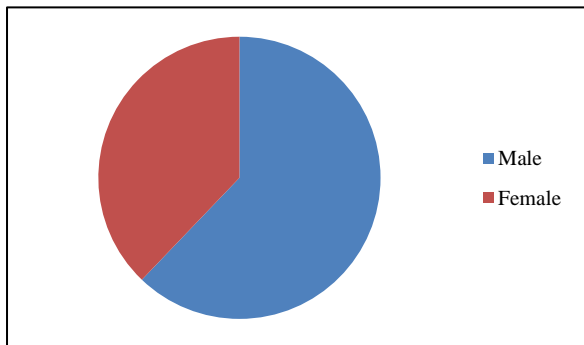
Incidence of total seropositivity for all the disease markers found to be highest in male donors 6.24% (62%) and females 3.80% (38%). Highest seropositivity is possibly due to higher numbers of male blood donors. (Table 2)



**Figure 2a: 5 years collection of blood from voluntary and replacement donors.**



**Figure 2b: Five years distribution of male and female donors.**



**Figure 3: Seroprevalence rates: male vs female blood donors.**

## DISCUSSION

The present study was conducted over a period of 5 years, retrospectively (2001-2005) and involved 1,530,20 blood donors both (voluntary and replacement types) who were screened and selected for blood donation at blood bank KEM hospital.

All the above mentioned four studies from different regions showed that the percentage of replacement donors was predominant, as stated by Sonawane BR, Bharat Singh et al, Garg S et al. and MUCHS Tanzania. (Table 3)

Our study, by contrast showed that the percentage of voluntary donors in last five years i.e from year 2001 – 2005 was outnumbered the replacement donors. The maximum percentage of donors was of voluntary type 1,00,316 (65.55%).

Study by UCMS, Nepal, MUCHS Tanzania et al, Ambajogai. Thus, showed similar results as our study i.e. male donors far exceed the female donors. In these studies, however, the female donors are relatively more than those observed in studies in Indian donors, as mentioned above. The low proportion of female donors could be attributed to low motivation levels in female donors and a higher degree of deferral of female donors, owing to low body weight and low haemoglobin values.

Study by Garg et al from Dr. S N Medical College, Jodhpur, Rajasthan from year 1994-1999, showed that the total 46,957 donors were tested, out of which 42,291 (90.1%) were replacement donors and 4666 (9.0%) were voluntary donors. Our study, in contrast showed majority of donors were of voluntary type (65.55%). (Table 4)

Study by Kapoor et. al year 1995-96 G B Pant Hospital, New Delhi, showed that the majority (58%) of donors in these blood banks were replacement donors, followed by voluntary (39.3%) donors.<sup>10</sup> In contrast, our study showed the majority (65.55%) blood donors were voluntary and (34.44%) blood donors were replacement type.

Study by Arya et al from SP Medical College Bikaner, India in year 1993-2003, showed that the a total of 102980 blood units were collected and tested for HIV infection.<sup>11</sup> Amongst of these blood units 95261 were collected from replacement donors and 7359 were from voluntary donors. Our study, in contrast showed the majority of donors was voluntary type.

Henceforth, it has been observed that the voluntary blood donation is more safe and advocated as compared to replacement donation, as high incidence of HIV, HBV, HCV and Syphilis were observed in replacement blood donors.

So, our study again confirms that blood/components from healthy voluntary blood donors are safer as compared to replacement blood donors. So we should achieve a 100% target of voluntary blood donation to prevent the blood transfusion related infections.

## CONCLUSION

The present study was conducted over a period of 5 years from January 2001 - December 2005, in a blood bank at a tertiary healthcare center, Mumbai. The data was obtained during this period from blood bank records and was analyzed retrospectively to find out seropositivity rates and trends in different groups of blood donors. This is a retrospective study and the data was tabulated annually.

A total of 1,53,020 blood units were screened for HIV, anti-HCV, HBsAg and VDRL as per the WHO strategy-1 during the 5 years period. All the anti-HIV, HBsAg, anti-HCV and VDRL screen reactive blood units were discarded. Screening tests for blood unit is done with the primary objective to ensure the safe blood transfusion. 1,00,316 (65.66%) donors were of voluntary type, while 52,704 (34.44%) were of replacement donors. The maximum number of donors are voluntary males (55.69%) followed by replacement males (33.30%).

## Recommendations

Blood donors must trust the healthcare system and should be assured that the blood donation will not lead to compromised health. The increase in voluntary blood

donation would mean an increase in obtaining the safe blood.

We have to work to achieve the target of 100 percent for voluntary blood donation. Our results indicate that the number of female blood donors were less in comparison to male blood donors, so proper health education is required for female blood donors. Periodic studies to investigate transfusion transmissible infectious diseases are required to enable safety reviews of the blood supply. Collection of blood only from voluntary, non-remunerated blood donors should be encouraged, screening for all transfusion transmitted infections and reduction of unnecessary transfusion is advised. To make latest technology available for operating the blood transfusion services and ensure it's functioning in an updated manner. To launch extensive awareness programs for blood donor information, education, motivation, recruitment and retention in order to ensure adequate availability of safe blood. The practice of replacement blood donors shall be gradually phased out in a timely manner to achieve 100% voluntary non-remunerated blood donation program. Efforts shall be directed towards recruitment and retention of voluntary, non-remunerated blood donors through education and awareness programs. The replacement donors shall be encouraged to become regular voluntary blood donors. Activities of NGOs shall be encouraged to increase awareness about blood donation amongst masses to ensure safe blood donation. Enrolment of safe blood donors shall be encouraged. Rigid adherence to blood donor screening guidelines shall be enforced.

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*Ethical approval: The study was approved by the Institutional Ethics Committee*

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