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RESEARCH ARTICLE

Seroprevalence of the Blood Borne Infection in Blood Donors: Our 11 year (2001-2011) experience in a tertiary care teaching hospital at Amritsar (Punjab).

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Abstract

Screening of blood before transfusion is an effective strategy to reduce transfusion transmitted infections (TTI) . Limited surveillance data exist in both for the state of Punjab and for the city of Amritsar for the seroprevalence of Hepatitis B and C , HIV and Syphilis.

Material and methods- This was a retrospective study done on blood donors at a tertiary care hospital in (Amritsar)Punjab. Blood bank records were retrieved to calculate seroprevalence rates of various TTI's (stand alone or in combination) over a period of 11 years (2001 to 2011).

Results- A total of 56915 donors were screened of which 1935 (5.39%) donors had seroprevalence for TTI's . Individual seroprevalence rates of HIV, HBV, HCV, Syphilis were 0.16%, 0.75 % , 1.79 % and 0.67 % respectively. Hence ,HCV was the most commonly recorded TTI over a period of 11 years . In the present study only 0.036% donors had evidence of multiple infections .

Conclusion- Although the overall rates of all the TTI's were comparable with work of other researchers, but it was noted that the seroprevalence rates for HCV and VDRL fluctuated greatly during the study period while the seroprevalence of HIV and HBsAg were relatively consistent . The study thus concludes that the prevalence rates of HCV & VDRL need to be studied for proper surveillance and necessary steps taken for ultimate goal of providing safe blood to recipients.

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INTRODUCTION

Blood transfusion is a life saving intervention and millions of lives are saved each year globally through this procedure.^[1] Unsafe blood remains a major threat for the global spread of transfusion transmissible infections (TTI).According to WHO , safe blood is a universal right , which means blood that will not cause any harm to the recipient and that has been fully screened and is not contaminated by any blood borne disease such as HIV, Hepatitis , Syphilis or Malaria. ^[2] .Strategies (such as donor selection criteria , and improved tools for testing TTI)have been put in place which have been extremely effective in controlling TTI's but transmission of diseases still occurs. The compromised safety of blood supply becomes important in developing country (such as India) as these countries depend heavily on replacement donors, and the escalating costs of medical care arising as a sequelae of TTI's leads to poor human developmental indices. It is thus essential to know the prevalence rates of TTI's so as to compare geographical variation among various regions in India (at city, state, and national level)and to predict the trend so as to utilize the data for implementing guidelines for the control of TTI's in blood donors. In the present study, we assessed the prevalence of HIV, HCV, HBV, syphilis and their co-infections in our donor population in a blood bank of a tertiary care teaching hospital (catering to both urban and rural population) and to analyze their trends over a period of 11 years (2001-2011) .

MATERIALS AND METHODS-

A retrospective study of 56,915 consecutive blood donors (both voluntary and replacement) over the period of 11 years (January 2001 to December 2011) was conducted by retrieving the data from the archives of the blood bank records at Sri Guru Ram Das Medical College and Hospital, Amritsar (Punjab), India.

The replacement donors primarily consisted of friends, family members, or relatives of the patients. Voluntary donors were students of the college and from the various camps organized by the blood bank from time to time in and around the city.

A detailed pre-donation questionnaire was included in the donor registration form. Information regarding risk factors past history of surgery, prior hospitalization, history of blood transfusion and donation, occupation, high risk behavior, and history of vaccination, or any episode of jaundice was recorded.

All donors were screened for anti HCV antibodies (HCV Ab; Micro ELISA 3rd generation , Qualisa , RFCL) , hepatitis B surface antigen (HBsAg; Hepalisa J; Glaxo/Mitra/ Qualisa , RFCL) , anti Human Immunodeficiency virus antibodies (HIV Ab ; HIV 4th Generation kit for detection of Antibodies to HIV 1 AND HIV 2 , J Mitra /Glaxo/nQualisa ,RFCL) and Venereal Diseases Research Laboratory activity-VDRL (Syphilis rapid test - Acon, SD Syphilis3.0/ Span Diagnostics).

The data derived was recorded in the form of simple tables for easy comparison .

RESULTS-

Of the 56915 consecutive blood donors included in the study, 82.22% were replacement donors, whereas; 17.77% were voluntary donors. [Table-1]

In the present study , 1935(3.39%) donors had serological evidence of TTI's. Of all these infected donors the infected donors with TTI's 1.08% (21/1935) had multiple co- infections .

Overall , HCV was the most common TTI recorded having a sero-prevalence rate of 1.79 % followed by HBV (0.75%), syphilis (0.67%) and HIV (0.16%) respectively. [Table-1]

In the present study, 21 donors who had evidence of these multiple infections ; (20/21;95.2%) donors had evidence of 2 co-infections simultaneously and only 1 donor had evidence more than 2 co infections . [Table 2 and 3].

The most common combinations were HBV & VDRL (7/21;33.3%), followed by HCV&VDRL and HCV & HIV with 4 cases each (19%) . Interestingly no case were recorded of HBV & HIV co-infection over a period of 11 years.

Table 1 - Prevalence of transfusion transmitted infections in donors

Year	Total no of donors	HIV Positive cases		HBsAg Positive cases		HCV Positive cases		Syphilis Positive cases	
		No .	Prevalence % age	No	Prevalence % age	No.	Prevalence % age	No	Prevalence in % age
2001	3296	9	0.27	51	1.54	60	1.82	11	0.33
2002	4616	9	0.19	41	0.88	90	1.94	08	0.17
2003	4913	12	0.24	34	0.69	56	1.13	11	0.22
2004	4699	13	0.27	26	0.55	81	1.72	10	0.21
2005	4720	06	0.12	24	0.50	96	2.03	14	0.29
2006	4570	09	0.19	36	0.78	86	1.80	17	0.37
2007	4379	04	0.09	20	0.45	80	1.80	16	0.36
2008	4901	09	0.18	34	0.69	65	1.32	87	1.70
2009	6215	04	0.061	28	0.45	59	0.94	48	0.77
2010	6843	05	0.071	61	0.89	66	0.96	63	0.92
2011	7764	10	0.12	51	0.65	67	0.84	69	1.32

Total	56915	94	0.165	431	0.757	1024	1.79	386	0.67
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Table- 2 Year wise frequency of Co-infections from year 2001-2011 in Blood Donors

Sr no	Infections	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1	HBV&HCV						1			1		1
2	HBV&HIV	-	-									
3	HCV&VDRL	1		1	1					1		
4	HBV&VDRL			1		1		1	2	1	1	
5	HCV&HIV		1	1			1		1			
6	HIV&VDRL							1	1			
7	HBV&HCV&VDRL									1		

Table -3 Prevalence Rates of various combinations of multiple infections

Sr no.	Infection	No	%age
1.	HBV&HCV	3	0.0052
2.	HBV&HIV	00	00
3.	HCV&VDRL	4	0.0070
4.	HBV&VDRL	7	0.0122
5.	HCV&HIV	4	0.0070
6.	HIV&VDRL	2	0.0035
7.	HBV&HCV&VDRL	1	0.0017
	Total	21	0.036

Table -4 Comparison of TTI Prevalence in different parts of India

Zone	HIV%	HBsAg %	HCV%	Syphilis	Reference
North	0.56	2.23	0.66	-	Pahuja et al (2007) ^[16]
East	0.35	1.66	0.35	0.80	Bhattacharya P et al (2010) ^[18]
West	0.15	0.88	0.101	0.22	Shah et al (2013) ^[30]
South	0.39	1.41	0.84	0.08	Bhawani et al (2010) ^[23]
Present Study	0.16	0.75	1.79	0.67	(2013)

DISCUSSION-

The majority of donors in the present study were replacement donors (82.22%) and similar findings have been reported from other parts of India. In a study by Kochhar et al.^[3] and Singh et al.^[4]; 96.53 % and 82.4% of their respective donors were replacement donors. In northern India, the voluntary donor rates vary from 9.1% to 52.3%^[5,6] which is almost similar to the present study comprising of 17.77% voluntary donors. A report by the National AIDS Control Organization (NACO) in 2007 estimates the rate of voluntary donations in India to be 55%. A steady rise in voluntary donations from 11.3% in 2001 to about 24.5% in 2011 was observed in the present study and such an increase in rate has also been reported by others studies across India.^[4,5,6,7] Replacement donors however still comprise a large proportion of blood donors^[5] and this probably reflects a deficiency of proper health education programs and the indifferent attitude towards health sector. The need of the hour is to shift the burden to voluntary blood donations has been emphasized by various authorities and researchers. It has been emphasized by various authors and researchers involved in transfusion medicine that a large multidisciplinary approach towards enhancement of voluntary donations needs to be undertaken by various government agencies.

The second and the principal part of the present study which tried to calculate the sero-prevalance rates of TTI's in 56915 donors screened during the 11 years found that 1935 (3.39%) donors were infected by one or more blood transmissible infectious agents.

Results of our study shows that seroprevalence of HCV in healthy donors is very high, (1.79 %; 1024/56915) followed by Hepatitis B virus infection (0.75 %; 431/56915). Interestingly HIV was the least common of the co infections recorded in the present study (0.16%; 94/56915). A gradual increase in HBV&HCV seropositivity documented in the study can be attributed to the increase in the narcotic abuse in state of Punjab which has been reported by various government agencies as the sharing of the needles and syringes predisposes to HBV &HCV infection.

HCV Prevalence:

Anti- HCV positivity 1.79% (with a wide range of fluctuation 0.86% - 2.03%) in the present study was almost similar to that reported in other studies.^[4,8-14] Although literature search reveals that the higher prevalence rates of 6% and 15.9% have also been reported by researchers in India^[15,19].

Infective rates from other regions of India are compared in Table -4.

. Also as [Table -1] reflects the rates have been consistently in the range of 0.86 – 2.03% over a period of 11 year.

HBsAg Prevalence :

Over a period of eleven years; the prevalence of HBsAg was 0.75% (range 0.45% - 1.54%) which corroborates with work done by researchers in rest of the country^[20,16][Table-4]. A low prevalence of HBV of 0.62% has been reported in a southern Indian state of Karnataka.^[21] Few researchers Matee et al and Salawu *et al* have reported a very high rates higher seropositivity for HBsAg^{8,9} (8.8% and 7.50% respectively)[Table-4]

Syphilis prevalence:

The overall positivity for syphilis (0.67%) was lower than the other studies conducted in various parts of India.^[3,4,8-10] Although a very low prevalence rates have also been recorded (0.13 % by Awasthi et al and 0.08 % by Bhawani et al)^[22,23] but high rates of 2.8 % have also been recorded by Gupta R et al.^[24] The fluctuation range recorded over a period of 11 years in the present study was recorded as 0.12%-1.70% [Table -4]

HIV Prevalence :

Rate of HIV recorded in our study (0.16%) is comparable to the reported prevalence rates of 0.12% - 0.60% among blood donors in rest of India as compared in Table -4.

≥2 Transfusion Transmitted Infection Prevalence :

Data on the prevalence of ≥2 TTIs is limited.^[7] In our study 21 donors (0.036%) had co-infections with maximal cases of HBV & Syphilis (11 donors) This is in contrast to the findings of other researchers such as Jain et al who have found maximal co-infectivity with HBV and HIV (9.9%)^[25]. Very low overall

seropositivity rates of multiple infections have been reported (0.03%) by Mathai et al, where again the most common co- infection was HBV- HIV.^[26]

No association of HBV was found with HIV infection in the present study ;where as studies on prevalence of hepatitis viruses in patients with HIV from various parts of India as has been reported as high as 12-15%. A point to note is that the absence of HBsAg in blood donors may not be sufficient to ensure the lack of circulating HBV and hence there are chances of missing occult HBV infection.^[8] A study in central India has shown a positivity of 2.2% for HBV DNA in donors who tested negative for HBsAg by ELISA.^[27] Majority of the problems are due to prevalence of asymptomatic carriers in the society, as well as, blood donations during the window period of infections. Most government hospital blood banks in India use ELISA test kits, which cannot detect HIV before 22 days, HBV before 59 days and HCV before 82 days of infection.^[28] Considering the vast population of the country, even a very low prevalence amounts to a presence of large number of infected people.²⁶

CONCLUSION-

Overall prevalence of all four TTI's in our blood bank was 3.39%. Thus the present study concludes that in view of the current rate prevalence of TTI's, we have to urgently consider the need to modulate and adopt newer sensitive technologies. Stringent measures need to be taken for blood donor screening, by using more sensitive methods to detect infections early, like Nucleic acid amplification technology (NAT) assays.

It is important to continue to monitor the trend in the prevalence of transfusion transmissible infections (TTI's) so as to assess the risk of TTI's in our pool of donors, and by inference, the risk in general population receiving such blood, bearing in mind the possibility of bleeding donors during the "window period" when they may be negative to the routine screening for antigen or antibody to infections being screening for antigen or antibody to infections being screened for.

Although the overall prevalence rates of TTI's in our blood bank were comparable but there was great fluctuation in seropositivity of HCV & VDRL (Table -1) over 11 years. Hence the prevalence of not only HCV & VDRL but also HIV, HBV and co- infections needs to be studied on a larger scale for better understanding of the impact on clinical outcome and treatment response.

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