

Original Research Article

Seroprevalence trends of transfusion transmitted infections among blood donors in a tertiary care hospital of Himachal Pradesh, India

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ABSTRACT

Background: Transfusion transmitted infections (TTIs) is a major concern for patients and physicians worldwide. Blood banks in all health care institutions worldwide screen blood for TTIs and ensure that only non-reactive blood is released for clinical use. The present study aimed to study the seroprevalence and trends of transfusion transmitted infections in blood donors in Shimla district of Himachal Pradesh, India.

Methods: retrospective review of blood donor's hospital records (replacement donors and as voluntary donors) covering the period January 2008 to December 2014 was conducted. The serological results for Hepatitis B, Hepatitis C, HIV, syphilis and malaria were retrieved.

Results: A total of 39,083 blood donors of both sexes attended the blood bank during this period. Overall, HBC, HIV, syphilis and malaria rate for blood donors was found to be 0.45%, 0.16%, 0.08%, 0.07% and 0.003% respectively. There is a downward trend in seroprevalence of all screened TTIs namely HBV, HCV, HIV and syphilis and malaria from 2008-2011.

Conclusions: The study exhibits that over a period of years there is rise in voluntary blood donations which is heartening and encouraging. Trend analysis for prevalence TTIs among blood donors has shown a decreasing trend. It is recommended that continual quality assured screening of donated blood should be carried out as per the prescribed norms to deal with acquired TTI's.

Keywords: Seroprevalence, Transfusion transmissible infections, Voluntary and replacement blood donors

INTRODUCTION

Blood transfusion, apart from being an integral part of medical or surgical management, has public health importance. Although it is lifesaving in innumerable situations, it is quick and easy route for transmission of infectious agents which are continue to be a major challenge for Blood transfusion organizations across the world. Transfusion transmitted infection (TTI) is a bacteria, virus or parasite that can be transmitted in donated blood through a transfusion to a recipient. According to World Health Organization it is mandatory to screen pre-transfusion blood test for TTIS namely

HIV, hepatitis B, hepatitis C viruses, syphilis and malaria. All these infectious disease screening must be negative in order to release the blood unit for transfusion.¹⁻³

In India, Government of India published National Blood Policy in the year 2002. The objective of the policy is to provide safe, adequate quantity of blood, blood components and products. All blood banks are empanelled by the government and all authorized centers have been instructed to follow blood safety guidelines as listed by the National Aids Control Organization (NACO). Stricter control over the quality of blood and its

products has been done to ensure that only non-reactive blood and blood components are released for clinical use.⁴

Trend analysis of TTIs is useful in evaluating the efficacy of the currently employed screening procedures. This enables policy makers to suggest strategies for ensuring safe blood. Against this backdrop, the study was conducted to study the trends of various TTIs among voluntary and replacement blood donors at Indira Gandhi Medical College and Hospital and at outreach voluntary blood donation camps in Shimla, Himachal Pradesh from the year 2008 to 2014.

METHODS

A retrospective review of blood donor's hospital records was conducted for a period of 7 years from January 2008 to December 2014. All blood donors who reported to blood bank at IGMC, Shimla, Himachal Pradesh, India or enrolled in outreach voluntary blood donation camps during study period and who satisfied the criteria for blood donation were included in this study.

The inclusion criteria included age between 18 - 60 years, minimum weight of 50Kg, and minimum hemoglobin level minimum of 12.5%, pulse rate between 50 to 100mm without any irregularities, blood pressure diastolic 50 to 100 mm Hg, systolic blood pressure 100 to 180 mm Hg, normal body temperature and oral temperature not exceeding 37.5 degree Celsius.

Before donation the prospective donors were medical screened by filling a questionnaire regarding diseases followed by a physical checkup. After this 5 ml blood

sample was collected from each donor. It was later centrifuged and the sera were separated and analyzed. Two kits were used based on WHO recommendation of two different testing strategies involving enzyme-linked immunosorbent assay (ELISA) and rapid assays for surveillance.

All tests were performed in accordance with the instruction of the reagent manufacturer. Quality of the reagent was tested beforehand. Appropriate control was incorporated in all test procedures. All reactive samples were labeled as seropositive, disinfected and discarded.

The data entry was carried out using Microsoft Office Excel worksheet and percentage and proportions for each variable was calculated. The outcome variable was serological status of the selected individual, whether positive or negative for TTIs. Informed written consent was taken from all donors. The permission from head of the institution and clearance from Institutional Ethics Committee was obtained.

RESULTS

An overall of 39,083 whole blood donations were collected from 2008 to 2014 among which 23,578 (60.3%) were voluntary donations and 15,505 (39.7%) were replacement donations.

Demographic characteristics associated with all donations shows that 92.6% of the donations came from male donors (Table 1). Overall, the major infection among the TTIs was Hepatitis B (0.45%) followed by HCV (0.16%). The seroprevalence of HIV, syphilis and malaria was 0.08%, 0.07% and 0.003% respectively.

Table 1: Time trend of total blood collection, gender distribution and type of donors from 2008-2014.

Year	Total blood donors (n)	Gender distribution		Type of donor	
		Male n (%)	Female n (%)	Voluntary n (%)	Replacement n (%)
2008	2936	2759 (94.0)	177 (6.0)	1018 (34.67)	1918 (65.33)
2009	3007	2856 (95.0)	151 (5.0)	1187 (39.47)	1820 (60.53)
2010	4004	3764 (94.0)	240 (6.0)	2087 (52.12)	1917 (47.88)
2011	4537	4095 (90.3)	442 (9.7)	2426 (53.47)	2111 (46.53)
2012	6239	5895 (94.5)	344 (5.5)	3760 (60.27)	2479 (39.73)
2013	7272	6937 (95.4)	335 (4.6)	3227 (44.37)	4045 (55.62)
2014	11088	9873 (89.0)	1215 (11.0)	9873 (89.04)	1215 (10.96)
Total	39083	36179 (92.6)	2904 (7.4)	23578 (60.33)	15505 (39.67)

The results exhibit an increasing trend in number of blood donors on yearly basis from 2008-2014. The yearly increase ranged from 2.4% (2008-2009) to 71.6% (2013-2014). Also the trend analysis shows a declining trend of replacement donors in comparison to voluntary donors. While in the year 2008 merely 34% constituted voluntary

donors, the proportion increased to 89% in the year 2014. Also there was a declining prevalence trend of all TTIs over these seven years. HBV prevalence declined from 0.95% in 2008 to 0.45 in 2014. Similarly HCV declined from 0.34 in 2008 to 0.03 in 2014 (Table 2).

DISCUSSION

In present study, overall the voluntary donors were more than and replacement donors. Also, over a period of years there was declining trends of replacement donors and increasing trend of voluntary donors (Figure 1). These findings are similar to the studies done by Gupta PK et al

and Pallavi P et al.^{5,6} This may be attributed to the fact that Himachal Pradesh state government launched the voluntary blood donation program which may have resulted in the increase in the voluntary donations.

We observed that there was a preponderance of males over females for blood donation (Figure 2).

Table 2: Trend of prevalence of TTIs among blood donors from 2008-2014.

Year	HBSAg n (%)	HCV n (%)	HIV n (%)	VDRL n (%)	Malaria n (%)
2008	28 (0.95)	10 (0.34)	10 (0.34)	1 (0.03)	0 (0.0)
2009	10 (0.33)	14 (0.47)	4 (0.13)	0 (0)	0 (0.0)
2010	23 (0.57)	17 (0.42)	7 (0.17)	0 (0)	0 (0.0)
2011	20 (0.44)	4 (0.09)	3 (0.07)	0 (0)	0 (0.0)
2012	27 (0.43)	3 (0.05)	3 (0.05)	3 (0.05)	0 (0.0)
2013	30 (0.41)	11 (0.15)	2 (0.03)	7 (0.1)	0 (0.0)
2014	37 (0.33)	2 (0.02)	3 (0.03)	15 (0.14)	1 (0.01)
Total	175 (0.45)	61 (0.16)	32 (0.08)	26 (0.07)	1 (0.003)

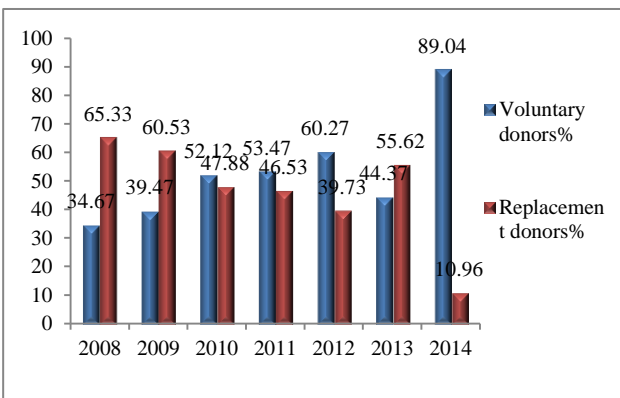


Figure 1: Trends of voluntary and replacement donors from 2008-2014.

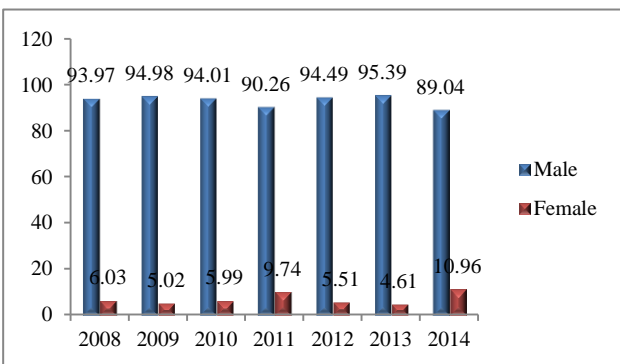


Figure 2: Trends of Sex wise distribution of healthy donors from 2008-2014.

This may be due to the fact that Indian females are mostly anemic and thus 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.

The present study revealed an overall seroprevalence of HBV at 0.45% and declining trends across the years which is similar to findings by Gupta et al, Mahapatra et al and Pailoor et al (Figure 3).^{5,7,8} For hepatitis C, in our study the estimated prevalence was 0.16% which is similar to that reported by Mahapatra et al.⁷ A much higher level of prevalence has been reported in studies conducted by Sukrutha R et al (0.50%), Sawke N et al (0.57%), Pahuja S (0.66%).⁹⁻¹¹ A study conducted by Pailoor et al has reported a lower prevalence level (0.06%).⁷ This variation in the HCV seroprevalence in different studies in India could be due to the use of different ELISA test kits having different sensitivities and specificities.

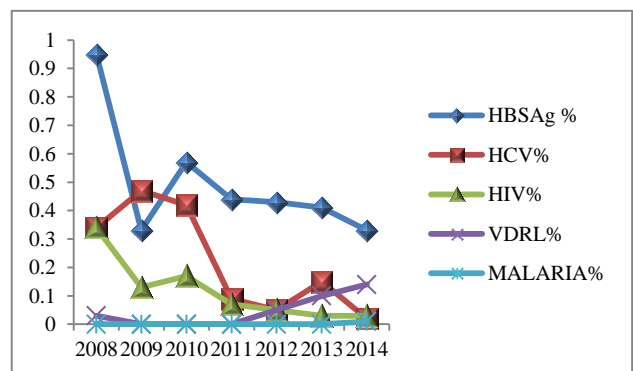


Figure 3: Prevalence rate of TTIs in Blood Donors from 2008-2014.

In the present study, the prevalence of HIV was found to be 0.08%. Similar findings by Gupta et al, Giri et al, Pailoor et al in their study.^{5,8,12}

A lower seroprevalence has been reported by Mahapatra et al (0.025%) however a much higher seroprevalence has been reported in their study by Sukrutha R et al (0.26%) and Karmakar PR (0.60%).^{9,13} For syphilis, the seroprevalence was found to be 0.07% in the present study, similar to findings by Giri et al, Mythreyee et al.^{12,14} Studies conducted by Sabharwal ER (0.51%) and Gupta N (0.85%) have reported higher prevalence.^{5,15} However, studies conducted by Mahapatra S et al. (0.025%) and Gupta AK (0.04%) have reported lower prevalence.^{7,16}

In the present study, the prevalence of malaria was found to be 0.003%. Similar findings by Negi et al whereas zero seroprevalence was reported by Gupta et al, Sabharwal et al Giri et al Mythreyee et al.^{5,12,15,17} A comparatively higher seroprevalence of 0.01 have been reported by Pailoor et al.⁸ The consistent low levels of prevalence of TTIs in present study is an indicative of the fact that the efforts of both the various governmental and nongovernmental organizations are probably yielding good results.

CONCLUSION

The study exhibits that over a period of years there is rise in voluntary blood donations which is heartening and encouraging. For increasing blood donation among females there is a need to create awareness among them and motivating them to come forward to donate blood voluntarily.

Also, present study reveals that over this seven year period, trend analysis for risks of TTIs has shown a decreasing trend. Mandatory screening, strict implementation of donor selection criteria along with use of sensitive screening test are warranted to deal with acquired TTIs.

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Conflict of interest: None declared

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

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