

SEROPREVALENCE OF HEPATITIS B AND HEPATITIS C VIRAL INFECTIONS AMONG BLOOD DONORS OF CENTRAL KARNATAKA, INDIA

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ABSTRACT

Background: Hepatitis B virus (HBV) & Hepatitis C virus (HCV) are transfusion transmissible infections. Observation of the trend in seroprevalence is useful to plan preventive measures.

Aims & Objective: To study trend of seroprevalence of HBV & HCV infections among blood donors with respect to type of the donor, age, sex and blood group of the donor.

Material and Methods: A study was conducted from January 2005 to December 2009 at the blood bank of tertiary care Medical College Hospital, serving people of Central Karnataka. Blood units collected from eligible blood donors were subjected to ELISA for screening for hepatitis B surface antigen and IgG antibodies to Hepatitis C virus. Prevalence of HBV and HCV infections was noted using SPSS version 13 statistical package in relation to type of donor, age, sex and blood group of donor. Significance of the trend was determined by chi square test.

Results: A total of 19,413 blood donors were screened, the seroprevalence of HBV & HCV infection was 2.12% & 0.1% respectively. HBV infection was more prevalent among replacement donors. Decrease in seroprevalence of HBV & HCV infections was noted from 2005 to 2009.

Conclusion: To reduce the prevalence of post-transfusion hepatitis, stringent donor screening procedure and 100% voluntary blood donations may be effective. Routine screening for HBV & HCV in blood banks should be performed using more sensitive methods.

Key-Words: Hepatitis B (HBV); Hepatitis C (HCV); Seroprevalence; Blood Donors

Introduction

Millions of lives are saved each year through blood transfusion but, a safe blood is a critical component of health care to prevent the spread of blood borne infectious diseases. Safe blood is a continuing concern especially in developing countries where 80% of the world population lives. General lack of quality systems, poor laboratory procedures, inadequate testing of donated blood, inappropriate use of blood and blood components may contribute for unsafe blood transfusion services. Burden of the disease and loss of life resulting from unsafe blood transfusions is very serious problem for the communities in developing countries. The transfusion transmissible infections (TTI) like hepatitis B, hepatitis C, HIV, malaria and syphilis etc. were first observed in the process of blood transfusion in the late 1940s. Hepatitis B is a global problem, with 66 percent of the entire world's population living in areas where there are high levels of infection. More than 2 billion people in the world have evidence of past or current HBV infection and 350 million are chronic carriers of the virus, which is harboured in the liver and causes an estimated 6,20,000 deaths. The virus causes 60 to 80 percent of all primary liver cancer, which is one of the three top causes of cancer death in east and South East

Asian region, the Pacific Basin and sub Saharan Africa.^[1] HCV was identified in the year 1989. World Health Organization (WHO) estimates that 3 percent of the world population is infected with HCV and around 170 million individuals are chronic carriers at risk of developing liver cirrhosis and liver cancer.^[1,2]

In our study, the seroprevalence of HBV and HCV was determined in clinically healthy blood donors and trend was noted with respect to type of donor, age, sex, blood group of donor.

Materials and Methods

A study was conducted from January 2005 to December 2009 in SS Blood Bank, which is attached to tertiary level teaching hospital of SS Institute of Medical Sciences and Research Centre Davangere. Institutional ethical clearance was obtained from research and publication committee, along with informed consent from all donors who participated in this study.

Blood donors were either replacement or voluntary donors. The replacement donors were the friends or relatives, recruited by patients or their relatives or friends

to replace blood used or expected to be used for the patients from the blood bank. In the blood bank donors were screened by targeted questionnaire and by medical examination. Clinically healthy individuals of 18 to 65 years of age with body weight more than 45 kg and haemoglobin more than 12.5 g/dl were qualified for donation. Sera of these qualified blood donors were screened for hepatitis B surface antigen (HBsAg) and IgG antibodies to HCV by using commercially available (J Mitra & Co Pvt Ltd New Delhi) Enzyme Linked Immunosorbent Assay (ELISA) kits. The procedure of test was followed according to manufacturer's instruction. The positive sera and random negative samples were retested by ELISA in Bapuji blood bank Davangere in order to assure the quality of in house by external peer.

Data were entered and analyzed by using SPSS version 13 statistical package. Prevalence of HBV and HCV was noted with respect to age, sex, type of donor, year and the blood group. Significance of the trend was determined by chi square test.

Results

A total number of 19,413 donors were screened during the study period. Of these 19,189 (99%) were males and 224 (1%) were females. Ninety four percent of donors were replacement donors and 46.13% of donors belonged to the age group 18 to 25 years. O positive was the commonest blood group observed.

Table-1: Seroprevalence of HBV & HCV according to age of the donor

| Age (Years) | Seroprevalence (%) | |
|-------------|--------------------|-----------|
| | HBV | HCV |
| 18-25 | 154 (1.72) | 11 (0.12) |
| 26-35 | 183 (2.35) | 5 (0.06) |
| 36-45 | 66 (2.93) | 2 (0.08) |
| 46-60 | 9(2.1) | 1 (0.23) |
| 61 & above | 1 (14.28) | 0 |
| p Value | p <0.001 HS* | 0.77 NS** |

*HS: highly significant; **NS: Non significant

Table-2: Seroprevalence of HBV & HCV according to type of the donor

| Age (Years) | Seroprevalence (%) | |
|-----------------|--------------------|----------|
| | HBV | HCV |
| Voluntary donor | 17 (1.4) | 1 (0.1) |
| Replacement | 396 (2.2) | 18 (0.1) |
| p Value | 0.20 NS* | 0.98 NS* |

*NS: Non significant

Overall, the seroprevalence of HBV and HCV was 2.12% and 0.1% respectively. HBV was more prevalent in 26 to 35 years of age where as HCV was more prevalent in 18 to 25 years of age (Table 1). Prevalence of HBV with respect age was statistically significant. Among HBsAg positive donors only three were females and rest others were males. All the HCV positive donors were males. HBV was

more prevalent among replacement donors in comparison with voluntary blood donors (Table 2). Association of prevalence HBV and HCV infections with respect to sex, type of donor, blood group was statistically insignificant. Seroprevalence of HBV and HCV was decreasing from the year 2005 to 2009 (Figure 1). Association of prevalence with year was insignificant.

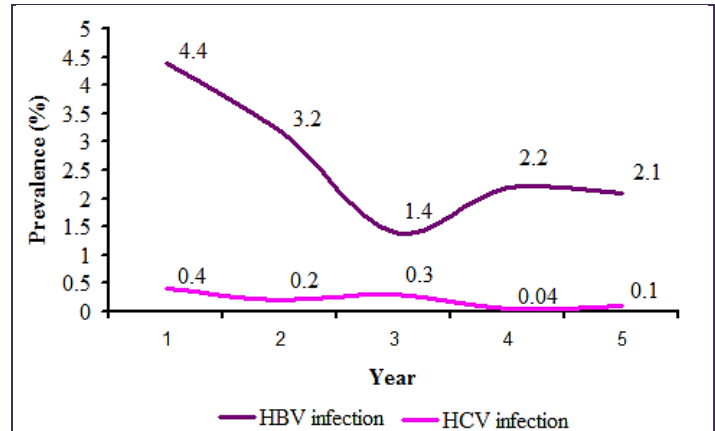


Figure-1: Trend of seroprevalence of HBV and HCV among blood donors

Discussion

Hepatitis B and C infections are endemic throughout the world especially in tropical and developing countries. HBV and HCV infections are a major cause of acute liver disease, cirrhosis and primary liver cancer in South East Asian region. More than one third of the population has been infected with HBV and it is estimated that there are 80 million HBV carriers (about 6% of the total population). The global prevalence of HCV infection is around 2% with 170 million persons chronically infected with virus and 3 to 4 million persons newly infected each year.^[2] Around 10 -15% of HBV infected persons are chronic carriers and 50% of the infectious HCV infected cases are asymptomatic.^[1]

The blood transfusion is an effective mode of transmission of both HBV and HCV, as it allows large quantum of infective virions into the recipient. Pre-donation clinical screening of donors to reject or defer the risky group from donation is an important step. But many of the donors are not detected during pre-donation clinical screening by blood bank officer especially, if the persons are, in window period of the disease or in convalescent phase or asymptomatic cases or carriers. The seroprevalence of HBV and HCV is more in replacement donors than in voluntary donors. The reason could be the obligatory motto behind the donation in case of replacement donors, who might hide their disease during pre-donation clinical screening. This observation is supported by many other

studies.^[3-5] In our study seroprevalence of HBV was more in replacement donors but, the association was statistically insignificant. This finding could be because of very low proportion (06%) of voluntary blood donors in our study. However, a change from replacement donors to 100% voluntary blood donation is required in every blood bank to reduce risk of TTI. This may be achieved by creating public awareness about voluntary blood donation and its benefits.

In our study, the seroprevalence of HBV was increasing significantly with the age of donor. This could be because of less number of donors belonging to the age group of 60 to 65 years. The seroprevalence of HBV and HCV in blood donors of various countries and in different parts of India is given in the Table 3. The trend of seroprevalence in Davangere is shown in the figure 1. Seroprevalence of HBV and HCV was decreasing from 2005 to 2009. Recent awareness in general public about the importance of hepatitis B vaccination and inclusion of hepatitis B vaccination in Indian academy of paediatricians (IAP) vaccination schedule for children explains the decreasing trend.^[1]

Table-3: Comparison of seroprevalence of HBV & HCV in different places

| Year | Place | Seroprevalence (%) | |
|------------|---------------------------------------|--------------------|-------|
| | | HBV | HCV |
| 1989-96 | New Delhi (India) ^[6] | 2.5 | |
| 1994-99 | Jodhpur (India) ^[7] | 3.44 | 0.285 |
| 1996-2002 | Chandigarh (India) ^[8] | 1.55- 0.99 | 0.4 |
| 1997-2002 | New Delhi (India) ^[3] | 1.8 | 0.5 |
| 2001-07 | Lucknow (India) ^[9] | 1.96 | 0.85 |
| 2005 | Kolkata (India) ^[10] | 1.66 | 0.35 |
| 2004-05 | Tanzania ^[11] | 8.8 | 1.5 |
| 2005 | Rawalpindi (Pakistan) ^[12] | 2.45 | 2.52 |
| 2005 | Cuttack (Orissa) ^[13] | 1.13 | 1.98 |
| 2002-04 | Manila Philippines ^[14] | 4.2 | 0.3 |
| 2003-07 | Noethwest Ethiopia ^[15] | 4.7 | 0.7 |
| | Morang (Nepal) ^[16] | 0.87 | 0.26 |
| 2006-07 | Banke (Nepal) ^[16] | 1.2 | 0.11 |
| | Kaski (Nepal) ^[16] | 0.35 | 0.16 |
| 2007-08 | Osogbo Nigeria ^[17] | 18.6 | 6 |
| 2007 | Sudan ^[18] | 6.25 | 0.65 |
| 2005- 2009 | Present study (Davangere, India) | 2.12 | 0.1 |

The seroprevalence HBV and HCV among the blood donors alarms about the blood safety. Blood banks in India screen only HBsAg as a marker of HBV infection. HBsAg assays are not sensitive enough in the window period (45-56 days), in early convalescence phase of acute HBV infections and in chronic HBV infections, where HBsAg is often present at very low levels. Mutants with genetic differences may allow HBsAg to escape detection by currently available HBsAg screening assays. Potential HBV infectious blood donations, which are negative for HBsAg may be identified by either anti Hbc (core antigen) assay or HBV nucleic acid testing (NAT).^[19] In US, Japan and France anti Hbc was

made mandatory in 1980s. Due to false positivity of Anti Hbc assay tests, HBV NAT was introduced in many western countries to overcome the window phase of HBsAg assays.^[20]

In the view of high prevalence of hepatitis B, it is worth to implement the use of anti Hbc assay along with assay of HBsAg in order to prevent post transfusion hepatitis to a certain extent.

Conclusion

This study has determined prevalence of HBV infection of 2.12% and HCV infection of 0.1% among blood donors of Central Karnataka. Seroprevalence of HBV was higher among replacement donors. Hence, to reduce the prevalence of post-transfusion hepatitis, stringent donor screening procedure and 100% voluntary blood donations may be effective. Routine screening for HBV & HCV in blood banks should be performed using sensitive ELISA methods.

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