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Research Article

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Retrospective Study on Seroprevalence of HIV, Hepatitis B, Hepatitis C and Syphilis Among Blood Donors in a Rural Tertiary Care Hospital

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ABSTRACT

Background: Blood safety begins with a healthy donor. Collecting blood which is safe for transfusion is one of the principal challenges in the health care system. Transfusion of a contaminated blood increases the morbidity and mortality of the recipient.
Aims and objectives: The aim of the present study was to estimate the seroprevalence of Transfusion Transmissible Infections(TTI's) among blood donors and to estimate the prevalence of co-infection rate.
Materials and methods: A retrospective study was conducted at Adichunchanagiri hospital and research centre, B.G. Nagara for a period of two years and involved testing of 3831 blood donors, who were serologically screened for HIV, HCV, HBV and Syphilis at the blood bank.
Results: For a period of 2 years, a total of 3831 donors were tested. Among them 2339(61.05%) were voluntary donors and 1492(38.94%) were replacement donors. Male donors constituted for about 2681(69.98%) and females 1150(30.01%). Overall seropositivity for all TTI's was 1.33%. Seropositivity was more among voluntary donors(0.83%) compared to replacement donors(0.5%). Seroprevalence of HIV is 0.10%, HBV is 0.96%, HCV is 0.26%, Syphilis is 0%. There were no occurrence of concomitant infections in the present study.
Conclusion: Seroprevalence of HBV was more among voluntary donors, HIV and HCV seroprevalence was higher among replacement donors. Hence thorough screening of blood donors is must to prevent TTI's to recipients.
Category: Infectious diseases, Serology

Key Words: *Blood donors, Seroprevalence, TTI's, HIV,HBV,HCV, Syphilis.*

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INTRODUCTION:

Blood transfusion is a therapeutic intervention that can improve or even save lives. Obtaining safe blood and its components, however, is one of the greatest challenges in poorly developed and developing countries. Supply of contaminated blood not only increases morbidity and mortality, but also increases the costs of patient care within the health system[1].

With every unit of blood, there is 1% chance of transfusion associated problems including transfusion associated diseases [2]. Blood transfusion is the most efficient way of transmission of HIV. Even a small transfusion of infected blood results in virtually 100% seroconversion [3].

Blood donations must be screened for infectious agents, including human immunodeficiency virus(HIV), Hepatitis C virus(HCV), Hepatitis B virus(HBV), according to recommendations by the World Health organization (WHO)[4].

Transfusion transmitted infections are still a serious problem in areas of public health and compromise blood availability and safety, especially in developing countries where financial resources and blood bank infrastructure is limited[5]. To decrease the risk of TTIs and ensure access to safe blood and its components, WHO issued a series of recommendations with the aim of establishing national systems and legislations that regulate the effective collection of donations, routine screening for Transfusion Transmissible Infection (TTIs), the implementation of quality systems and rational use of blood products [4].

Aims and Objectives:

1. To estimate the seroprevalence of HIV, HBV, HCV and syphilis among the blood donors.
2. To estimate the proportion of concomitant infections of TTIs among blood donors.

MATERIALS AND METHODS:

Study design and setting

The present study is a retrospective analysis of consecutive blood donors record covering the period between January 2021 to December 2022 at Adichunchanagiri Hsopital and research centre, B.G. Nagar. It is a rural tertiary care teaching hospital providing health care services to nearby villages in Karnataka, India. Institutional ethical committee clearance was obtained. Blood donors were either volunteers or the replacement donors.

In the blood bank unit of hospital the first step in screening for blood donors is taking the past medical history of the individual, past history of blood transfusion etc. Healthy individuals of age 18 to 65 years with body weight above 45 kg were qualified for donation and included in the study. The medical and demographic histories of the donors were recorded and venous blood was collected as per standard procedures.

Screening test for HIV-1 and HIV-2:

Each donor serum was screened for anti HIV -1 and anti HIV-2 antibodies using Standard Q HIV 1/2 Ab test (Rapid immunochromatography test) by SD BIOSENSOR health care private limited. Samples which came out to be positive with rapid test were confirmed by ELISA using 4th generation Microlisa – HIV Ag and Ab kit by J.mitra and Co. pvt. ltd.[6,7]

Screening test for HBsAg and HCV and antibodies:

Each donor serum were screened for HBsAg using one step rapid visual test for the qualitative detection of HBsAg by Hepacard by diagnostic enterprises. Those tests which came out to be positive were confirmed by micro well ELISA test for the detection of Hepatitis B surface antigen(HBsAg) using HEPALISA by J.Mitra and Co.pvt.ltd.[8-11]

Each donor serum were Screened for anti HCV antibodies by Abbott Bioline HCV kit. Those tests which were positive by rapid test were confirmed by Microwell ELISA test for the detection of Antibodies to Hepatatis C virus using HCV microlisa by J. Mitra and Co.pvt.ltd.

Screening test for syphilis:

Serum from all donors were tested for presence of treponemal specific antibodies by Rapid test for syphilis (Modified TPHA) using Serocheck-Tp kit by viola diagnostic systems[12].

ABO blood grouping and rhesus typing:

Blood grouping was done by Eryclone Anti-A, Anti-B, Anti-A,B monoclonal bood grouping antibodies for slide and tube tests. Rh typing was done by Eryclone Anti-D (Rho) (IgM) monoclonal blood typing antibodies for slide and tube tests[13].

All screening and confirmatory tests were performed as per manufacturers guidelines.

Statistical analysis:

Statistical analysis: Data was entered in excel sheet and results were analysed using epidata software. Results were expressed in terms of descriptive statistics.

Results:

In the present study, a total of 3831 blood donors were screened for TTI's. Among which Male donors constituted for about 2681(69.98%), while female donors were 1150(30.01%). around 48% (1841) were in the age group of 18-31 years followed by 31-40 years age group who constituted to around 38% (1466).Among the blood donors type, majority of the donors were voluntary type 2339(61.05%) followed by replacement donors 1492(38.94%). (Table 1)

Table 1: Demographic Characteristics of blood donors

Characteristics		Number	Percentage
Gender	Female	**1150**	**30.01%**
	Male	**2681**	**69.98%**
Age group (Years)	18-30	**1841**	**48.05%**
	31-40	**1466**	**38.26%**
	41-50	**402**	**10.49%**
	51-65	**122**	**3.18%**

Donor type	Voluntary	**2339**	**61.05%**
	Replacement	**1492**	**38.94%**
ABO Blood groups	A	**956**	**24.95%**
	B	**961**	**25.08%**
	AB	**245**	**6.395%**
	O	**1659**	**43.30%**
Rhesus (Rh type)	Positive	**3624**	**94.59%**
	Negative	**207**	**5.40%**

Total seropositivity among blood donors for a period of two years is 51(1.33%). The incidence of HIV seropositivity was 4(0.1%) and HBV 37(0.96%) HCV 10(0.26%) and Syphilis was 0(0%). Maximum seropositivity was observed for HBV followed by HCV (Table 2). Graph indicates the seropositivity of all the four infection markers for two years(2021,2022)(Figure 1). Total seropositivity for overall TTI's in the present study is 51(1.33%). The coinfection rates among various TTI's were 0 for two years. All the seropositive blood donors were male.

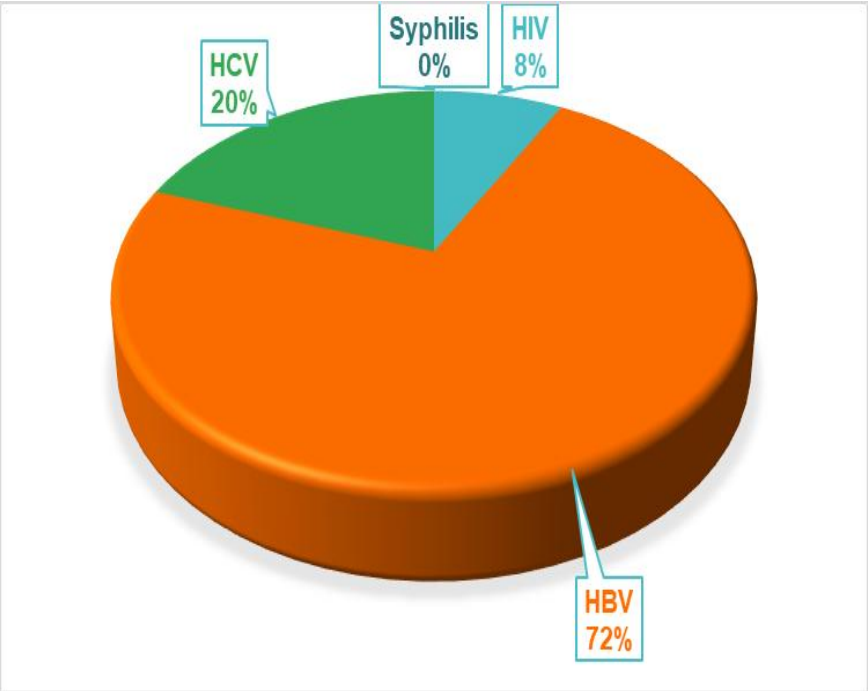

Figure.1. Pie chart representing seropositivity of all four TTI's for two years.

Table 2: Trends of seropositivity of HIV, HBV, HCV and Syphilis among blood donors

Years	Total Screening	HIV	HBV	HCV	Syphilis
2021	**1389**	**2**	**10**	**4**	**0**
2022	**2442**	**2**	**27**	**6**	**0**
Total	**3831**	**4**	**37**	**10**	**0**

Percentage of voluntary donors were high compared to replacement donors. (Table 3) (figure 2) Seropositivity for all the transfusion transmissible infection was highest among voluntary donors and lower in replacement donors. (Table.4)(Figure 3). there is an increase in the trend of voluntary blood donors in two years.

Table 3: Two years month wise distribution of blood donor types

Months	Voluntary		Replacement	
	2021	2022	2021	2022
January	**67**	**68**	**75**	**63**
February	**5**	**8**	**96**	**81**
March	**29**	**258**	**79**	**76**
April	**6**	**274**	**43**	**55**

May	**1**	**35**	**39**	**85**
June	**15**	**287**	**50**	**68**
July	**7**	**179**	**65**	**65**
August	**98**	**205**	**109**	**56**
September	**128**	**149**	**42**	**77**
October	**9**	**57**	**37**	**54**
November	**196**	**33**	**55**	**51**
December	**111**	**114**	**27**	**44**
Total	**672(17.54%)**	**1667(43.51%)**	**717(18.71%)**	**775(20.22%)**

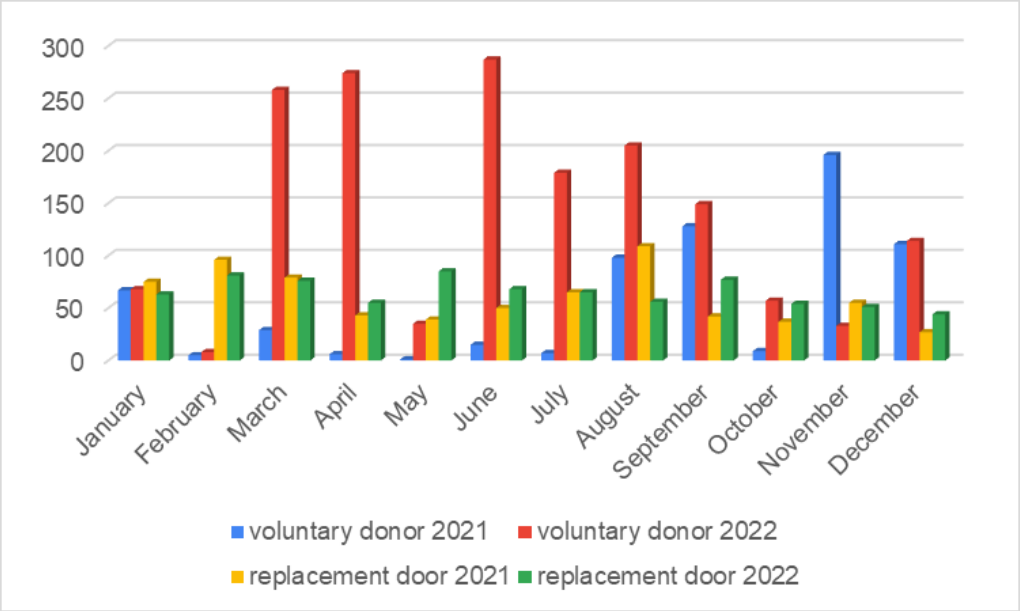

Figure 2: Graph showing month wise voluntary and replacement donors for the year 2021 and 2022.

Table 4: Seropositivity among voluntary and replacement donors

	Seropositive donors				
	Voluntary donors		**Replacement donors**		**Total**
	2021	**2022**	**2021**	**2022**	
HIV	**0**	**1**	**2**	**1**	**4 (0.10%)**
HBV	**4**	**20**	**6**	**7**	**37 (0.96%)**
HCV	**1**	**3**	**4**	**2**	**10 (0.26%)**
Syphilis	**0**	**0**	**0**	**0**	**0 (0%)**
Total	**5**	**24**	**11**	**11**	**51 (1.33%)**

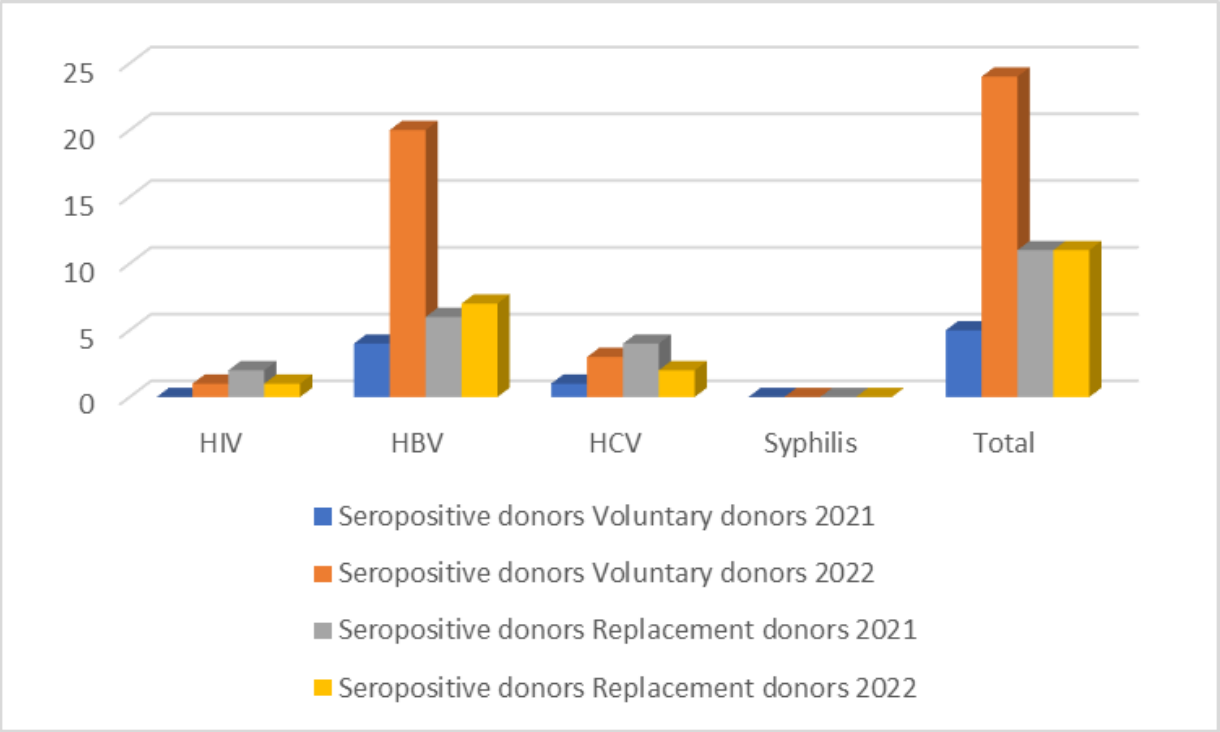

Figure.3: Graph showing seropositivity among voluntary and replacement donors for the year 2021 and 2022.

DISCUSSION:

The present study was a record based study conducted for a period of two years , retrospectively(2021-2022) and involved 3831 blood donors both voluntary and replacement types who were selected and screened for blood donation at Adichunchanagiri hospital and research centre. B.G. Nagar. Karnataka.

Our study showed an overall seropositive prevalence rate of 1.33% for all the TTI's , which is in comparison with study by Singh B et al, Nanu et al and Parveen K et al which showed 3.1%, 3.04% and 5.97%seropositivity rates[14,15,16]. (Table.5)

Table .5: Overall seropositive prevalence rates in Blood donors.

	Seropositive donors no (%)	Total number of Donors screened
Singh B	**2365(3.1%)**	**76089**
Nanu A	**2468(3.04%)**	**81120**
Parveen K	**9150(5.97%)**	**1,53,020**
Present study	**51(1.33%)**	**3831**

In the present study the seropositivity rate among Voluntary donors were high compared to replacement donors. Whereas studies from Nanu et al, parveen et al and Mundee Y showed higher seropositive ratesin replacement donors and lower among voluntary donors[15-17]. (Table 6)

Table.6 : Seropositive prevalence rates among voluntary and replacement donors.

Seropositive donors			Donors screened
Studies	**Voluntary donors(%)**	**Replacement donors(%)**	**Total**
Nanu A	**334(2.8%)**	**1140(4.3%)**	**38166**
Mundee Y	**1095(1.9%)**	**1316(4.1%)**	**101764**
Parveen K	**5101(5.08%)**	**4045(7.67%)**	**153020**
Present study	**32(0.83%)**	**22(0.5%)**	**3831**

In the present study the seropositivity among males were 1.9% and that of females was 0%. Seropositive rate was observed only in male donors.

Present study showed seropositivity rate for HBV was higher among voluntary donors 24(0.626%), whereas for HIV and HCV the seropositivity was higher among replacement donors(3 and 6) respectively(Table 4). A study by Nanu A et al showed Seropositivity for HBV and HIV to be significantly higher among replacement donors while HCV seropositivity was similar among both types of donors[15]. Study by Parveen K et al showed higher seroprevalence in

replacement donors for all the TTI's [16]. Study by Makroo et al showed that the seropositivity was higher in replacement donors compare to voluntary donors[18].

Our study showed an increase in the trend of seropositivity from year 2021 to 2022 among both type of donors. Which is similar to the results found in the study by Parveen K et al, Nanu A et al and Makroo et a.[15,16,18].

Present study showed zero prevalence of Concomitant Transfusion transmissible infection among blood donors. Which is in contrast to study conducted by Parveen K et al which showed concomitant HIV and HBV infection to be 0.16%, HIV and VDRL to be 0.09%. whereas Study by Nanu A et al showed HIV and HBV co- infection to be 0.6% , HIV and VDRL to be 0.1%. This could be due to the lesser duration of our study period and the number of donors screened during the period of study.[15,16]

Present study showed voluntary blood donation was increased from17.54% to 43.51% in a duration of one year 2021 and 2022 respectively. Majority of the donors were of voluntary type, Seropositivity was more among males. HIV and HCV seropositivity was higher among replacement donors, HBV seropositivity was highest among voluntary donors. Seroprevalence of Syphilis is zero for two years.

CONCLUSION:

In the study period of 2 years , a total of 3831 donors were tested. Among them 2339 were voluntary donors and 1492 were replacement donors. Male donors constituted for about 2681 and females 1150. Overall seropositivity for all the transfusion transmissible infection was 1.33%. Seropositivity was more among voluntary donors(0.83%) compared to replacement donors(0.5%). Seroprevalence of HIV is 0.10%, HBV is 0.96% , HCV is 0.26% , Syphilis is 0%. Transfusion transmissible infections (TTI's) are the greatest threat to blood safety for the recipient. Hence thorough screening of donor blood is mandatory before transmission to the recipient.

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