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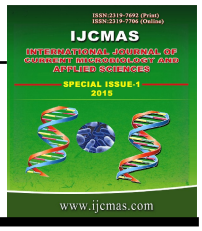

Original Research Article

Association of Sociodemographic Factors with Seroprevalance of HIV, HCV and HBV Infections among Blood Donors

Ruquiya Afrose*, Sayeedul Hasan Arif, Mohammad Akram, Tausia Nasreen and Syed Shamshad Ahmad

Department of Pathology, JNMC, AMU, Aligarh, U.P., India

**Corresponding author*

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Seroprevelence of HIV, HCV, HBV, Socio-demographic factors, blood donors

A B S T R A C T

Transfusion-transmissible infectious agents 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. The aim of this study was to determine the seroprevalence and their association with various sociodemographic factors among blood donors over a period of eight years at blood bank of JN Medical College, Aligarh Muslim University, Aligarh. A retrospective analysis of consecutive blood donors' records covering the period from September 2009 to September 2014 was conducted. All samples were tested by Commercial Enzyme Linked Immunosorbent Assays method approved by National AIDS Control Organisation. Data were evaluated with SPSS and differences in seropositivity among various sociodemographic groups were calculated using the chi square test. A total of 119194 apparently healthy adult donors were screened during the study period. Among these donors 98% were males, 72% were in the age group of 18–40 years, 68.5% belong to rural area and 82.9% were replacement donors. The overall seroprevalence rate of HIV, HCV and HBV was 0.09%, 0.22% and 1.59% respectively. The seroprevalence of HIV was significantly increased among 18–40 years of age group ($P = 0.0005$) however there was no significant difference in HIV seropositivity in terms of sex, area of residence and type of donor. Similarly the seroprevalence of HCV was also significantly increased among 18- 40 years of age group ($P < 0.001$). Regarding seropositvity of HbsAg, it was significantly increased among all the risk group analysed i.e. 18–40 years of age group ($P = 0.001$), males ($P = 0.007$), rural population ($P = 0.001$) and replacement blood donors ($P = 0.001$). Overall, age group of 18–40 years was found to be common significant risk group for all the three types of infections analysed. A substantial percentage of the blood donors harbour HIV, HBV and HCV infections. Strict selection of blood donors and comprehensive screening of donors' blood using standard methodology and protocols are highly recommended to ensure the safety of blood for recipient.

Introduction

Transfusion-transmissible infection (TTI) is the undesirable and serious complication of unsafe blood transfusion. Hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) are the most serious TTIs (Bhawani *et al.*, 2010).

Prevention of TTIs during blood transfusion is achieved by reducing unnecessary transfusions, excluding donors with specific risk factors, systematic screening and pretransfusion testing of all donated blood for infection. However it is not followed uniformly in developing countries like India and the risk of TTIs remains high (WHO 2002; Tiwari *et al.*, 2008).

Evaluation of data on the prevalence of TTIs, among blood donors permits an assessment of the occurrence of infections in the blood donor population and it helps in formulating the strategies for providing safe blood supply. Identification of those factors having increased risk of these infections in the donor population is important for prevention of TTIs. It is more relevant in our country where professional donation is not uncommon. Among the various risk factors sociodemographic factors are important as these risk groups can be easily screened out from blood donation.

This study aimed to evaluate association of certain sociodemographic factors like age, sex, residence and type of donation with the seoroprevelance of HBV, HCV and HIV among blood donors.

This study was conducted from September 2009 to September 2014 at JNMC, AMU, blood bank unit in Aligarh. The majority of contributors to this blood bank are replacement donors. The voluntary donations primarily were obtained from blood donation camps in general public, organized by our blood bank. The study was approved by the Local Ethics Committee of the Faculty of Medicine, JNMC.

Healthy blood donors are selected by the resident doctors at the department. Consent for infectious marker testing is obtained from all donors at the time of pre-donation counselling. Each donor was included only once in the study. Donors were selected by taking history and clinical examination to eliminate professional donors. Information was collected regarding sociodemographic risk factors such as area of residence, age, blood type, sex, education, profession, marital status, replacement or voluntary donation, donation number and date of the last donation. Information also collected for previous surgery, previous illness, hospitalization, blood transfusion and tattoo marks. Examination includes weight, body temperature, pulse rate, blood pressure and haemoglobin level.

A blood sample of 5–10 ml was collected from each participant using a sterile plain vacutainer, and the serum was separated by centrifugation and placed in sterile serum storage vials. Needles were destroyed using a needle destroyer and then discarded in a sharps box. These serum samples were examined for HIV, HCV and HBsAg infection. All samples were tested for HIV, anti-HCV and HBsAg markers by using a third-generation ELISA (enzyme linked immunosorbant assay) (SD HIV 1/2 ELISA 3.0, SD HCV ELISA 3.0, and SD HBsAg ELISA 3.0 manufactured by SD bio standard diagnostics pvt. Ltd., India) using fully-automated bichromatic spectrophotometer (Thermo fisher scientific). Absorbance was read at 450nm with reference wavelength at 620nm. Samples were considered reactive according to the manufacturer's specification.

Seropositive blood units were discarded as per standard protocols.

Statistical analysis was done using chi square test to find out the association of different sociodemographic factors with seroprevalence of TTIs.

Results and Discussion

A total of 119194 apparently healthy adult donors were screened during the study period. Table 1 shows the sociodemographic characteristics of the donors. As shown in table 1, 116808 (87.9%) donors were males and 2386 (2%) were females. Of all donors, 72% were in the age group of 18-40 years, 68.5% belong to rural area and 82.9% were replacement donors.

The overall seroprevalence rate of HIV, HCV and HBV was 0.09%, 0.22% and 1.59% respectively (Table 2).

As shown in Table 3, the seroprevalence of HIV was significantly increased among 18-40 years of age group ($P < 0.005$) however there was no significant difference in HIV seropositivity in terms of sex, area of residence and type of donor. Similarly the seroprevalence of HCV was also significantly increased among 18–40 years of age group ($P < 0.001$). Regarding seropositvity of HbsAg, it was significantly increased among all the risk group analysed i.e. 18–40 years of age group ($P = 0.001$), males ($P = 0.007$), rural population ($P = 0.001$) and replacement blood donors ($P = 0.001$). Overall age group of 18–40 years was found to be common significant risk group for all the three types of infections analysed.

In the present study the overall seroprevalence rate of HIV, HCV and HBV was 0.09%, 0.22% and 1.59% (Table 2) respectively. It was found that HBV was the commonest and HCV was the second most common TTI in our study. This observation was similar to most of the other Indian studies (Arora *et al.,* 2010; Pahuja *et al.,* 2007; Bhattacharya *et al.,* 2007; Chandra *et al.,* 2009). Probably this is because of higher prevalence of hepatitis B in the community compared to other infections.

In this study age of the donors ranged between 18 and 60 years as this is the recommended age group for blood donation in our country. Donors were grouped into younger age group (18–40 years) and older age group (41–60) to find out the seroprevalance of TTIs in both the age group. Majority of the donors (72 %) were from the younger age group. It was observed that the seroprevalence of HIV was significantly increased among younger age group ($P < 0.005$). Seropositivity of HCV and HBV was also significantly increased among 18–40 years of age group ($P < 0.001$). Overall age group of 18–40 years was found to be common significant risk group for all the three types of infections analysed. Younger age as a risk group was also observed in other similar studies (Baba *et al.,* 2000; Ejele *et al.,* 2005; Tessema *et al.,* 2010). This is the sexually active group of the community, which is the major risk group for the infections transmitted through blood.

There was a predominance of males among the study participants (98%). Females are mostly anemic in India so they are generally screened out for blood donation. We observed that HBV seropositivity was more common in males. However, gender was not a significant factor for HIV and HCV seropositivity. Higher Seroprevalance of these TTIs in males was the observation of several other studies (Al Rashed 2003; Ameen *et al.,* 2005; Wang *et al.,* 2003;

Shrestha *et al.,* 2009; Tserenpuntsag *et al.,* 2008). On the other hand, various other studies did not support this observation (Abed Al-Gani, 2011; Rodenas *et al.,* 2006; Oner *et al.,* 2011).

Most of the patients in our setup come from rural background so most of the donors (68.5%) in our study have rural background. It was a common observation of various studies all over the world that rural donors have more TTI seropositivity because of lack of education, lack of awareness and poor living conditions devoid of safety measures for TTIs (Oner *et al.,* 2011; Giri *et al.,* 2012; Voiculescu *et al.,* 2010; Khattab et al 2010). Contrary to this, we have not observed rural background as a significant risk factor for HIV and HCV seropositivity. However, HBV seropositivity was significantly more common among rural donors.

In this study 82.9% were replacement donors. In India most of the donation is done in the form of replacement donation by the relatives of the patients. Seroprevalance of all the TTIs (HIV, HCV and HBV) in this study was higher in replacement donors. Association of HBV infection with replacement donors was highly significant in this study. Replacement donors carry a relatively higher risk of transfusion transmitted infections due to chances of missing professional donors during donor screening procedures. Association of replacement donors carrying increased risk of TTIs is also found to be significant in various other studies (Nada and Atwa, 2013; Gupta *et al.,* 2004; Nirali *et al.,* 2013). This study highlights the importance of voluntary donation and careful screening of donors in case of unavoidable replacement donation.

We observed that younger age group and replacement donation are the significant sociodemographic risk factors associated with TTIs. Careful and systematic screening of all the risk groups is required to improve the safety of the blood supply.

Table.1 Donors characteristics

Factor	No	Percentage
Age		
18–40	85822	72.0
41–60	33372	28.0
Sex		
Male	116808	98.0
female	2386	2.0
Residence		
Rural	81648	68.5
urban	37546	31.5
Donation type		
Voluntary	20384	17.1
Replacement	98810	82.9

Table.2 Seropositivity

Type of infection	Number of positives	% seropositivity
HIV	108	.09
HCV	263	.22
HBSAG	1896	1.59
Total	2267	

Table.3 Association of seropositivity with risk factors

Risk factor	HIV (%)	P value	HCV (%)	P value	HbsAg (%)	P value
Age						
18-40	61 (.071)	.0005	232 (.270)	.001	1621 (1.889)	.0001
41-60	47 (.141)		31 (.092)		275 (.824)	
Sex						
Male	105 (.09)	.8162	258 (.221)	.907	1879 (1.609)	.0007
female	3 (.125)		5 (.209)		17 (.712)	
Residence						
rural	79 (.095)	.4289	186 (.228)	.477	1603(1.963)	.0001
Urban	30 (.080)		77 (.205)		293 (.780)	
Donation						
Voluntary	11 (.053)	.07	33 (.162)	.059	224 (1.098)	.0001
replacement	97 (.098)		230 (.233)		1672 (1.692)	

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