

Original Research Article

Prevalence of Hepatitis-B among voluntary blood donors at a Medical College Hospital blood bank in Chennai

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	International Archives of Integrated Medicine, Vol. 7, Issue 2, February, 2020.	
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	Available online at http://iaimjournal.com/	
	ISSN: 2394-0026 (P)	ISSN: 2394-0034 (O)
	Received on: 14-01-2020	Accepted on: 18-01-2020
	Source of support: Nil	Conflict of interest: None declared.
How to cite this article: Yengkhom Daniel Singh, Govindarajan R, Bagavad Geetha M, Deeptisachan, Krishnakumar J. Prevalence of Hepatitis-B among voluntary blood donors at a Medical College Hospital blood bank in Chennai. IAIM, 2020; 7(2): 29-34.		

Abstract

Background: Hepatitis B is one of the most important infectious agents that are transmitted via blood transfusion. Diagnosis of Hepatitis B among voluntary blood donors is a challenging task in the screening lab of blood banks for transfusion-transmitted diseases. In India one million people succumb annually by the complication of HBsAg of which cirrhosis and liver cancer predominate.

Aim: To analyze the prevalence of Hepatitis-B among voluntary blood donors in our hospital blood bank.

Materials and methods: This retrospective study was conducted in Sree Balaji Medical College and Hospital Blood Bank which lie in the suburban population of Chennai for 4 years. Data were analyzed and reports were used as a preventive tool to control the disease among the public and donor population. **Results:** A total of 5698 donor samples were tested for 4 years which showed 51 (0.89%) positive cases of Hepatitis-B, among which male donors were 92.1% and highest age-wise prevalence was seen in donors under 40 years of age group and a predominance of A+ve donors (37.2%) with a diagnostic accuracy of 100% in the ELISA method of testing.

Conclusion: We concluded that the prevalence of Hepatitis B was highest among all other transfusion-transmitted diseases with more cases were reported in males and the highest prevalence in

the age group of below 40 years. The ELISA method showed more accuracy than the Card method. Prophylactic measures and preventive methods need to be improvised in order to control disease transmission among the general public and blood donors.

Key words

Blood donors, Hepatitis B, Prevalence, Prevention.

Introduction

Hepatitis B is a DNA virus that causes both acute and chronic infections in men, mainly affecting the liver [1]. Hepatitis B virus is transmitted via infectious blood, body fluids containing blood, sexual and perinatal modes [2]. About 30% of reported hepatitis B has no identifiable risk factor [1, 3]. Hepatitis B is a major aggravating health issue encountered in India. Hepatitis B carrier state prevalence in the general population was classified as high when 8% or more, intermediate when 2% to 7% and low when less than 2% based upon HBV endemicity [4, 5, 6, 7]. Worldwide statistics reveal that about 2 billion people are affected among which 350 million have chronic infective states [8, 9]. In India HBsAg carriers were over 40 million and one million people succumb annually due to the complication of HBsAg of which cirrhosis and liver cancer predominate. Every year one million Infants in India develop lifetime risk of developing chronic HBV infection [10, 11]. HBsAg is the first marker to appear in the blood after infection and remains in circulation throughout the symptomatic course of the disease [12, 13]. HBsAg is detectable even before the elevation of serum transaminases and onset of clinical disease [14]. As per India's drugs and cosmetic act 1943, each blood unit collected from donors has to be tested for 5 transfusion-transmitted infections, in this list next to HIV, HBsAg screening test is a must and the rest include Hepatitis C, VDRL and Malaria [15, 16, 17, 18, 19]. Blood donors in India are of two main types – voluntary and replacement donors. Screening for HBsAg can routinely be done in all the blood banks with user-friendly kits such as ELISA and other card methods based on serum/plasma immunoassay. These methods

provide a rapid result and are easy to perform [18, 19, 20].

Materials and methods

Testing samples were obtained from the voluntary blood donors in Sree Balaji Medical College and Hospital Blood Bank, Chrompet, Chennai. This retrospective study included the samples obtained from 1st January 2015 to 31st December 2018; a period of 4 years. Both voluntary and replacement donor samples were included in the study. Donors were selected after standard donors screening criteria described by NACO guidelines. The screening was done by qualified and trained medical officers and staff nurses. Samples were tested by qualified and trained technicians. By providing pre-donation questionnaire form which included donor registration form and information details like the history of surgery, previous illness, hospitalization and blood transfusion were obtained. Donors between 18 and 65 years of age with body weights above 45 kilograms and hemoglobin more than 12.5 gm/dl were permitted to donate. High risk groups like a person with chronic diseases, professional blood donors, drug abusers, pregnant women, patient treated in Thalassemia clinics, STD ops and sex workers were excluded from the donation process. After blood collection, donor samples were tested for serological tests by both the Card method and by ELISA method. Data of 4 years were included in the study for analysis.

The card method used was Verucheck® which is based on the principle of agglutination of antibodies/antisera with respective antigen in the immune-chromatography format along with the use of nanogold particles as agglutination revealing agent. For ELISA, we used 3rd

generation ELISA kits namely, HEPALISA and BeneSphera™. HEPALISA works on the ‘Direct Sandwich’ principle. BeneSphera™ works on the principle of direct, non-competitive, solid-phase enzyme immunoassay with horseradish peroxidase as the marker enzyme.

Table - 1: Year wise and gender distribution of total donors.

Year	Total	Male %	Female %
2015	1256	1170 (93.1)	86 (6.8)
2016	1414	1375 (97.2)	28 (1.98)
2017	1515	1493 (98.5)	22 (1.45)
2018	1513	1447 (95.6)	66 (4.36)

Table - 2: Distribution of voluntary v/s replacement donors.

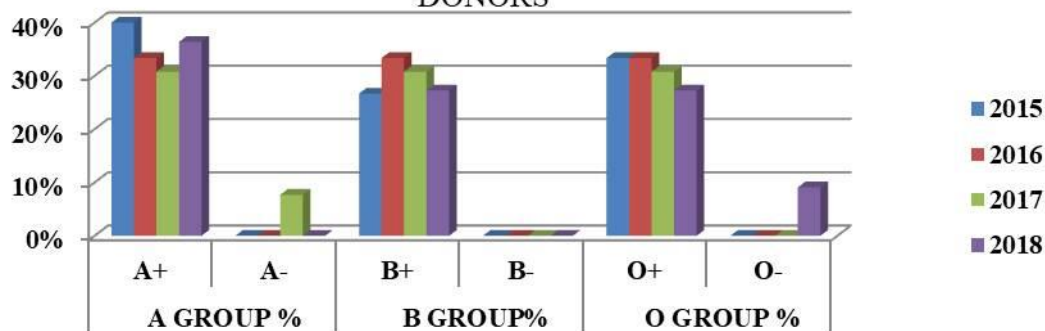
Year	Total donors	Voluntary donor%	Replacement donor%
2015	1256	1153(91.7)	103(8.2)
2016	1414	1303(92.1)	111(7.8)
2017	1515	1427(94.1)	88(5.8)
2018	1513	1466(96.8)	47(3.1)

Table - 3: Blood group wise distribution of HbsAg positive donors.

Year	A GROUP %		B GROUP%		O GROUP %		Total
	Rh+	Rh-	Rh+	Rh-	Rh+	Rh-	
2015	6 (40)	0	4(26)	0	5(33)	0	15
2016	4(33.3)	0	4(33.3)	0	4(33.3)	0	12
2017	4(30.7)	1(7.6)	4(30.7)	0	4(30.7)	0	13
2018	4(36.3)	0	3(27.2)	0	3(27.2)	1(9.0)	11

Chart - 1: Yearly blood group distribution of HbsAg positive donors.

Chart 1: YEARLY BLOOD GROUP DISTRIBUTION OF HBsAg POSITIVE DONORS



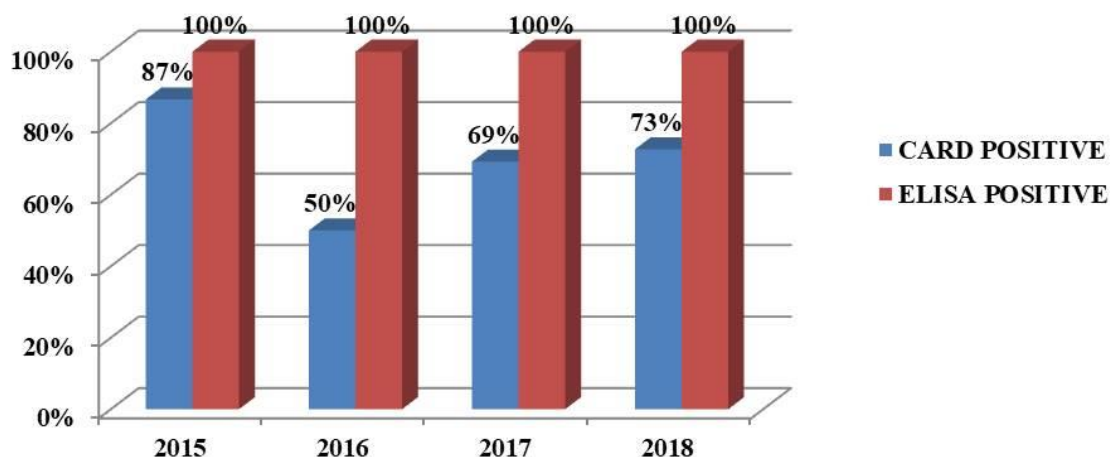
Results

An increase in the total number of donors was seen from 2015 to 2018. But the gender-wise ratio did not show much variation (**Table - 1**).

Interestingly, there was a rise in the number of voluntary donors of about 5.1% from 2015 to 2018 which could be attributed to increasing awareness and community health services (**Table - 2**).

Chart - 2: CARD vs ELISA method in HbsAg positive donors.

Chart 2: CARD VS ELISA METHOD IN HBsAg POSITIVE DONORS



Only two Rhesus negative blood donors were encountered in the span of 4 years, and A-negative and O-negative blood groups in 2017 and 2018 respectively (**Table - 3**).

A-positive blood donors were comparatively highest in 2015. Similarly, B-positive blood donors were highest in 2016 (**Chart - 1**).

ELISA method proved to be 100% accurate as compared to the Card method. The accuracy of the Card method was variable and did not follow any particular trend (**Chart - 2**).

Discussion

In our study, out of a total of 5698 donors, 51(0.89%) cases were positive for HBsAg which is similar to Bagiyalakshmi, et al. (2016) and Gupta, et al. (2004) [21, 22]. As per the WHO classification, Tamil Nadu comes under a low prevalence (<2%) area among voluntary blood donors. In our study replacement donors consisted only 6.12% whereas voluntary donors were 93.8%. When compared to Shalini, et al., which had a similar distribution with 56.34% voluntary donors and 43.66% replacement donors in Ranchi [23]. In our study, most of the positive donors were under 40 years of age, out of which

18 to 30 years age group accounted for 43.1% and the range of 31 to 40 years age group accounted for 47.05% which is close to the studies conducted by Baba, et al., Taseema, et al., Quadri, et al. and Remya, et al. [24, 25, 26, 27]. In our study, 2015 year accounted for 1.19% positive cases whereas in 2018, 0.7% was positive. In 2016 and 2017, 0.84% and 0.8% positive cases were reported respectively. Since the P-value is <1%, it is considered as not significant. In our study, the highest number of positive cases (35.29%) was seen in A-positive blood groups, followed by O positive group (31.37%) and the least was seen in B positive (29.41%). Among the Rh categories, one A-negative case and one O-negative case were reported respectively when compared to Batool, et al. Therefore, a significant association was seen between blood group A and Hepatitis B [17, 18]. In our study, ELISA method was accurate for 100% detection of Hepatitis B infection when compared to Card method with an accuracy of 70.58%. Failure of Rapid Card test method may be due to: 1) Inadequate coating of the antigen. 2) Nature of the antigen used. 3) Genetic heterogeneity of the virus was cited as a reason for false positivity in the Card method. At present 3rd generation, Elisa kit for Hepatitis B

reduces the incidence of hepatitis B infection in patients. In 2015, one case was reported with combined infection of Hepatitis B and Hepatitis C [26, 27].

Conclusion

To conclude, the prevalence of Hepatitis-B is high among all Transfusion-transmitted infections (TTI's), predominantly in male and voluntary blood donors compared to replacement donors. Incidences of cases reported were highest in the 2015 year with most cases below 40 years. Predominantly A+ve donors were infected. ELISA method shows more reliable results than the Card method and it should be mandatory for voluntary blood donors screening to avoid false-negative which is more common in the Card method. Considering the complications, mode of spreading and due to carrier and chronicity of disease, increased awareness and prophylactic measures need to be taken at the public level. Hepatitis B has a low prevalence among blood donors in the state (<2%) as per WHO, but since the population of Chennai urban and suburban increase due to Economic growth and modernization. The risk of spreading Hepatitis B is high but it can be checked by vaccination, education of high-risk groups like sex workers, health care providers and voluntary blood donors.

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