Seroprevalence Of Hepatitis B Virus Infection Among Blood Donors In Local Population

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Citation

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Abstract

Objectives: To determine the seroprevalence of HBsAg in the local population in and around Vizianagaram(Andhra Pradesh)from April 2003 – Oct 2010 ; to compare the prevalence of seropositivity of HBsAg with other regions in India ; to compare the prevalence of HBsAg positivity in voluntary and replacement donors. Materials and methods: A retrospective study was conducted on blood donors over a period of 7yrs to assess the prevalence of hepatitis B virus infection. Hepacard , which uses the principle of one step immunoassay was used for screening the donors. Results: A retrospective study was carried on 8601 blood donors out of which 2560(29.76%) were voluntary donors and 6401(70.24%) were replacement donors .The prevalence of HBsAg seropositivity in replacement donors was found to be 2.45% ; in voluntary donors 2.54% and overall prevalence was estimated to be 2.48% . The prevalence of HBsAg positivity was not found to be significant among voluntary and replacement donors donors($p > 0.05$) . Whereas a significant result was observed in voluntary group over the study period ($p < 0.001$). Conclusion: The increasing prevalence of HBsAg can be reduced by more sensitive screening assays and proper donor selection.

INTRODUCTION

Hepatitis B infection has become an issue of global importance. Hepatitis B causes an estimated 1-2million deaths per year worldwide[1,10] and it is estimated that there are 300 million carriers of Hepatitis B virus in the world. Countries are classified on the basis of endemicity of Hepatitis B virus infection into high (8% or more)(like equatorial Africa , South East Asia, China , parts of South America), intermediate (2-7%) (like Eastern Europe, Middle East, South Asia) or low (<2%)(developed countries as North America and Australia) incidence countries[1].The prevalence of chronic hepatitis B infection in India ranges from 2-10% as shown by different studies[10]. This infection is the leading cause of morbidity and mortality not only because of the acute illness but also due to its chronic sequel like chronic hepatitis , cirrhosis and hepatocellular carcinoma.

Currently there are four recognized modes of hepatitis B infection – mother to child at birth (perinatal) , contact with infected person(horizontal) , sexual contact and parenteral route through blood/fluids. HBsAg in the serum is the earliest marker of active HBV infection (acute/chronic) being detectable even before elimination of transaminases and onset of clinical illness.

The strategies used to reduce the transfusion transmitted infections includes improving donor selection , testing the donated blood for specific antibodies against infectious agents , using autologous transfusion[2,3] but the transmission of disease still occurs[4] because of the inability to detect the disease in window phase of the infection , prevalence of asymptomatic carriers , false negative results , immunologically variant viruses and laboratory testing errors[5].To understand and assess the magnitude and dynamics of transmission of a disease in a community and for its control and prevention , the assessment and study of its prevalence is very important .

MATERIALS AND METHODS

The study was conducted in the blood bank, Department of Pathology , MIMS Medical College, Nellimarla , Vizianagaram. A total of 8601 units of blood were collected from donors (voluntary and replacement) from 2003 April to Oct 2010.They were carefully selected for donation after satisfactorily answering the donors questionnaire and passing the physical examination conducted by the physician-in-charge.

The family members, friends or relatives of the patients were categorized as replacement donors. People who donate blood without expecting any favour in return or in voluntary blood donation camps were classified as voluntary blood donors. All the samples were screened for Hepatitis B surface antigen using Hepacard (Biomed industries, India) (rapid chromatographic immunoassay) for qualitative detection of HBsAg in serum/plasma.. All the tests were performed in accordance with the manufacturer's instructions with adequate controls.

The statistical analysis of data was done using Pearson chi-square test for trends in proportions when proportions are very small.

RESULTS

A total of 8601 donors were screened over a period of 7yrs from Apr 2003-Oct 2010, of which 6041(70.24%) were replacement donors and 2560(29.76%) were voluntary donors. The year wise percentage is shown in the following table 1.

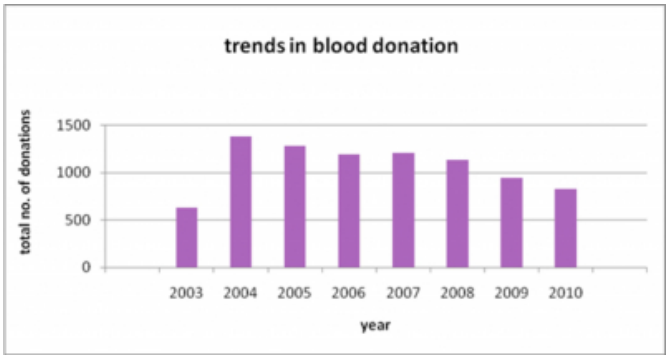
Figure 1

Table 1 : trends in voluntary and replacement blood donation

Year	Total no. of donors	No. of replacement donors	% of replacement donors	No. of voluntary donors	% of voluntary donors
2003	626	384	61.34	242	38.66
2004	1383	758	54.81	625	45.19
2005	1284	794	61.84	490	38.16
2006	1192	733	61.49	459	38.51
2007	1206	766	63.52	440	36.48
2008	1137	1058	93.05	79	6.95
2009	941	773	82.15	168	17.85
2010	832	775	93.15	57	6.85
Total	8602	6041	70.24	2560	29.76

Figure 2

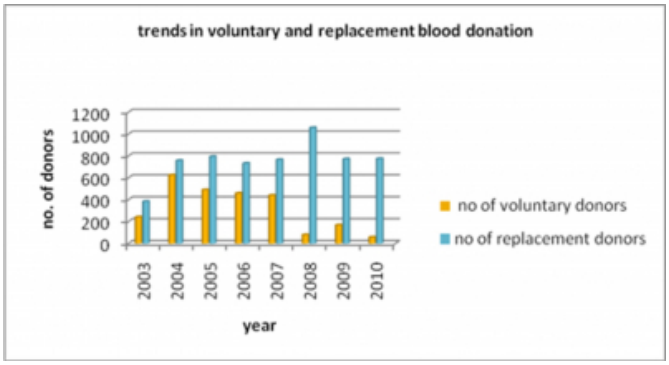
Fig.1: total number of blood donations from year 2003-2010



It can be clearly seen from the above graph (Fig.1) that there is a decrease in the total number of blood donors in our study ; especially after the year 2007.

Figure 3

Fig. 2 shows trends in voluntary and replacement blood donors from year 2003-2010



The Figure 2 depicts that there is no consistent trend (increase or decrease) among the replacement and voluntary donors during the study period but the number of replacement donors outnumbers the voluntary donors.

Figure 4

Table 2 : shows incidence of HBsAg among voluntary and replacement donors during 2003-2010

Year	HBsAg positive in replacement donors(no.)	% of HBsAg positive in replacement donors	HBsAg positive in voluntary donors(no.)	% of HBsAg positive in voluntary donors	Total no. of HBsAg positive cases	% of total HBsAg positive cases
2003	9	2.34	2	0.83	11	1.76
2004	22	2.90	5	0.80	27	1.95
2005	20	2.52	14	2.86	34	2.65
2006	24	3.27	10	2.18	34	2.85
2007	22	2.87	16	3.64	38	3.15
2008	20	1.89	8	10.13	28	2.46
2009	21	2.72	10	5.95	31	3.29
2010	10	1.29	0	0	10	1.20
Total	148	2.45	65	2.54	213	2.48

A significant increase in HBsAg positive cases among the voluntary group was observed showing a linear trend over the period as shown in table 2 (x^2 trend = 19.03 ; $p<0.001$)

In replacement group a uniform and consistent trend of HBsAg positive cases was seen throughout this period. No significant linearity was found between the two groups in the reference period (x^2 trend = 2.896)($p>0.05$)

Before year 2006 and after 2006, there is a significant increase in HBsAg positivity in voluntary group for later cohort while in replacement group this was insignificant[31/1816 versus 34/744 ($z = 3.48$; $p <0.001$) and 75/2669 versus 73/3372 ($z = 1.59$; $p>0.05$)].

Figure 5

Table 3 : comparison of seroprevalence in various donor categories

Donors	Total no. of HBsAg positive cases	Prevalence of HBsAg positivity(%)
Replacement	148	2.45
Voluntary	65	2.54
Total	213	2.48

The prevalence of seropositivity of HBsAg in our study between voluntary and replacement donors did not show a significant difference(2.45% versus 2.54% respectively) but showed comparable results ($p > 0.05$) as clearly shown in table no.3.The overall prevalence of HBsAg infection among the blood donors in our hospital based setting was estimated to be 2.48%.

Figure 6

Fig 3. Shows %seropositivity in replacement and voluntary donors

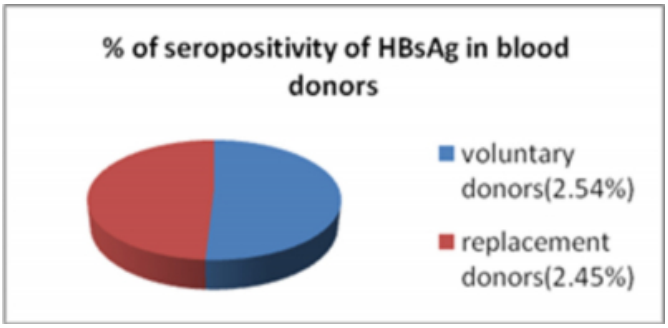
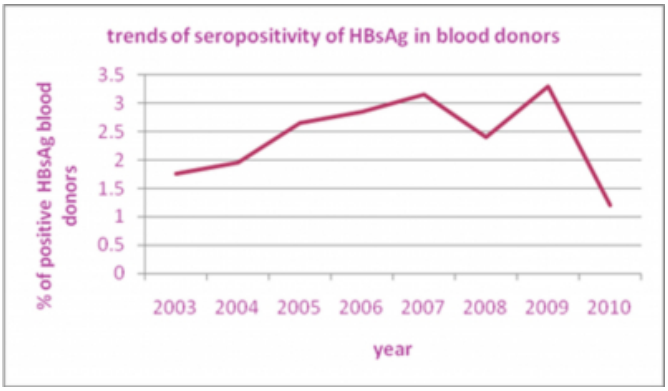


Figure 7

Fig 4. Trends in seropositivity of HBsAg over the study period



The above line diagram (Fig 4) shows that there is no consistent trend in the seropositivity of HBsAg infection during the study period. The figure shows a rising trend from the year 2003 – 2007; followed by a sudden fall in 2008 ; then again a rising trend in 2009 followed by again a steep fall in 2010.

DISCUSSION

The results obtained for Hepatitis B surface antigen will go a long way in providing useful information for the diagnostic purposes and epidemiological studies of the infection.

Replacement donors(70.24%) constituted the majority of blood donors in our study, a finding similar to other studies[17,20,21].

The overall prevalence of HBsAg seropositivity in blood donors in local population in our study was noted 2.48% which is comparable with the other studies[10] like Delhi(1997) (2.23%)[17,20] ; ; Bangalore(1999) (1.86%)[27] ; Madurai (2000) (4%)[26] Maharashtra (2002) (2.15%) ; Kerela (2002)(3.1%)[25] ; Rural India(2003) (2.78% for voluntary donors and 4.84% in replacement donors)[23]; Pune(2008) (0.99%)[21] ; Coastal Karnataka(2009) (0.62%)[21] ; Chandigarh (2010) (voluntary 0.65% and replacement 1.07%)[18].(as shown in table no 4).

Figure 8

Table 4 : prevalence of seropositivity of HBsAg in India

Study	Year	Place	Prevalence(%) of HBsAg positivity
Nanu et al	1997	Delhi	2.23
Srikrishna et al	1999	Bangalore	1.86
Chandrasekaran et al	2000	Madurai	4.0
Mathai et al	2002	Kerela	3.1
Sonwane BR et al	2003	Rural india	2.78(v) ; 4.84(r)
	2007	Maharashtra	2.15
Chattoraj et al	2008	Pune	0.99
Karandeep singh et al	2009	Coastal karnataka	0.62
Gagandeep kaur et al	2010	Chandigarh	0.65(v) ; 1.07(r)
Present study	2011	Vizianagaram	2.48

There was no significant difference in the prevalence rates of HBsAg seropositivity among voluntary and replacement donors in the present study.The findings are comparable to the study conducted by Chattoraj et al[21] but shows variance from other studies[17,19,20] which showed a higher seropsitivity in replacement than voluntary donors. The reason could be probable inclusion of professional blood donors. The trend in the seropositivity of HBsAg positivity doesn't show significant change in replacement donors where as in voluntary blood donors the trend appears to be very inconsistent.

If we compare the HBsAg positivity in other developing countries of the world the rate is quite high as compared to India. Table 5 shows prevalence of HBsAg in other countries.[17,29,30]

Figure 9

Table 5 : prevalence of HBsAg in other countries

Country	% of HBsAg positivity(prevalence)
Egypt	39.4
Indonesia	8.8
Ghana	15
Kathmandu	2.5

This variation in the prevalence of hepatitis B infection from city to city or in different countries depends upon a complex mix of behavioural , environmental and host factors, incidence and age of primary infection . It is lowest in areas with high standards of living and highest in areas with low socio-economic levels.

To conclude , prevention is the most important aspect on which we need to work hard. Based on the knowledge of the predominant mode of HBV transmission through unsterile injection practice , vigilant donor selection , health education and awareness about safe injection usage , proper sterilization of instruments , safe sexual practices , use of sensitive laboratory techniques and immunization of people at risk particularly health care workers should form an integral component of such a program. The evolving molecular epidemiological information will improve better understanding of disease and pave the way for rational approach to different phases of infection. Accurate identification and clinical management of both the blood donors and family members would reduce the probability of transfusion and preventing further dissemination of the infection.

Now that the vaccine is manufactured in India and is available at lower cost it should be possible to include this in national immunization schedule.

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