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Seroprevalence of HIV, HBV & HCV IN 1000 Blood Donors at Dayanand Medical College and Hospital, Ludhiana, Punjab, India.

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ABSTRACT

Transfusion-transmissible infections (TTI) such as human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) are among the greatest threats to blood safety for the recipient. This study aimed to determine the seroprevalence of these viral markers in relation to voluntary/replacement donation & number of donations in 1000 blood donors at Dayanand Medical College & Hospital, Ludhiana. Study was conducted on 1000 blood donors donating blood in Department of Immunohematology & Blood Transfusion, DMCH, Ludhiana and at outreach voluntary blood donation camps. Screening and selection of blood donors was done as per criteria for donor selection laid by Director General of Health Services, Ministry of Health, New Delhi. Serum of these blood units was screened by 3rd generation ELISA for these three viral markers. The results were interpreted as per the strategic guidelines provided by WHO. Chi Square test & Chi square for trend analysis was done. Out of the 1000 donors tested 83.8% were replacement donors & 16.2% were voluntary donors. 95.3% were males and 4.7% were females with M:F ratio of 20.27:1. Mean age in the present study was 32.58 ± 10.24 yrs. Maximum number of blood donors were in the age group of 21-30 yrs in both voluntary, 51.85% and replacement group, 52.03% followed by 31-40 yrs with voluntary donors as 25.6%, & replacement donors 25.42%. Seropositivity was more in first time donors in both voluntary 1.85% and replacement 2.02% donors. Incidence of HIV was 0.2% & was only in replacement donors; HBsAg was 1.4% more in replacement donors 1.43% vs 1.23% in voluntary group. In HCV the incidence was 1.2% more in the replacement donors 1.31(11) vs 0.61(1) in voluntary donors. Voluntary blood donation is more safe and advocated than replacement donation where higher incidence of TTI's was observed.

Keywords- Voluntary donor, Replacement donors, Blood donors

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INTRODUCTION

Although blood transfusion is life saving in innumerable situations, it is quick and easy route for transmission of infectious agents. Transfusion of whole blood or its components is an integral part of medical or surgical management and carries the risk of transmitting transfusion transmitted infections (TTIs) like hepatitis, Human immunodeficiency virus (HIV), syphilis, malaria, toxoplasmosis, brucellosis and some other viral infections like cytomegalovirus, Epstein –Barr virus, herpes and West Nile virus from donors to the recipients. Efforts are therefore made worldwide to provide zero risk transfusion. Among the TTI's, hepatitis B (HBV), hepatitis C (HCV), and HIV are the most dreadful. It is unlikely that any single test or combination of tests will be 100% effective in detecting window period infections and repeat donation increases the risk of transfusion transmitted infections as seroconversions assumed to occur at the midpoint between a donor's last seronegative donation and the first seropositive donation [1]. In the UK, the risk of HIV transmission is now 1 in 5 million. The most recent reported case in the US of HIV being transmitted through transfusion occurred in 2008. Thereafter there was no reported HIV transmission through transfusion. HIV transmission occurred in this case, firstly because the routine donor answered incorrectly to questions about high-risk behavior during the donor screening questionnaire and secondly, due to being recently infected the donor was in the window period (approximately 12 days when tests are unlikely to detect HIV) which resulted in the infected blood being used. The importance of donors answering honestly to eligibility questionnaires is emphasized by this case. Near about 2 billion people have been infected with HBV and 360 million have chronic infection worldwide and it is the 10th leading cause of death worldwide causing 50,00,00 to 1.2 million deaths per year due to chronic hepatitis, cirrhosis and hepatocellular carcinoma [2,3]. In Asia and most of Africa, chronic HBV infection is more common and in Western countries, the disease is relatively rare [3]. Nearly 3.9 million people are estimated to be infected with HCV, the most common chronic blood borne infections, leading to 8,000 to 10,000 deaths annually in USA [4]. Varying preferences in different geographical areas requires different strategies for ensuring blood safety in different areas. HIV has become a major problem to the mankind and its prevalence is increasing day by day. In 2009 it was estimated that 2.4 million people were living with HIV in India, which equates to a prevalence of 0.3% [5].

Indian subcontinent is classified as an intermediate HBV endemic (HBsAg carriage 2-7%) zone and has the second largest global pool of chronic HBV infections³. India has 2.5 million HIV, 43 million HBV and 15 million HCV infected persons and the risk of transfusion transmission of these viruses may be alarming due to high seroprevalence of anti HIV-1, anti-HCV and HBsAg was 0.5%, 0.4% and 1.4% respectively in blood donors [6].

Seroprevalence of HIV was reported as 0.32% in blood donors in Kolkata by Das [7] et al (2011); HCV as 1.09% by Gupta et al [8]; 0.25 - 0.9% by Singh et al [9]; 0.35% by Das et al [7] and of HBsAg was 1.7 - 2.2% by Singh et al [9]; 1.55% by Das et al [7]. Knowing the seroprevalence of HIV, HBV and HCV in healthy blood donors will tell us the incidence of silent carriers of these infections and enable us to suggest strategies for ensuring their detection and hence prevention of their transmission for ensuring blood safety.

This study aims to study the seroprevalence of HIV, Hepatitis B & C and to compare the seropositivity in relation to voluntary / replacement donation & number of donations in 1000 blood donors at Dayanand Medical College & Hospital, Ludhiana, Punjab.

METHODS

Study was conducted on 1000 consecutive blood donors donating blood in Department of Immunohematology & Blood Transfusion, Dayanand Medical College & Hospital, Ludhiana and at outreach voluntary blood donation camps. Screening and selection of blood donors was done as per criteria for donor selection guidelines laid by Director General of Health Services, Ministry of Health, Govt. of India, New Delhi [10]. Medical screening will include answering a questionnaire, thorough medical history regarding these viral diseases and brief physical check up. The donor selection criteria includes age, weight, haemoglobin, detailed medical history regarding fever, medication, vaccination, I.V. drug abuse, sexual behaviour, jaundice in the last 1 year, blood donations in the last 3 months or any evidence of renal, cardiac and pulmonary disease/ chronic illness.

Serum of all the blood units was screened for HIV, HCV, and HBV by a semi automated ELISA reader "Biomurex". The commercially available kits for HIV, HCV and HBsAg were used from Biomurex or from Ranbaxy Laboratories Limited. The results were interpreted as per the strategic guidelines provided by WHO¹¹ for the purpose of the surveillance. The samples were tested by 3rd generation ELISA for these three viral markers. The relation of seropositivity with age, sex, voluntary / replacement donors, first time donation & second time donation was studied.

Hepatitis-B surface antigen was detected by Bioelisa HBsAg. Bioelisa is a solid phase ELISA (Enzyme linked immunosorbent assay) based on "direct sandwich" principle. ELISA for The 3rd generation microelisa detects antibodies against HCV in human serum or plasma. 3rd generation ELISA is used to detect HIV antibodies. Chi Square test & Chi square for trend analysis was done.

OBSERVATIONS

Out of 1000 donors 953 (95.3%) were males and 47 (4.7%) were females with M:F ratio of 20.27:1. The sex distribution in voluntary & replacement donors showed that there were more females in replacement (5.37%) as compared to voluntary blood donors (1.23%) as compared to males which were more in voluntary 98.76% vs 94.6% in replacement. The mean age in this study was 32.6 ± 10 yrs with maximum number of donations in the age group of 21-30 yrs (52%) followed by 31-40 yrs (25%) in both voluntary & replacement group.

Maximum seropositivity was seen in first time donors in both voluntary and replacement donors (Fig 1). Fig 2 shows that highest seroprevalence was seen in replacement donors. The maximum cases were having seroprevalence for HBsAg followed by anti HCV and minimum cases were showing seroprevalence for HIV. No case of HIV was seen in voluntary donors.

Figure 1: Distribution of Sero Positive Blood Donors (%) According To Number of Donations

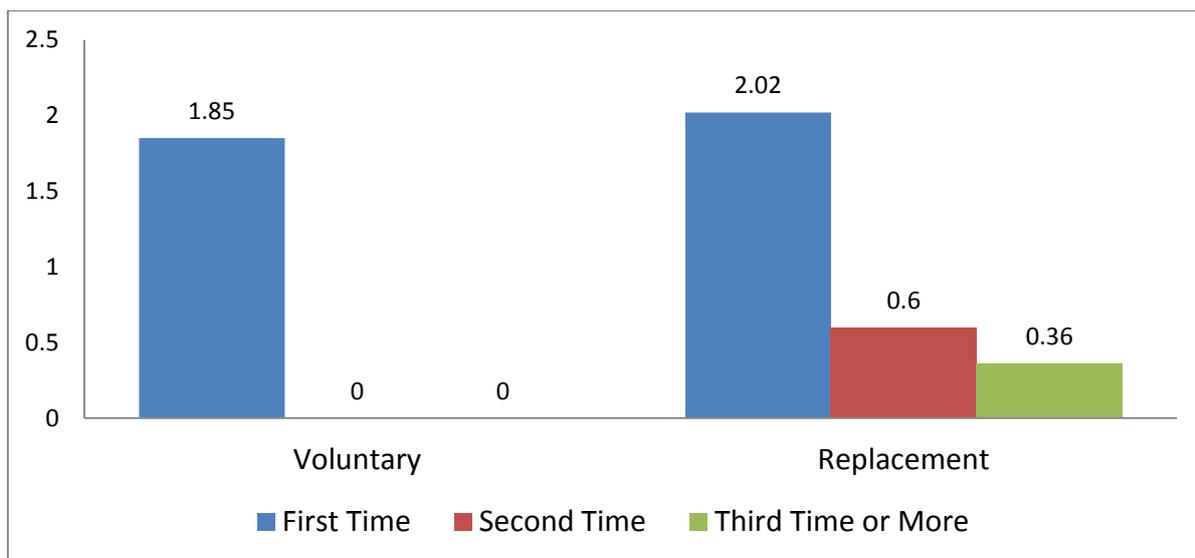
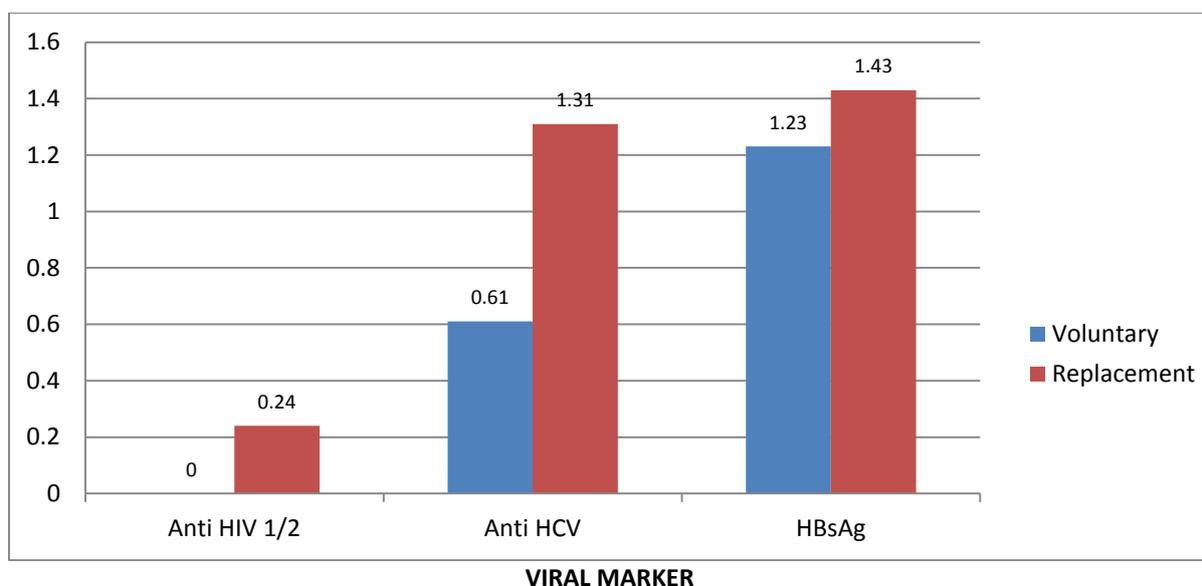


Figure 2: Seroprevalence of Transfusion Transmitted infections in Blood donors(%)



VIRAL MARKER

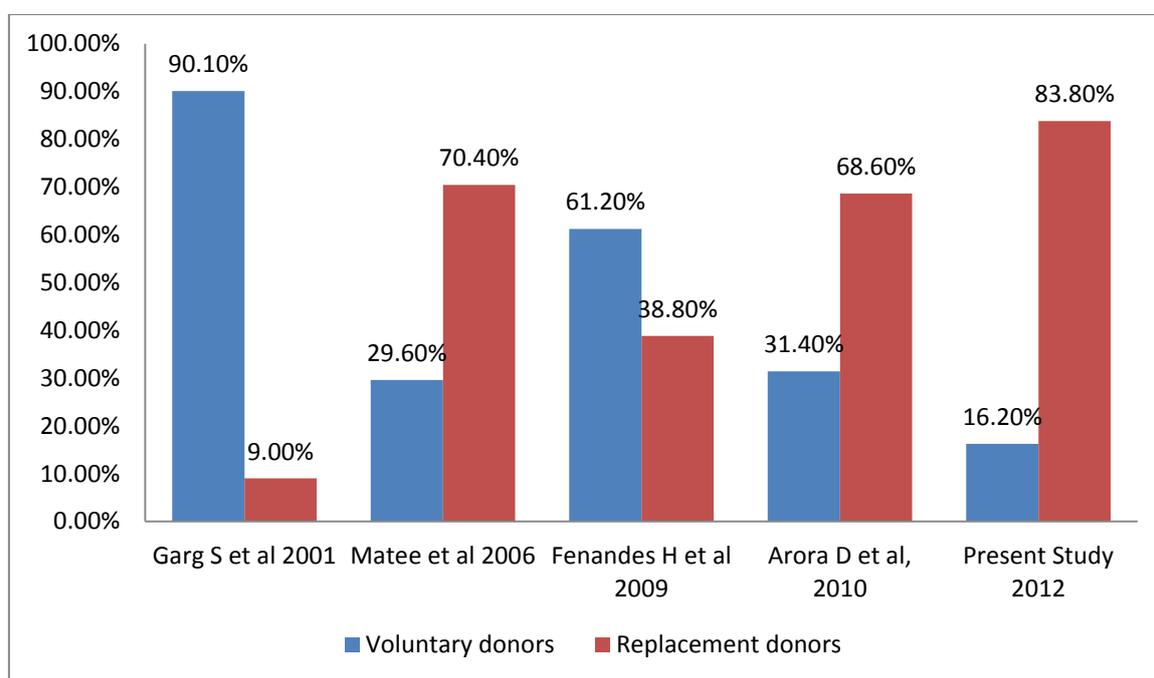
DISCUSSION

Among 1000 blood donors studied, none belonged to the professional donor category. Out of total of 1000 donors 953 (95.3%) were males and 47 (4.7%) were females. This is in accordance with the literature. Fredandes [12] et al from Manglore showed lowest participation by females (2.5%) as compared to our study. Singh [9] et al from Manipal showed higher participation by females indicating more awareness in that area. But Matee [13] et al showed highest participation by females i.e. 10.9% indicating the awareness level and fitness level in females in Tanzania is more as compared to Indian population. The preponderance of males over females may be due to the fact that Indian females are mostly anemic and medically unfit for blood donation. Besides low turnout of the females for blood donation may be viewed in the light of comparatively low educational status and the general trend of not involving the female members by the heads of families in such

activities. There is a need to create awareness among females and motivating them to come forward to donate blood voluntarily.

The voluntary & replacement group contributed 16.2% (162/1000) and 83.8% (838/1000) donors respectively in the present study. The voluntary collection in the present study was the lowest followed by Arora [14] et al, 31.4% in southern Haryana in the Indian studies (Fig 3). Maximum voluntary collection of blood was seen in a study by Garg [15] et al at Jodhpur, 90.15%. Matee [13] et al 2006 in Tanzania showed lower voluntary collection, 29.6%. There is need to make efforts to create more awareness among the general population towards blood safety and spread the message of voluntary blood donation among the masses specially the young. This will go a long way in decreasing the incidence of TTI's

Figure 3: Comparison of Voluntary and Replacement Donors in Various Studies



Age-wise distribution of the blood donors indicated enthusiastic young age group (21-30 yrs.) contributing maximum, 51.85% voluntary and 52.03% in replacement group respectively. The contribution towards blood donation decreased with increase in age with the blood donors of age 50 yrs. and above contributing only 3.09% and 2.98% in voluntary & replacement group respectively. Similarly, in a study conducted by Chander et al [16] at a teaching hospital at Bhairahawa, Western Nepal, the maximum numbers of blood donors were in the age group of 15-29 years.

Seropositivity was more in first time donors in our study i.e. 71.42% (20/28) than in the repeat donors. Significantly increased overall seropositivity for all these TTI's was observed in first time donors as compared to repeat donors in both voluntary & replacement group being 1.85% and 2.02% respectively in the present study. This is in agreement with previous studies. The significantly increased seroprevalence among first time donors might be due to the fact that people who regularly donate blood usually have a profile of low-risk of HIV, HBV & HCV infection because they were selected many times. This

further supports that repeat donors are relatively safe. But this is not always true as in case of a repeat donor in a window period, routine tests will not detect the reactivity and otherwise these repeat donors were considered safe.

Seroprevalence was maximum in the age of 21-40 yrs in our study. Tessema B [17] et al 2010 in Ethiopia also observed that the seroprevalence was more in the age of 26-45 yrs similar to our results.

Seropositivity of HIV

In the present study the overall seropostivity of HIV was 0.2%. Highest seroprevalence is reported by Matee MIN et al 2006 from Tanzania while lowest by Mujeeb A et al [18] in Karachi, followed by Rudra et al [19] at Bangladesh and by Gupta N et al [8] at Ludhiana from the same institute as the present study. (Table 1)

Seropositivity of HBsAg

In the present study overall seropostivity of HBsAg was 1.4%. The highest seroprevalence is reported by Buseri FI [20] et al 2009 from Nigeria (18.60%) and the lowest by Gupta N [8] et al, 2002 (0.66%) from Ludhiana from the same institute. After a gap of 10 yrs the prevalence of HBsAg has increased. Efforts to control this infection need to be strengthened to decrease the prevalence of these infectious markers (Table 1).

Table 1: Seropostivity Of Various Infective Markers In Various Studies

Studies	Anti HIV	HBsAg	Anti HCV
Garg S et al 2001	0.44%	3.44%	0.285%
Gupta N et al, 2002	0.084%	0.66%	1.09%
Mujeeb A et al, 2006	0.00%	2.21%	0.50%
Matee MIN et al, 2006	3.80%	8.80%	1.50%
Buseri FI et al 2009.	3.10%,	18.60%,	6.00%
Rudra S, et al 2010	0.03%	1.40%,	0.09%
Arora D et al, 2010	0.30%	1.70%,	1.00%
Present study, 2012	0.20%	1.40%	1.20%

Anti HCV Seropositivity

In the present study anti HCV seropostivity among 1000 blood donors was 1.20%. Highest seroprevalance was reported by Buseri FI [20] et al 2009 (6%) from Nigeria and lowest by Garg S. et al [15] (0.285%) from Jodhpur. However the reactivity in the same institution has more or less remained the same after ten years (Table 1). More HCV reactivity in replacement donors suggests that the clinical course is anicteric in these cases and mere absence of history of jaundice is not sufficient to rule out HCV infection, history of viral illness is important to rule out the infection.

The problem with HCV infection may be greater than generally recognized. While effective vaccines currently exist for HBV, a fully protective HCV vaccine is yet to be available. Public health interventions, therefore, continue to be the only effective method of preventing HCV infection. Any strategy to prevent HCV infection must therefore be based on

accurate data, including information about its incidence and prevalence. Such information is lacking in many developed countries.

In the present study seropositivity of HIV, HBsAg & Anti HCV was more in the replacement than in the voluntary group, being 0.2% Vs. nil for HIV, 1.43% Vs. 1.23% for HBsAg and 1.31% Vs. 0.61% for anti HCV, though the differences were not statistically significant. This is in accordance with the study by Garg S et al [15] and Matee et al [13]. These results are in keeping with those of other studies [8-10] strongly indicate that replacement donors are less suitable and that major emphasis should be made to encourage voluntary donors.

As far as geographical influences are concerned seroprevalence of HIV in the present study (0.20%) has decreased as compared to study by Garg S et al [15] (0.44%) but increased if compared to the Gupta N et al [8] (0.084%) which is a study done in the same institution ten years back. However this seroprevalence of HIV is comparable to contemporary study by Arora D et al [14] (0.30%) done at Hissar, inferring that prevalence of HIV has increased in the same belt. The seroprevalence of HBsAg in the present study (1.40%) has increased as compared to the study in the same institution done by Gupta N et al, [8] (0.66%) but has decreased as compared to study by Garg S et al [15] (3.44%) at Jodhpur. HCV seroprevalence is almost same (1.20%) in a study in same institution done in 2002 by Gupta N et al [8] (1.09%) but has increased as compared to a study by Garg S et al [15](0.285%) at Jodhpur.

Studies done in Nigeria Buseri FI et al [20], show a very high seroprevalence of 3.10%, 18.60% and 6.00% of HIV, HBsAg & HCV respectively. In Tanzania, seroprevalence of 3.80% and 8.80% of HIV & HBsAg in a study by Matee MIN et al [13] is also very high.

Developed countries like USA had reduced the risk of HIV-1, HCV to less than 1 per million through expanded donor screening criteria and through improvements and expansion of blood testing (including minipool NAT) and achieved it at a cost exceeding \$2 million and cost effectiveness far beyond accepted limits at \$ 1.5.to \$6 million per quality adjusted life adjusted life year (Jackson). But the scenario is totally different in developing group of countries and least developed countries where usually insufficient and inadequate preparatory testing is a major weakness of safe blood supply. Only 66% of developing group of countries and 46% of least developed countries for HBV and 71% and 48% for syphilis , despite improvements between 1988 and 1992, and are vulnerable of acquiring TTI's through blood transfusion [21].

CONCLUSION

Blood donation by regular repeat non remunerated blood donors is more safe & advocated as compared to replacement donation where higher incidences of HIV, HBV & HCV are observed. Efforts must be made to increase the voluntary blood donor pool especially mobilizing the young adults and females. Transmission of TTI's during the serologically negative window period still pose a threat to blood safety, therefore strict selection of blood donors with emphasis on voluntary blood donation and there honest self

deferral is recommended. Voluntary blood donation is more safe and advocated than replacement donation where higher incidence of TTI's was observed.

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