

Incidental detection of hepatitis B and C viruses and their coinfection in a hospital-based general population in tertiary care hospital of Uttar Pradesh

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ABSTRACT

Introduction: Substantial proportion of liver diseases worldwide is caused by hepatitis B virus (HBV) and hepatitis C virus (HCV) infections which manifest not only as an acute illness but also lead to chronic sequelae. Together HBV and HCV cause chronic infection in more than 500 million persons and about one million deaths annually. Most of the people with chronic infection are not aware of the infection thus enabling it to go unnoticed, and undiagnosed and act as a potential source of infection for the community at large. Therefore, we aimed to find the prevalence of HBV and HCV in Barabanki, Uttar Pradesh among individuals attending the tertiary care hospital. **Materials and Methods:** From February 2015 to January 2016, 3750 patients attending the outdoor patient departments or admitted to the indoor patient departments of teaching hospital and advised to undergo HBV and HCV for screening before any invasive/surgical procedure were included in the study. Screening was done by rapid card test followed by the confirmation of all samples by enzyme immunoassay. **Results:** Seroprevalence of HBV and HCV was found to be 3.9% and 1.76% respectively with higher seroprevalence among males and in married participants in both infections. Blood transfusion is statistically a significant risk factor for HCV infection ($P < 0.05$). Coinfection with HBV/HCV was seen in 0.16% of the individuals visiting the hospital. **Conclusion:** Higher seroprevalence of HBV and HCV among the hospital-based population mandates screening of high-risk individuals. Awareness by health education of safe sexual practices and improved safety of blood and its products are among the most important preventive measures to control HBV and HCV infection.

Keywords: Coinfection, hepatitis B virus, hepatitis C virus, seroprevalence

Introduction

Hepatitis B virus (HBV) and hepatitis C virus (HCV) account for a substantial proportion of viral hepatitis, caused by either of the five hepatotropic viruses: A, B, C, D, and E. All of these viruses cause acute hepatitis showing symptoms of fatigue, loss of appetite, fever, and jaundice. The majority of the patients recover fully, but small proportion die due to acute hepatitis. Cirrhosis and hepatocellular carcinoma are common chronic sequelae of

hepatitis B and C infections. Globally, around 500 million people with chronic hepatitis B and C are unaware of their infection thus enabling it to go undiagnosed, until the virus has caused serious liver damage. Together hepatitis B and C leads to nearly 80% of mortality among all patients of hepatocellular carcinoma and death among approximately 1.4 million people every year, thus, making it seventh leading cause of death worldwide.^[1-3]

India has around 40 million HBV carriers accounting 10%–15% of the entire pool of HBV carriers of the world.^[4] Progression to cirrhosis and hepatocellular carcinoma occurs in 15%–25%

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of the carriers and may become fatal in many cases. The risk of chronicity is more if the infection is acquired during infancy and childhood. In India, approximately, 1 million infants are at risk of becoming carriers every year.^[5]

According to recent estimates, HCV affects 3% of the world population and India has a major share of this HCV burden with an estimated prevalence between 0.5% and 1.5%. Evolution of HCV infection is not only related to the duration of infection but also shows inter-individual variation. Majority of the individuals developing acute hepatitis C remain asymptomatic, while approximately 70%–90% of them become chronic carriers due to non-clearance of virus during the acute phase of disease. Cirrhosis develops in 5%–20% of individuals with chronic liver disease and death occurs in nearly 5% of infected persons from sequelae of chronic infection.^[6,7]

The major cause of chronic liver disease, cirrhosis and cancers in India is HBV. About 20% of these are associated with HCV infection.^[8] HBV and HCV coinfection and along with HIV is another area of concern. The availability and administration of safe and effective vaccine since 1982 has significantly changed the global epidemiology of HBV infection.^[9] Primary care physicians play an important role in disease detection and prevention as they are the first point of contact to the undiagnosed cases and though they have adequate knowledge about the risk factors they are unable to diagnose and follow-up the cases due to limited diagnostic facilities.^[10]

The present study was planned to determine the seroprevalence of HBV and HCV in Barabanki, Uttar Pradesh which will be of help to understand the dynamics of transmission HBV and HCV in this community and identify the risk factors associated with transmission and help its control and prevention.

Materials and Methods

Study design and participants

The study was a hospital-based cross-sectional observational study done from February 2015 to January 2016 in the Department of Microbiology, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh.

Patients who visited outdoor patient departments or were admitted to the indoor patient departments and were advised to undergo HBV and HCV for screening before any invasive/surgical procedure were included in the study. Previously diagnosed cases of HBV and HCV infection were excluded from the study.

Ethical approval

Approval from the Institutional Ethical Committee was obtained before commencement of the study. Informed consent was obtained from all participants before specimen collection.

Data collection

Epidemiological information including demographic (age, sex, and occupation), clinical data, information regarding risk factors (history of blood transfusion, intravenous drug abuse, sexual contact, tattooing) was obtained from patients at the time of blood sample collection.

Specimen collection

Universal (standard) safety precautions were observed during collection and handling of the specimen.^[11] A volume of 5 ml venous blood sample was collected by venipuncture from all patients advised for hepatitis B surface antigen (HBsAg) and HCV antibody test. All the samples were labeled properly and processed.

Processing of blood sample

The blood was allowed to clot for 45 min at room temperature, and serum was separated. Screening of HBV infection was done by determination of HBsAg using chromatography-immunoassay based card test (diagnostic enterprises). IgG antibodies to HCV were determined using chromatography-immunoassay-based test (HCV Tridot, Diagnostic Enterprises).

Samples reactive by card test were further confirmed by commercially available kit based on ELISA (Hepalisa– J. Mitra and Co. Private Limited, India) for HBV and 3rd generation ELISA (HCV Microlisa– J. Mitra and Co. Private Limited, India) for HCV according to the manufacturer's instructions.

Statistical analysis

The findings were statistically analyzed using Chi-square test (χ^2) and $P < 0.05$ was considered as the level of statistical significance.

Results

Sociodemographic characteristics

In this observational study, 3750 participants were screened for HBV and HCV infection, of which 52.5% were females and 47.5% were males, 81% were married while 19% were single. Participants who came from rural area were 98%, and only 2% were from the urban area.

Seroprevalence of hepatitis B virus

All the samples reactive by rapid immunodiagnostic tests were also positive by ELISA. Overall, the seroprevalence of HBV infection was found to be 3.9%. The prevalence for HBV infection among males and females was 5.5% and 2.4%, respectively. The highest seroprevalence of HBsAg was found in patients who were married and in individuals in the age group of 35–44 years [Table 1].

Seroprevalence of Hepatitis C virus

All the serum samples reactive by rapid immunodiagnostic tests for HCV infection were also positive by ELISA. The

Table 1: The demographic profile of the study participants, hepatitis B virus and hepatitis C virus positive individuals

Sociodemographic characteristics	Study participants	HCV positive (n=66)	HBV positive (n=147)
Sex			
Male	1781	36	99
Female	1969	30	48
Age group (years)			
<25	1125	6	42
25-34	1049	30	22
35-44	597	6	46
45-54	375	21	13
>55	604	3	24
Marital status			
Married	3038	63	126
Single	712	3	21
Place of resident			
Rural	3675	66	147
Urban	75	-	-

HBV: Hepatitis B virus; HCV: Hepatitis C virus

seroprevalence of HCV was found to be 1.76% among hospital-based general population. The higher seroprevalence of anti-HCV antibodies was found among males, married participants and in the age group 25–34 years [Table 1].

Prevalence of hepatitis B virus/hepatitis C virus co-infection

Among 3750 participants, 6 individuals (0.16%) were found to be coinfecting with HBV/HCV.

Risk factor association

Table 2 shows the association of various risk factors with seropositivity of HBV and HCV. Blood transfusion is significant risk factor for both HBV and HCV infection ($P < 0.05$). Sexual contact is found to be significantly associated with HBV infection ($P < 0.05$)

Discussion

In the present study, the seroprevalence of HBsAg in hospital-based population was found to be 3.9%. According to a systematic review and pooled analysis by Schweitzer *et al.*, on the prevalence of HBsAg covering 161 countries, HBsAg prevalence in India was found to be 1.46% (1.44–1.47).^[12] Various studies conducted in the hospital-based population in different parts of India such as in Rajasthan, Andhra Pradesh, and Karnataka the seroprevalence of HBsAg was found to be 0.87%, 1.06%, and 1.63%, respectively which is much less as compared to our study.^[13-15] The prevalence of hepatitis B varies not only in different regions of our country but also shows inter-country variation, and it depends on as behavioral, environmental, and host factors. In general, it is high in countries with low socioeconomic level and vice versa.

The prevalence of HCV in this study was found to be 1.76%. Studies done in various parts of India in hospital-based population have reported different seroprevalence as low

Table 2: The association of various risk factors with seropositivity of hepatitis B virus and hepatitis C virus

Associated factors	HCV (n=66)			P
	HBV (n=147)			
	Positive	Negative	Total	
Blood transfusion/blood component	39	57	96	<0.0001
	36	60		<0.0001
Percutaneous intervention	-	8	8	NA
	1	7		0.19
Sexual contact	61	3229	3290	0.13
	106	3184		<0.0001
Visit to gynecologist/dental	7	307	314	0.47
	15	299		0.32
Tattooing	-	126	126	NA
	2	124		0.19

HBV: Hepatitis B virus; HCV: Hepatitis C virus; NA: Not available

as 0.28% from Rajasthan by Sood and Malvankar to 4.8% from Pondicherry by Bhattacharya *et al.*^[13,16] Across the globe, seroprevalence of HCV among hospital-based population shows variation as reported from Mauritius, Ethiopia, and Pakistan to be 5.9%, 6%, and 9%, respectively which may reflect interplay of various factors as behavioral, social and host factors that influence HCV transmission.^[17-19]

The seroprevalence of hepatitis B among males and females in our study was 5.5% and 2.4%, respectively which is in consensus with other studies reporting higher prevalence in males and the possible reason could be that females clear the HBV infection more efficiently as compared to males.^[13] HCV seroprevalence was higher among males than females in the current study. Report on seroprevalence of hepatitis C in urban areas of Madagascar showed that the prevalence increased with age and did not differ significantly according to gender.^[20]

Married participants showed higher HBV and HCV seroprevalence when compared to unmarried participants. Transmission is more frequent between spouses than nonsexual contacts as acquisition

of these viruses can occur by sexual route.^[21] In the present study, sexual contact is a statistically significant risk factor for HBV infection but not for HCV.

Transfusion of blood and its components was found to be a significant risk factor for both HBV and HCV infection ($P < 0.05$). The prevalence of HBV infection in India ranges from 2% to 69.2% among multi-transfused patients of beta-thalassemic major patients. Inadequately sterilized needles and syringes have been linked with outbreaks of HBV infection in different parts of India. It has also been estimated that the median population attributable fraction for chronic hepatitis B linked to injections in India was 46% while that for hepatitis C and HIV was 38% and 12%, respectively.^[22,23] Other risk factors studied percutaneous intervention and tattooing did not show any statistical association with HCV or HBV infection.

The study showed coinfection with HBV/HCV in 0.16% which is quite less when compared with a study conducted by Saravanan *et al.* who reported coinfection in 5.9% patients of chronic liver disease and Reddy *et al.* found in 3.7% patients undergoing hemodialysis.^[24,25] Patients with chronic HBV/HCV coinfection are prone to develop severe disease and show poor response to interferon alpha treatment.^[26,27]

Since the HBV vaccination was included in the National universal immunization program by Government of India in the entire country in 2011–2012.^[28] The present study showed that not a single individual was found to be vaccinated against HBV.

Conclusion

The finding of comparatively higher seroprevalence of HBV and HCV among the hospital-based population mandates screening of high-risk individuals. Awareness by health education of safe sexual practices and improved safety of blood products are among the most important preventive measures to control HBV and HCV infection. It is suggested that early detection of the infection is important to prevent the transmission and better prognosis. Primary care physicians may play an important role in diagnosing the disease in an early stage using the rapid immunochromatographic assays in resource-limited laboratories. Also by educating the people visiting the primary care center about vaccination against the HBV, they will help in the prevention of disease and increase the herd immunity.

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Conflicts of interest

There are no conflicts of interest.

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