

Seroprevalance of Hepatitis B Surface Antigen amongst general population in a Tertiary Care Hospital

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Introduction

Hepatitis B virus (HBV) is a DNA virus belonging to *Hepadnaviridae* family.^{1,2} HBV infection leads to a wide range of liver diseases from acute hepatitis to chronic hepatitis, cirrhosis, and hepatocellular carcinoma (HCC).² World Health Organization (WHO) has classified HBV prevalence into high endemicity (>8%), intermediate (2-7%) and low endemicity (<2%). HBV prevalence in India is in intermediate range. Every year 100,000 Indians die due to HBV infection related illnesses.³ The diagnosis of HBV infection is based on a group of clinical, biochemical, histological, and serological markers. Interpretation of clinical significance of HBV markers and their relevance to the management of HBV infection is helpful to clinicians for appropriate therapy. It is particularly important for physicians to screen for HBV infection in HBV-endemic areas and to monitor liver disease progression in HBV carriers by using both serological and virological markers, so that effective treatment can be initiated early before the development of advanced liver disease.

Soon after its discovery as the "Australia antigen", Hepatitis B surface antigen (HBsAg) has been the prime diagnostic target for HBV.⁴ Hepatitis B surface antigen is an important component of HBV infection, being the first serological marker to be elevated in acute HBV infection and persistence of HBsAg for more than 6 months suggest chronic HBV infection.⁵ HBsAg is also used as an epidemiological marker to calculate the prevalence of hepatitis B infection. Various studies have been carried out in India over the last two decades on the epidemiology of HBV infection. An effective vaccine is available for over two decades that has brought about remarkable changes in the global epidemiology of HBV infection. Many HBsAg rapid tests are commercially available worldwide. According to the assessment report from the World Health Organization Blood Safety and Clinical Technology Department, majority tests were immunochromatographic assays with 98-100% sensitivity and 95-100% specificity.^{6,7} These HBsAg rapid test are economical and technically simple diagnostic tools.

To recognize and evaluate the extent of transmission of a disease in a community and for its

control and prevention, the study of its prevalence is very important. The first step in tackling the HBV disease burden in India is to have a more accurate assessment of the burden of the disease. Therefore, the present study was conducted in our hospital to know the seropositivity of Hepatitis B surface antigen amongst the general population.

Materials and Methods

The present study is retrospective Hospital Based Study conducted in the Department of Microbiology, Konaseema Institute of Medical Sciences, Amalapuram, from January 2016 to June 2016. Subjects included inpatients and outpatients for whom HBsAg detection was performed on the basis of patient's history, clinical findings, and risk factors. Case record form containing demographic details and clinical history was documented for every subject. A total of 4152 blood samples were screened for Hepatitis B surface antigen during this period by rapid immunochromatography (ICT, HEPACARD) test manufactured by Diagnostic Enterprises. Serum sample obtained from blood with standard procedure was used for performing the test. The tests was performed in accordance with the manufacturer's instructions with inbuilt controls. The immunochromatography assay are rapid and sensitive for detecting HBsAg. They are economical and do not require special equipments for analysis and have been recommended for routine use in clinical microbiology laboratories.

Results

Out of 4152 samples tested, 108 (2.6%) samples were screened positive for Hepatitis B surface antigen (Table 1). Seropositivity was seen more in males (3.01%) as compared to females (1.3%). (Table 2)

Table 1: Seropositivity of Hepatitis B Surface Antigen (HBsAg antigen)

Total Samples screened for HBsAg	Samples positive	Percentage (%)
4152	108	2.6

Table 2: Gender distribution of HBsAg positive patients

Gender	Total Samples screened for HBsAg	Samples positive	Percentage (%)
Male	3113	94	3.01
Female	1039	14	1.3

Discussion

HBV is an enveloped DNA virus transmitted vertically (mother to child), parenterally and sexually, which replicates in the liver and causes hepatic dysfunction. HBsAg is found on the surface of the virus and is also produced in excess amounts, circulating in the blood as 22-nm spherical and tubular particles. HBsAg can be identified in serum 30 to 60 days after exposure to HBV and persists for variable periods.¹ About 15 to 30% of acute hepatitis in India are due to HBV.⁸ The incubation period ranges from 6 weeks to 6 months, and clinical manifestations are highly age dependent. Infections occurring during infancy and childhood have the greatest risk of becoming chronic. Older children and adults are symptomatic in 33 to 50% of infections. Clinical signs and symptoms of acute HBV infection include fever, anorexia, nausea, vomiting, jaundice, dark urine, clay-colored stools, and abdominal pain. Extrahepatic manifestations like skin rashes, arthralgias, and arthritis may be immune complex mediated. Fulminant hepatitis occurs in about 1 to 2% of persons.⁹

Because the clinical symptoms of HBV infection are indistinguishable from other forms of viral hepatitis, definitive diagnosis is dependent on serologic testing for HBV infection. A variety of tests are available to make the diagnosis of HBV infection.¹⁰ Acute HBV infection is characterized by the presence of HBsAg in serum and the development of IgM antibody (IgM anti-HBc). In persons with chronic HBV infection, HBsAg remains persistently detectable, generally for life.¹¹

Globally, the consequences of acute and chronic HBV infection are major public health problems. Approximately 5% of the world's population have chronic HBV infection, leading to chronic hepatitis, cirrhosis, and hepatocellular carcinoma worldwide. More than 780 000 people die every year due to the acute or chronic consequences of hepatitis B.^{12,13} According to the WHO report on statistics of HBV in India, HBsAg prevalence among general population ranges from 0.1% to 11.7%, being between 2% to 8% in most of the studies.¹⁴ Prevalence of hepatitis B varies from country to country and depends upon behavioral, environmental and host factors. Countries which have high endemicity (where $\geq 8\%$ of the population is HBsAg-positive) include South-East Asia, China, Africa, Pacific Islands, the Amazon basin and parts of the Middle East. Countries with intermediate

endemicity (2–7%) include South Asia, Eastern and Southern Europe, Russia and Central and South America. The areas with low endemicity (<2%) include United States, Europe and Australia.^{15,16}

The present study reported HBsAg seroprevalence of 2.6% among general population group which is comparable to study by Behel et al (2008)¹⁷ reporting 2.25% prevalence. Recent studies by Sayed et al (2013)¹⁸ and Sood et al (2010)¹⁹ have reported a less prevalence of 1.63% and 0.87% respectively while Atul et al (2015)²⁰ Krishnaswamy et al (2015)²¹ have reported a higher prevalence of 4.79% and 3.6% respectively as compared to the present study. The data from various studies show wide geographic variations, which may represent differences in socio-economic status or cultural practices in different regions. However all the above studies report a higher prevalence of HBsAg among males as compared to females. There is a lack of large-scale population studies of the prevalence of HBV in India. The overall rate of HBsAg positivity has been reported to range between 2% and 8% in most studies.^{14,22,23} The first large general population-based epidemiological study of HBV infection in 7653 subjects from India by Chowdhury et al (2005) reported the prevalence of 2.9% for HBV infection.²⁴

Although India is in intermediate zone for HBV prevalence, an alarming high prevalence has been reported from the tribal population in India. The prevalence of HBsAg in the Idu Mishmi tribe of Arunachal Pradesh, was reported to be 21.2%.²⁵ Also very high levels of HBsAg positivity have also been reported in the tribes of Andaman and Nicobar Islands (Nicobarese tribe - 23.3%, Shompen tribe-37.8%, Jarawa tribe- 65%).^{26,27} The high endemicity of HBV infection in the tribal populations has been attributed to nomadic life style, wandering from hilly areas for livelihood, poor hygienic conditions, close person-to-person contact and certain socio-culture practices that may facilitate transmission of HBV.²⁸

Majority of the studies report a higher HBV prevalence in males as compared to females.^{17,18,19,20,21} Scientists in China are reporting discovery of unusual liver proteins, found only in males, that may explain the long-standing mystery why the hepatitis B virus follows gender discrimination affecting males higher than females.²⁹ Soon after the discovery of Australia antigen in the serum of an Australian aborigine, Alter and Blumberg et al found that there were larger numbers of male than female carriers.³⁰ Mazzur et al had suggested that the higher frequency of HBV carriers in males could result from behavioral differences between males and females; the life activities of males more often bring them into contact with hepatitis virus and, as a consequence, they are more likely to become infected and become carriers.³¹ A molecular level research by Liu et al indicates that estrogen may have a protective effect against the progression of chronic liver disease and the

development of HBV-associated HCC through decreasing HBV RNA transcription and inflammatory cytokine levels. In contrast, male patients may have a higher risk of HBV-associated HCC development through excessive activation of the androgen signaling pathway.³²

Conclusion

Hepatitis B infection pose a serious “silent epidemic” challenge to India. Infected persons are unaware of their chronic carrier status, continue to infect others and eventually burden the society with loss of productive workforce, and the health care system with expenses of treating liver failures, chronic liver diseases, and carcinoma. Screening and immunization of high-risk groups, such as those with history of exposure, risky practices, and occupational risk; prevention of mother-to-child transmission and promoting safe blood supply, safe injections are other recommended preventive measures. In a developing country like India, where diagnostic resources are limited in peripheral areas, rapid immunochromatographic tests make an exceptional means in screening of HBV infection which is an important public health concern. But immunochromatography based tests are only supportive tests, which need a further confirmatory test like ELISA and molecular detection methods like PCR. It is important to carry out larger studies to reveal the epidemiology of HBV and identify high prevalence areas. Concurrently, concentrating on improving public health measures to prevent disease transmission and decrease the burden of the disease is the need of the hour.

Limitation of the study

In the present study, the samples screened positive for HBsAg by rapid immunochromatographic test were not confirmed by ELISA as this facility was not available.

Conflict of interest: Nil

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