

Trend in seroprevalence of Hepatitis B virus infection among blood donors of coastal Karnataka, India

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Abstract

Background: Hepatitis B is one of the transfusion transmissible infections. The prevalence of this infection varies across the different geographies. Noting the trend in seroprevalence is useful to assist the preventive strategies. The aim of this study was to determine the trend of seroprevalence of hepatitis B in coastal Karnataka over a three-year period.

Methodology: The study was conducted at the blood bank of a tertiary care hospital serving predominantly the people of coastal Karnataka. A retrospective analysis of blood donors over a period of three years was done to assess the seroprevalence and the trend of hepatitis B infection. ELISA was used to detect the hepatitis B surface antigen in the donors as a marker of infection.

Results: A total of 30,428 blood donors were studied. 189 (0.62%) were positive, which comes under the "low prevalence (< 2%) zone" per World Health Organization (WHO) guidelines. A decreasing trend over three years was seen. Replacement donors and male blood donors showed higher seropositivity compared to voluntary donors and female donors. Chi-square test was used to calculate the significance of difference between the groups.

Conclusion: Coastal Karnataka has a low prevalence of hepatitis B in blood donors with a decreasing trend over the last three-year period.

Key Words: HBsAg, seroprevalence, blood donors

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Introduction

Hepatitis B is a major public health problem worldwide. Approximately 30% of the world's population or about 2 billion persons have serological evidence of either current or past infection with hepatitis B virus [1]. Countries are classified on the basis of endemicity of hepatitis B virus (HBV) infection into high (8% or more), intermediate (2-7%) or low (less than 2%) incidence countries. The prevalence of chronic HBV infection in India ranges from 2% to 10% as shown by different studies [1]. India therefore comes under the intermediate to high endemicity category. Hepatitis B infection is one of the transfusion transmissible infections; hence it is mandatory to test all blood donors for HBsAg. Serosurveys are one of the primary methods to determine the prevalence of HBsAg. The assessment of the occurrence of infections in the blood donor population is made on the basis of the evaluation of the data on the prevalence of hepatitis B infection. Consequently, the assessment helps in determining the safety of the blood products. It also gives an idea of the epidemiology of these diseases in the

community. In the present retrospective study, we evaluated the seroprevalence of hepatitis B virus among blood donors in coastal Karnataka. The study also aimed to determine the trend in hepatitis B infection and to compare the prevalence with that of other areas in India. The results of these prevalence studies should help in the creation of long-term strategies to improve public health and to prevent spreading of the disease in the local population

Material and Methods

The study was conducted at the blood bank of a tertiary care hospital serving predominantly the people of coastal Karnataka. In this retrospective study we reviewed 30,428 healthy blood donors over a period of three years from January 2005 to December 2007. They were carefully selected for donation by trained personnel after a complete physical examination and satisfactorily answering the donor's questionnaire. The family members, friends or relatives of the patients were categorized as replacement donors. People who donate blood without expecting any favor in return or in voluntary

Table 1. Donor category and gender distribution (age: 18-60years)

Year	Total donors	Replacement		Voluntary	
		Male	Female	Male	Female
2005	8,493	6,259	401	1,402	431
2006	9,908	8,026	532	1,036	314
2007	12,027	9,993	482	1,330	222
Total	30,428	25,693		4,735	

blood donation camps were classified as voluntary blood donors. At the end of the blood collection, donor samples were obtained for serological testing. HbsAg screening was done using the commercially available Erba Lisa ELISA kit (Transasia Bio-Medicals Ltd, Daman) with reported sensitivity of 100% and specificity of 99.9% per the manufacturer’s manual. All reactive samples were tested again using the same ELISA kit as well as a rapid test kit based on the principle of a one-step immunoassay (Hepacard, Biomed Industries, India). Samples showing repeat test reactivity on both methods were considered positive and were included for calculation of seroprevalence. The statistical evaluation of the data was made using biostatic software InStat Graph pad. The year-wise statistics were also calculated.

Results

Out of the total 30,428 blood donors, 28,046 (92.17%) were males and 2,382 (7.83%) were females with male to female ratio of 11.77:1. Table 1 shows that 84.43% of donors were categorized as replacement donors and the rest were voluntary blood donors. The initial screening test revealed that 226 (0.74%) donors were HBsAg reactive. On repeat testing, only 189 (0.62%) samples were positive (figure 1). The trend in seroprevalence over three years is shown in figure 2. The observed seroprevalence of HBV was higher in replacement donors than in voluntary donors (0.65% vs. 0.42%, respectively, Table 2). A higher seroprevalence rate was observed among male donors than in female blood donors (0.65% versus 0.25% respectively) and the difference is statistically

significant (p value: 0.024). The majority of the seropositive donors were younger than 35 years (137 donors were 35 years of age or less, and 52 donors above 35 years).

Discussion

According to India’s Drugs and Cosmetics Act (1945), each blood unit has to be tested for hepatitis B virus infection [2]. In our study, among the 30,428 blood donors screened, the overall seroprevalence of HBsAg was observed to be 0.62%. According to the WHO classification, this coastal part of Karnataka

Table2. Comparison of seroprevalence in various donor categories

Donors	Positive	Prevalence	p-value
Replacement	169	0.65%	0.072
Voluntary	20	0.42%	
Male	183	0.65%	0.024
Female	6	0.25%	

qualifies as a low prevalence area (less than 2%). The data providing a picture of hepatitis B infection burden in India has come from HBsAg seroprevalence studies (Table 3). In comparison with the other parts of India, the present study shows low seroprevalence of hepatitis B infection in coastal Karnataka. The present study revealed that HBV infection was more prevalent among replacement blood donors than voluntary donors as noted in the study of Sonwane *et al.* and Singhvi *et al.* [8,9]. Seroprevalence was significantly high in male donors

Figure 1. Results of donor screening

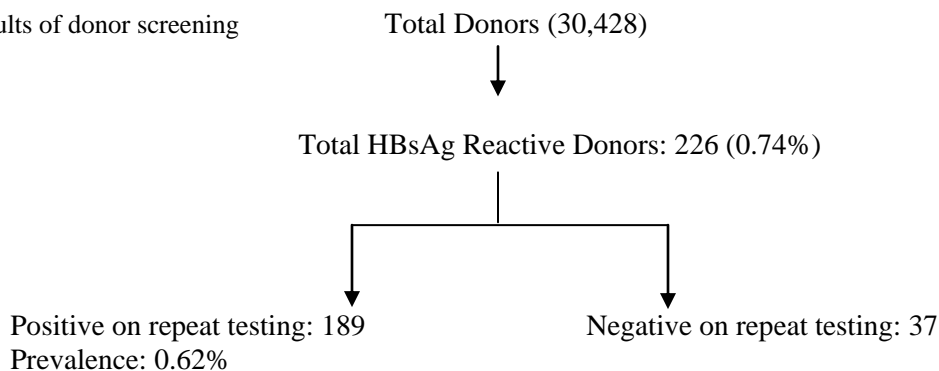
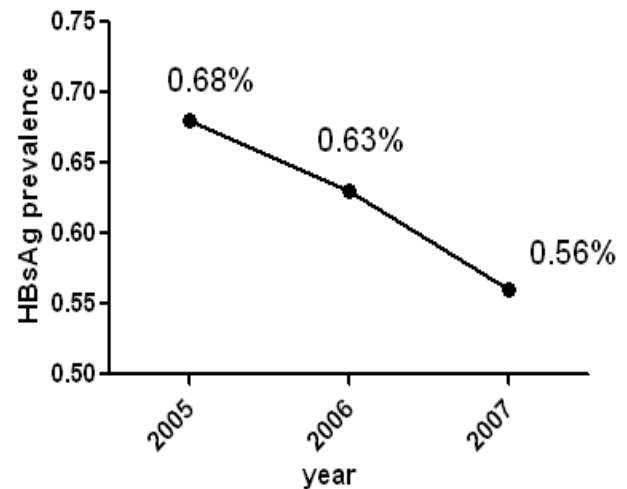


Table 3. Comparison of HBsAg prevalence rate in different parts of India

Place	Prevalence	Reference
New Delhi	< 2.5%, 2.23%, 2.76%	3,4,5
Kerala	3.1%	6
Madurai	4%	7
Rural India, Ambajogai		8
Voluntary Replacement	2.78% 4.84%	
Maharashtra	2.15%	1
Tamilnadu		9
Voluntary Replacement	1.37% 2.96%	
Dehradun	0.99%	10
Kolkatta	1.66	11
Kanpur	2.25%	12
Bangalore	1.86%	13
Coastal Karnataka	0.62%	Present study

as compared to female donors. It is to be noted that the majority of our study population were males. However, the statistical analysis (chi-square test) revealed this difference in the seroprevalence to be significant (p value -0.024). A significantly higher HBsAg seroprevalence in males than in females is also reported in other studies [7,14]. Rodenas *et al.* reported the higher prevalence of HBsAg in donors older than 38 years, whereas in the present study, the majority of seropositive donors were younger than 35 years [15]. The decreasing trend in seroprevalence was noticed over three successive years. The lower prevalence and decreasing trend in costal Karnataka may be a result of several factors. First, the literacy rate in Udipi and Dakshina Kannada District is more than 80%, whereas the overall literacy rate of Karnataka state is 67% and that of India is 65% (Census of India 2001). The awareness about the disease and modes of prevention may be one reason for the low prevalence and declining trend in HBV infection. Secondly, the implementation of strict pre-donation counseling and donor selection criteria help in excluding the possibly infected donors.

The better reflection of the seroprevalence of HBV infection in this region of India may be studied in the non pre-screened samples. The absence of HBsAg in blood donors may not be sufficient to

Figure 2. Trend in seroprevalence of HBsAg over three years

ensure the lack of circulating HBV and hence there are chances of missing occult HBV infection. These issues are the possible limitations of our study.

Ensuring the safety of patients by reducing the residual risk of transfusion transmitted hepatitis is the concern of every transfusion center. Along with advanced technology such as nucleic acid testing (NAT) for donor screening, other factors such as public awareness, educational and motivational programs, and mass immunization programs help in decreasing the infection. Pre-donation counseling, donor self-exclusion and ensuring 100% voluntary blood donation will be effective in decreasing the hepatitis B infection rate. This study provides a helpful guide in reducing the residual risk of transfusion transmitted hepatitis not only in India but also in the other developing countries of the world.

References

1. Prevention of hepatitis B in India, An overview. World Health Organization. New Delhi 2002.
2. Drugs and Cosmetics Act 1940 (India).
3. Nanu A, Sharma SP, Chatterjee K, Jyoti P (1997) Markers for transfusion-transmissible infections in North Indian voluntary and replacement blood donors: Prevalence and trends 1989–1996 *Vox Sang* 73: 70-73.
4. Pahuja S, Sharma M, Baitha B, Jain M (2007) Prevalence and trends of markers of Hepatitis C Virus, Hepatitis B Virus and Human Immunodeficiency Virus in Delhi blood donors: A Hospital Based Study. *Jpn J Infect Dis* 60: 389-391.
5. Singh B, Kataria SP, Gupta R. (2004) Infectious markers in blood donors of East Delhi: prevalence and trends. *Indian J Pathol Microbiol.* 47: 477-479.

6. Mathai J, Sulochana PV, Satyabhama S, Nair PK, Sivakumar S (2002) Profile of transfusion transmissible infections and associated risk factors among blood donors of Kerala. *Indian J Pathol Microbiol.* 45: 319-322.
7. Chandrasekaran S, Palaniappan N, Krishnan V, Mohan G, Chandrasekaran N (2000) Relative prevalence of hepatitis B viral markers and hepatitis C virus antibodies (anti HCV) in Madurai, South India. *Indian J Med Sci.* 54:270-273.
8. Sonwane BR, Birare SD, Kulkarni PV (2003) Prevalence of seroreactivity among blood donors in rural population. *Indian J of Med Sci* 57: 405-407
9. Singhvi A, Pulimood RB, John TJ, Babu PG, Samuel BU, Padankatti T, Carman RH (1990) The prevalence of markers for hepatitis B and human immunodeficiency viruses, malarial parasites and microfilaria in blood donors in a large hospital in south India. *J Trop Med Hyg* 93: 178-82.
10. Chattoraj A, Behl R, Kataria VK.(2008) Infectious Disease Markers in Blood Donors *Medical journal Armed Forces of India.* 64: 33-35
11. Bhattacharya P, Chandra PK, Datta S, Banerjee A, Chakraborty S, Rajendran K, Basu SK, Bhattacharya SK, Chakravarty R. (2007) Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004-2005: Exploratory screening reveals high frequency of occult HBV infection. *World J Gastroenterol* 21: 3730-3733.
12. Behal R, Jain R, Behal KK, Bhagoliwal A, Aggarwal N, Dhole TN (2008) Seroprevalence and risk factors for hepatitis B virus infection among general population in Northern India. *Arq Gastroenterol.* 45: 137-40.
13. Srikrishna A, Sitalakshmi S, Damodar P (1999) How safe are our safe donors? *Indian J Pathol Microbiol.* 42: 411-416.
14. Karki S, Ghimire P, Tiwari BR, Rajkarnikar M. (2008) HBsAg serosurveillance among Nepalese blood donors. *Annals of Tropical Medicine and Public Health* 1: 15-18.
15. Rodenas JG, Bacasen LC, Que ER. (2006) The prevalence of HBsAg(+) and anti HCV(+) among healthy blood donors at east avenue medical center, Quezon city. *Phil J of Gastroenterology* 2: 64-70.

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Conflict of interest: No conflict of interest is declared.