

SEROPREVALENCE OF HIV, HBV, HCV AND SYPHILIS IN BLOOD DONORS AT A TERTIARY HOSPITAL (BLOOD BANK) IN VADODARA

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ABSTRACT

Background: Safe blood is a critical component in improving health care and in preventing the spread of infectious diseases. But the quality and safety of blood transfusion is still a concern for health-care personnel's. The infectious diseases for which blood donors are screened in the hospital include HIV, Hepatitis B and C and Syphilis.

Aims & Objective: To study seroprevalence of HIV, HBV, HCV and SYPHILIS in blood donors at Tertiary Hospital.

Material and Methods: This was Secondary data analysis. Data was procured from Blood bank of the tertiary hospital. All the blood donors in the records over a period of three years were included in the analysis. A through search of records revealed that total 27,407 donors had been screened over the period of three years Samples were screened for HIV, HBsAg, HCV and Syphilis. All reactive samples were retested before being labelled as seropositive. Seroprevalence of HIV, HBsAg, HCV and Syphilis; comparative analysis of three years data using Chi square for linear trend analysis; comparison between prevalence rates among voluntary and replacement donors using Chi square test.

Results: Of the 27,407 donors, 13,168 (48%) were replacement and 14,239 (52%) voluntary Donors; 95.40% were male. Seroprevalence of major blood-borne pathogens (HIV, HBV, HCV and Syphilis) was 1.67%. Seropositivity of HIV, HBsAg, anti- HCV, and syphilis was 0.30%, 0.85%, 0.21% and 0.25%, respectively. There was statistically significant difference ($p < 0.001$) in the seropositivity of various markers between voluntary and replacement donors.

Conclusion: On comparing the data of three years, an increasing trend in seroprevalence of HIV, HBsAg, anti- HCV was observed.

KEY-WORDS: Human immunodeficiency virus (HIV); Hepatitis B Virus (HBV); Hepatitis C Virus (HCV); Seroprevalence; Voluntary Blood Donors

Introduction

Blood transfusion is an integral and life-saving procedure of modern medicine, but simultaneously it carries the risk of transmitting the life-threatening transfusion-transmissible infectious agents such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis and malaria.^[1] Thus ensuring the safety of blood is a major concern in transfusion therapy. This has necessitated formulation of a National Blood Policy and development of a National Blood Program under NACP.^[2] The policy aims to ensure easily accessible and adequate supply of safe and quality blood and blood components collected / procured from a voluntary non-remunerated regular blood donor in well-equipped premises, which is free from transfusion transmitted infections; is stored and transported

under optimum conditions. Transfusion Transmitted Infections (TTIs) are a major problem associated with blood transfusion.^[1] Accurate estimates of risk of TTIs are essential for monitoring the safety of blood supply and evaluating the efficacy of the currently employed screening procedures. Monitoring the incidence of transfusion transmitted infections in blood donors is important for estimating the risk of transfusion and optimizing donor recruitment strategies to minimize transmission. Evaluating trends in blood donor infectious disease rates is essential for monitoring blood supply safety and donor screening effectiveness. The present study was carried out with the objective to assess the proportion of voluntary donors and find out the prevalence and trends of various TTIs from 2009-11.

Materials and Methods

Present study is based on secondary analysis of the data procured from Blood bank of the government run tertiary hospital in the central Gujarat, India. A total of 27,407 blood units from voluntary and replacement donors were collected and screened over the period of almost three years (January 2009 to November 2011). Samples were screened by enzyme linked immunosorbent assay (ELISA) kits from J Mitra and Co Ltd. for HIV-1 p²⁴ antigen and anti-HIV I and II (4th generation Microlisa - HIV Ag and Ab), HBsAg (Hepalisa) and anti-HCV (HCV Microlisa). Third generation anti-HCV ELISA test kits utilizing a combination of antigens with the sequence of both HCV structural and non-structural antigens i.e. Core, E1, E2, NS3, NS4 and NS5, with increased sensitivity and specificity were used. The ELISA was validated by the acceptance criteria laid down by the manufacturer for the absorbance of reagent blank as well mean absorbance of positive and negative controls provided with the test kits. The cut off value was calculated as per manufacturer's directions for reporting positive and negative results. Known positive and negative samples were used randomly as external controls in each screening. Screening for syphilis was carried out by using ultra rapid test strip from Acon Biotech (Hangzhou) Co. Ltd. All reactive samples were retested before being labelled as seropositive and then all the seropositive blood units were disinfected and discarded. Data entry and analysis was carried out by using Microsoft Excel spread sheet (version 2007) and seroprevalence of HIV, HBsAg, HCV and Syphilis was derived. Comparative analysis of three years data was done using Chi square for trend analysis. Prevalence rates were also compared among voluntary and replacement donors using Chi square test.

Voluntary blood donation refers to "A person who gives blood, plasma or other blood components of his/her own free will and receives no payment for it, either in the form of cash or in-kind which could be considered a substitute for money. This includes time off work, other than reasonably needed for the donation and travel. Small tokens, refreshments and reimbursement of the direct travel costs are compatible with voluntary, non-

remunerated blood donation. And *Replacement blood donor* refers to "donor who gives blood when it is required by a member of the patient's family or community. This may involve a hidden paid donation system in which the donor is paid by the patient's family".

Results

Of the total 27,407 Donors, 13,168 (48%) were Replacement and 14,239 (52%) were Voluntary Donors. Most of them (95.40%) were male donors (Table 1). The overall prevalence of HIV, HBsAg, HCV and syphilis was 0.30%, 0.85%, 0.21% and 0.25%, respectively (Figure 1). On comparing the data of three years, the numbers of blood donors were more or less similar in each year. The prevalence of HIV increased from 0.23% in 2009 to 0.36% in 2011 which is not statistically significant ($p=0.151$).

Table-1: Donor Category and Gender Distribution

Year	Total Donor	Voluntary Blood Donors		Replacement Blood Donors	
		Male	Female	Male	Female
2009	8085	4254	457	3375	29
2010	9707	4222	355	5097	33
2011 (up to Nov.)	9615	4601	350	4628	36
Total	27407	13077	1162	13070	98

Table-2: Overall Seropositivity and of HIV, HBV, HCV and Syphilis

Seropositivity	2009	2010	2011	Total
Total Units	8085	9707	9615	27407
HIV Positive	19 (0.24%)	29 (0.30%)	35 (0.36%)	83 (0.30%)
HBs Positive	53 (0.66%)	80 (0.82%)	102 (1.06%)	235 (0.86%)
HCV Positive	14 (0.17%)	13 (0.13%)	31 (0.32%)	58 (0.21%)
VDRL Positive	29 (0.36%)	22 (0.23%)	20 (0.21%)	71 (0.26%)
Total Positive	115 (1.42%)	144 (1.48%)	188 (1.96%)	447 (1.63%)

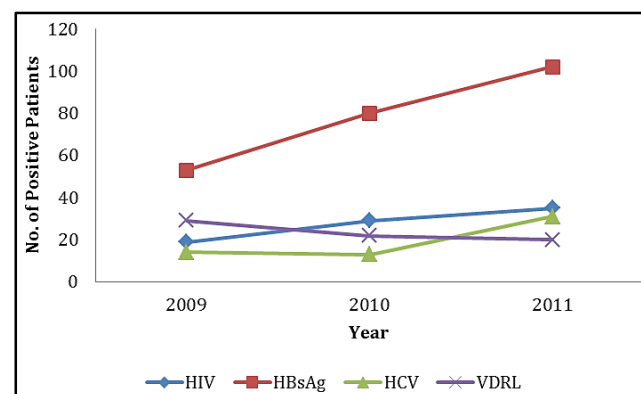


Figure-1: Overall Seropositivity and Trends of HIV, HBV, HCV and Syphilis

The prevalence of HBsAg positivity increased from 0.65% to 1.06%. So, this indicates an increasing trend over the period of three years duration which is statistically significant ($p=0.0045$). The prevalence of HCV decreased from 0.27% in 2009 to 0.13% in 2011 which is not statistically significant ($p=0.6221$). The prevalence of syphilis showed a decreasing trend from 0.35% in 2009 to 0.20% in 2011 which is statistically significant ($p=0.05$) (Figure 1).

The prevalence of HIV among replacement donors was 0.42% while in Voluntary donors it was 0.20% (Table 2). The HBsAg positivity among replacement donors was 1.10% while in voluntary donors it was 0.63% (Table 3). The HCV positivity in replacement donors was 0.24% while in voluntary donors it was 0.18% (Table 4). The VDRL positivity among replacement donors was 0.33% while in voluntary donors it was 0.19% (Table 5). The differences in the prevalence of HIV, HBsAg & VDRL positivity between replacement and voluntary donors were statistically significant ($P < 0.05$) while in HCV positivity the difference was not statistically significant ($P > 0.05$).

Table-3: HIV Positivity in Voluntary and Replacement Donors

HIV Status	Voluntary	Replacement	Total
Positive	28 (0.20%)	55 (0.42%)	83 (0.30%)
Negative	14211	13113	27324
Total	14239	13168	27407

Chi-square= 11.0704; $p = 0.0008$

Table-4: HBsAg Positivity in Voluntary and Replacement Donors

HBsAg Status	Voluntary	Replacement	Total
Positive	90 (0.63%)	145 (1.10%)	235 (0.85%)
Negative	14149	13023	27172
Total	14239	13168	27407

Chi-square=17.7084; $p = 0.000026$

Table-5: HCV Positivity in Voluntary and Replacement Donors

HCV Status	Voluntary	Replacement	Total
Positive	26 (0.18%)	32 (0.24%)	58 (0.21%)
Negative	14213	13136	27349
Total	14239	13168	27407

Chi-square=1.1825; $p = 0.2768$

Table-6: VDRL Positivity in Voluntary and Replacement Donors

VDRL Status	Voluntary	Replacement	Total
Positive	27 (0.19%)	44 (0.33%)	71 (0.25%)
Negative	14212	13124	27336
Total	14239	13168	27407

Chi-square=5.5302; $p = 0.0186$

Chi-square=5.5302; $p = 0.0186$

Discussion

Blood is a scarce and life-saving resource; however blood transfusion can be a source for transmitting life threatening infections if screening is not carried out properly. A well-organized Blood Transfusion Service (BTS) is a vital component of any health care delivery system. An integrated strategy for Blood Safety is required for elimination of transfusion transmitted infections (TTI) and for provision of safe and adequate blood. HIV, HBV, HCV and Syphilis infections are important blood-borne and transfusion transmitted infections throughout the world including India. It has been found that prevalence of HBsAg, anti-HCV and anti-HIV among blood donors or the general population varied from country to country.^[3]

Voluntary donors (52%) constituted half of the blood donors in our study, which is very less as compared to the annual report of Gujarat State AIDS Control Society (GSACS), 2010-11, in which voluntary blood donation was 79 %. In another study done by Col R Behl et al.^[4] 85.67% of their donors were replacement donors.

In this study, the overall prevalence of HIV seropositivity (0.30%) is higher than positivity annual report of GSACS, 2010-11, in which it was 0.15%. This rate is also higher (0.06%) than that found in a study done in Mangalore by Hilda Fernandes et al.^[5] This positivity rate is lower than that of other studies done by Bharat S et al.^[6] and Pallvi P et al.^[7]. In which it was 0.8% and 0.44% respectively. There was significant difference in the prevalence of HIV among voluntary and replacement donors. Similar results were seen in other studies done by Bharat S et al.^[6], Nanu A et al.^[8] which showed a lower prevalence of HIV positivity in voluntary donors.

There was significant increase in prevalence of HIV seropositivity over the three year period of the study, which is a finding concordant with another study done in Delhi by Makroo RN et al.^[9]

The prevalence of HBsAg seropositivity (0.85%) is higher than positivity in annual report of GSACS, 2010-11 (0.72%). This positivity rate is lower than that seen in a study by Bharat S et al.^[6] in which

HBsAg seropositivity rate was 1.8%. The prevalence rate was significantly higher amongst replacement donors as compared to voluntary donors. Other studies by Bharat S et al^[6] and Nanu A et al^[8] showed a lower seropositivity in replacement as compared to voluntary donors. There was no significant increase in the prevalence of HBsAg positivity in the last three years duration. However a study by Bhattacharya P et al^[10] showed a significant increase.

Anti-HCV positivity (0.21%) was lower than that reported by other studies by Pallavi P et al^[7] (0.23%), Jain A et al.^[11] (1.57%), and Das BK GB et al.^[12] (0.35%) and higher than another study by Fernandes H et al^[5] in which it was 0.06%. There was no significant difference in anti-HCV positivity in voluntary and replacement donors which is a finding similar to that in a study done by Col R Behl et al.^[4] Anti-HCV positivity showed a significantly increasing trend during the study period which is similar to another study by Amrutha Kumari B DS et al.^[13]

In this study, Syphilis positivity was 0.25%, which was more or less similar with a study done by Gupta A et al.^[14], in which it was 0.27%. A significant difference in prevalence was found among voluntary donors as compared to replacement donors which is similar to a study done by Matee MI et al.^[15]. The positivity for syphilis showed a significant downward trend over the study period which differs from a study done by Pallavi P et al.^[7].

Data management in blood bank is very robust, accurate and highly reliable. Hence, such prevalence study gives the effect of the cohort study, as if data were collected prospectively.

Conclusion

On comparing the data of three years, an increasing trend in seroprevalence of HIV, HBsAg, anti- HCV was observed.

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