

Patterns of infections among blood donors in a tertiary care centre: A retrospective study

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ABSTRACT

Background. Transfusion-transmitted infections continue to be a threat to safe transfusion practices. We analysed the prevalence and patterns of co-infections among voluntary and replacement donors.

Methods. Blood donations collected over a 5-year period were studied for the type of donation (voluntary or replacement), number of seroreactive cases and the number, type and distribution of co-infections.

Results. Of the 42 439 units of blood collected over a 5-year period, 19 118 (45%) were from voluntary and 23 321 (55%) from replacement donors. There were 1603 seroreactive cases (3.8%). These included 250 with HIV (0.6%), 734 with hepatitis B surface antigen (HBsAg; 1.7%), 337 with hepatitis C virus (HCV; 0.8%) and 282 (0.7%) with VDRL (Venereal Diseases Research Laboratory) reactivity. Twenty-three (0.05%) of these had ≥ 2 seroreactive infections; 20 of these were in replacement donors and only 3 in voluntary donors and the difference was statistically significant ($p < 0.005$). Among HIV seropositive donors, there were 4 seroreactive for syphilis and 5 for HBsAg. Among HIV seronegative donors, 5 were seroreactive for HBsAg and VDRL, 4 for HCV and VDRL, and 2 for HBsAg and HCV. One person was seroreactive for HIV, HBsAg and VDRL. The multiple infection rate showed a decreasing trend over the years.

Conclusion. Multiple infections pose a small but definite risk to the recipients of blood products. Voluntary donations are safer as compared with replacement ones and need to be encouraged.

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INTRODUCTION

Despite stringent donor screening and testing practices, safe blood free from transfusion-transmitted infections (TTIs) remains an elusive goal. Although technological advancements have led to the development of more sensitive methods to detect markers of TTIs, the problems of 'window period', false-negative results, prevalence of asymptomatic carriers, genetic variability in viral strains and technical errors remain.¹ Although there are many studies on the prevalence of TTIs in blood donors,^{1–4} data on the presence of co-infection with more than one TTI is sparse.^{2,5} We analysed the

prevalence and patterns of co-infections among voluntary and replacement donors in our region over a 5-year period.

METHODS

The study was done at the Department of Transfusion Medicine, Government Medical College and Hospital, Chandigarh over a period of 5 years (2001–05). All blood donations collected over this period were included. The donors were either voluntary or replacement donors. Voluntary donations were taken in the blood bank or at voluntary blood donation camps. Replacement donors were either relatives or friends of patients. All samples were screened for hepatitis B surface antigen (HBsAg; Hepalisa, J. Mitra), anti-human immunodeficiency virus antibodies (HIV Ab; HIV 3rd generation kit for detection of antibodies to HIV1 and HIV2, J. Mitra), anti-hepatitis C virus antibodies (HCV Ab; MicroELISA 3rd generation, J. Mitra) and Venereal Diseases Research Laboratory (VDRL) reactivity (Carbogen kit, Tulip Diagnostics). The total number of seroreactive cases and their distribution were noted. Further, within the seroreactive group, cases with a combination of ≥ 2 TTIs were labelled as co-infection. The number, type and distribution of co-infections were noted and the findings were analysed.

RESULTS

A total of 42 439 blood units were collected over the 5-year period. Of these, 19 118 (45%) were voluntary and 23 321 (55%) were replacement donors. There was a change in the trend of the type of donors towards the later years with an increase in the number of voluntary donors, from 28.2% in 2001 to 56.5% in 2005 (Table I).

Of the 42 439 donations, there were 1603 seroreactive cases (3.8%). These included 250 cases of HIV (0.6%), 734 HBV (1.7%), 337 HCV (0.8%) and 282 (0.7%) of VDRL reactivity. The comparative seropositivity of voluntary and replacement donors is shown in Table II. Twenty-three (0.05%) of these had co-infection (≥ 2 TTIs) with the maximum being in the age group of 21–35 years (17 of 23; 74%). Only 1 woman had a co-infection. The co-infection rate showed an overall decreasing trend over the years but this was not statistically significant ($p > 0.1$).

Twenty of the 23 donors seroreactive for ≥ 2 infections were replacement donors and the difference with voluntary donors was significant ($p < 0.005$). Of the 23 blood donors with co-infections, 11 were HIV seroreactive. Four of these were seroreactive with VDRL, 5 with HBsAg and 1 with HCV. Among the 11 HIV seronegative blood donors, HBsAg and VDRL seroreactivity was present in 5 donors followed by HCV and VDRL in 4, and HBsAg and HCV in 2. One donor was seroreactive to HIV, HBsAg and VDRL.

DISCUSSION

TTIs continue to be a threat to safe transfusion practices. With every unit of blood, there is a 1% chance of a transfusion-associated problem including TTIs.⁴ Professional donors and

TABLE I. Trends in voluntary and replacement blood donation

Year	Total donations	Voluntary (%)	Replacement (%)
2001	7250	2048 (28.2)	5202 (71.8)
2002	8277	2366 (28.6)	5911 (71.4)
2003	7998	4184 (52.3)	3814 (47.7)
2004	9342	5115 (54.8)	4227 (45.2)
2005	9572	5405 (56.5)	4167 (43.5)
Total	42 439	19 118 (45)	23 321 (55)

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donors with high risk behaviour such as drug addicts, homosexuals and commercial sex workers constitute the major risk segment.

In our study, voluntary donations were about 45% of the total. In northern India, the voluntary donor rates vary from 9.1% to 52.3%^{6,7} and the National AIDS Control Organization (NACO) website (<http://www.nacoonline.org/upload/Final%20Publications/Blood%20Safety/voluntary%20blood%20donation.pdf>) suggests that in 2007, voluntary donations in India were about 55%. We encountered a steady rise in voluntary donors from about 28% in 2001 to about 56% in 2004, a trend noted in other studies too.^{1,6,7} However, replacement donors still comprise a large proportion of blood donors.⁶ Many studies have estimated the prevalence of TTIs in voluntary and replacement blood donors (Table III). All studies have shown that replacement donors have higher seroreactivity rates than voluntary donors due to a number of factors including concealing high risk behaviour and paid donors posing as relatives. Similarly, ≥ 2 TTIs were also higher in replacement (86.9%) than voluntary (13.1%) donors and the difference was significant ($p < 0.005$). Although ≥ 2 TTIs showed a decreasing trend over the years, the difference was not significant ($p > 0.1$). 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 TTIs in accordance with the National Blood Policy.

Data on the prevalence of ≥ 2 TTIs is limited. Kapur and Mittal found that in HIV-positive donors, HBsAg was positive in 12.2% while VDRL was reactive in 11.8%.⁸ Jain *et al.*⁹ estimated the seroprevalence of hepatitis virus in patients infected with HIV and found that 9.9% of patients were HBsAg-positive, 6.3% were HCV-positive and about 1% had dual infection with HBV and HCV. However, they studied patients enrolled to receive antiretroviral therapy and not blood donors. Mathai *et al.*² found that of 31 942 donors screened over a 6-year period, mixed infections were seen in only 10 donors (0.03%). We found that 23 of 42 439 donors screened over a 5-year period had co-infection

(0.05%). As is evident, the prevalence of more than one TTI is very low.

Studies on the prevalence of hepatitis viruses in patients with HIV have shown the HIV and HBV/HCV co-infection rate to be 12%–15%.^{10–12} However, studies from India show that this varies with the geographical region with rates of 9%–30% for HBV and 2%–8% for HCV have been reported.^{13–16} We encountered HIV and HBV in 5 of 23 (21.7%) and HCV in 2 of 23 (8.6%) co-infections. Many factors favour mixed infections including a high degree of epidemiological similarity between the HIV and hepatitis viruses. They have similar routes of transmission, risk factors such as high risk sexual behaviour and a higher prevalence with other sexually transmitted diseases such as syphilis. It is important to detect these as ≥ 2 TTIs would pose a greater threat to the recipient of the infected blood.

We found a higher rate of VDRL seroreactivity than that in other studies.¹⁷ This may be because we did not use any other test to confirm the presence of syphilis. Syphilis infection can increase the susceptibility to HIV infection. For its part, HIV can alter the clinical course of syphilis, increase the likelihood of relapse, and confound the diagnosis of neurosyphilis. In a study done to analyse the association of HIV infection with hepatitis B and syphilis in blood donors, of the 60 Western blot confirmed HIV-positive blood samples, none were positive for HBsAg and 4 were positive for syphilis.¹⁷ In contrast, we found an association of both syphilis and hepatitis B with HIV in blood donors. This reflects the trend in the general population.^{10–12}

In conclusion, we found ≥ 2 TTIs in both voluntary and replacement donors. This emphasizes the need for highly sensitive donor screening techniques to enable the detection of TTIs. These pose a definite risk to the recipient of the blood. Due to a similarity in risk factors and routes of transmission, public awareness and education would go a long way in curbing the prevalence of these infections and increasing blood safety. In the West, the practice of donor self-exclusion helps in the deferral of high risk donors. However, due to low socioeconomic status and lack of awareness,

TABLE II. Seroreactivity of voluntary and replacement donors

Year	HIV		HBV		HCV		VDRL	
	Voluntary	Replacement	Voluntary	Replacement	Voluntary	Replacement	Voluntary	Replacement
2001	16	69	43	119	10	57	12	35
2002	24	86	45	99	5	26	8	59
2003	4	9	60	61	22	31	13	36
2004	13	11	73	89	63	55	22	44
2005	7	11	57	88	33	35	25	28
Total (%)	64 (0.15)	186 (0.44)	278 (0.65)	456 (1.07)	133 (0.3)	204 (0.5)	80 (0.19)	202 (0.48)

HIV human immunodeficiency virus HBV hepatitis B virus HCV hepatitis C virus VDRL venereal diseases research laboratory

TABLE III. Prevalence of transfusion-transmissible infections in studies from India

Study, duration	HIV		HBV		HCV		VDRL	
	Voluntary	Replacement	Voluntary	Replacement	Voluntary	Replacement	Voluntary	Replacement
Singh <i>et al.</i> , ¹ Delhi, 1997–99	0.8	0.8	1.9	1.2	3.0	1.3	–	–
Garg <i>et al.</i> , ⁴ western region, 1994–98	0.4	0.2	3.5	2.6	0.23	0.13	–	–
Sharma <i>et al.</i> , ⁷ Chandigarh, 1997–2002	0.45	0.32	1.26	0.91	0.52	0.23	0.57	0.26
Our study, 2001–05	0.44	0.15	1.07	0.65	0.5	0.3	0.48	0.19

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the implementation of donor self-exclusion is difficult in India. Voluntary donations are safer as compared to replacement ones and should be encouraged. Efforts should be made to increase the number of voluntary donors and reduce replacement donations to a minimum.

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Obituaries

Many doctors in India practise medicine in difficult areas under trying circumstances and resist the attraction of better prospects in western countries and in the Middle East. They die without their contributions to our country being acknowledged.

The National Medical Journal of India wishes to recognize the efforts of these doctors. We invite short accounts of the life and work of a recently deceased colleague by a friend, student or relative. The account in about 500 to 1000 words should describe his or her education and training and highlight the achievements as well as disappointments. A photograph should accompany the obituary.

—Editor