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RESEARCH PAPER

High prevalence of Hepatitis B virus infection among pregnant women in a tertiary care hospital

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Phukon P¹, Barman D², Barua P³

Address for correspondence:

¹Scientist B

²Post Graduate Trainee

³Professor and Nodal officer

(Corresponding Author)

Viral Research Diagnostic Laboratory

Department of Microbiology

Jorhat Medical College & Hospital

Jorhat-785001, Assam

Email: vrdljmcb2016@gmail.com,

drpurnimabarua@gmail.com

Mobile: +919435141989

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Background and aims: Hepatitis B (HBV) infection is a global public health problem affecting 2 billion people worldwide. The control and management of HBV infection in the developing world, particularly among pregnant women, requires attention due to the disease's high death and morbidity rates. Additionally, during pregnancy, the detection of HBsAg suggested the probability of vertical transmission of HBV. This investigation sought to elucidate the seriousness of HBV transmission among pregnant women who visited Jorhat Medical College and Hospital (JMCH), Jorhat. *Materials and methods:* A total of 5324 pregnant women were screened for HBV infection using a rapid diagnosis kit. Positive samples were further subjected to determine HBcAb and anti-HBcIgM by ELISA assay. *Results:* Out of this, 29 tested positive for HBsAg (0.54 %), and among these cases, 24(82.76 %) cases significantly belonged to the Mising tribe. The prevalence of HBsAg was higher (n=14, 48.27%) in the age group of 25-34 years compared to other age groups in this study. Among these, 13.8% (n=4) tested positive for HBcAb, and anti-HBcIgM was detected in 17.24% (n=5) patients. *Conclusion:* The prevalence of HBV infection observed among pregnant women in this study reflects a high risk of HBV perinatal transmission, particularly in a specific tribal population, and thus underscores the need to design intrusion strategies to prevent vertical transmission for HBV infection.

Keywords: HBV; HBsAg; HBcAb; anti HBcIgM; Mising tribe.

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INTRODUCTION

The leading cause of death and morbidity in developing nations is HBV infection, which can induce cirrhosis, hepatocellular cancer, acute fulminant hepatitis, and chronic hepatitis. Around 2 billion people have serological evidence of current or past HBV infection, and more than 350 million people are chronically infected worldwide. It is linked to 60-80% of all primary liver cancers.¹ However, other methods, including sexual activity, intravenous drugs, getting tattooed, undergoing surgery, and blood

transfusions, are also responsible for the spread of HBV.² Pregnant women constitute a vulnerable group for high morbidity and mortality and a high risk of transmitting the infection to newborns. In high-endemic areas, vertical transmission is a significant mode of transmission. Several studies worldwide have commended that antenatal screening of all women for HBV infection and vaccination of babies born to HBsAg-positive mothers would prevent transmission.³

Although the hepatitis B surface antigen (HBsAg) in serum is the initial seromarker for HBV identification, its

absence does not always rule out HBV transmission because the patient may be in the “window period” or because of concealed HBV infections (OBIs). Other serological markers, such as hepatitis B core antibody (HBcAb), antibodies to the surface antigen of Hepatitis B (anti-HBcIgM), and hepatitis B core antigen (HBcAg) types, may be helpful indicators of HBV exposure or infection since HB core antibodies also cause primary liver cell carcinoma, fulminant hepatitis, etc. Therefore, it is essential to study HBsAg seroprevalence as well as HBcAb, anti-HBcIgM, and HBcAg, which determine the infectivity and progression of the disease.

According to the WHO, India makes up around 15% of the global HBV population and is in the moderate to high endemic category (2-7%). However, the distribution is localized, and the prevalence among the isolated tribal communities is very high.⁴ Numerous tribal people have lived in India’s North-Eastern (NE) area for various reasons over time, and among certain tribal groups, HBV infection is widespread. Among the NE States, a high prevalence of HBV was reported in 1983 in the tribal population of Arunachal Pradesh.⁵ The Mising tribes comprise 16.16% of Assam’s overall tribal population are Southeast Asian ancestors with roots in the Abo Tani society. Abo Tani community comprises many tribes in Arunachal Pradesh and Tibet Autonomous Region (TAR) in China. The Idu Mishmi tribe of Arunachal Pradesh, descended from the Lhoba tribe of Tibet, has a high frequency of HBsAg (21.1%), and HBV genotype C in this tribe suggests viral gene flow from Southeast Asian nations where genotype C of HBV is predominated.^{6,7} Antenatal mothers serve as a sentinel for disease prevalence in the community. This prompted us to design this research to determine the prevalence of HBV infection among antenatal mothers. Mising is one of the major tribes in Assam, and the biggest

settlement is in the Jorhat district of Assam; JMCH serves the area. Therefore, ante-natal mothers attending this upper Assam tertiary care hospital have been chosen as the study site.

MATERIALS AND METHODS

Study population: All consecutive pregnant women attending antenatal OPD of Obstetrics and Gynaecology of JMCH from July 2015 to June 2016 were considered.

Sample collection: In this cross-sectional observation, venous blood (5 ml) was collected under strict aseptic precautions, and serum was separated by centrifugation and preserved at -20°C till analyzed. During blood collection, demographic and epidemiological data were gathered on a pre-tested proforma with patients’ written informed consent.

Laboratory detection of Hepatitis B virus: Blood samples were screened for HBsAg by rapid test kit (Abbott pharmaceuticals), and positive samples were subjected to determine HBcAb and anti-HBcIgM assays by ELISA (Dia Pro) according to the manufacturer’s instructions.

Statistical analysis: ANOVA test was done by Microsoft Excel software, and the p values $d > 0.05$ was used to indicate statistical significance.

Ethical issue: The Institutional Ethics Committee approved a protocol of JMCH (SMEJ/JMCH/MEU/841/2011/4430, 19.09.2016).

RESULTS

A total of 5324 antenatal women were screened, and 29 tested positive for HBsAg with a seroprevalence of 0.54%. 239 of the 5324 cases belonged to the Mising tribe. Among the positive cases, 24 (82.75%) belonged to the Mising tribe with a seroprevalence of 10.04% (Fig. 1). Those who tested positive for HBsAg were further tested for the serological markers HBcAb and anti-HBcIgM.

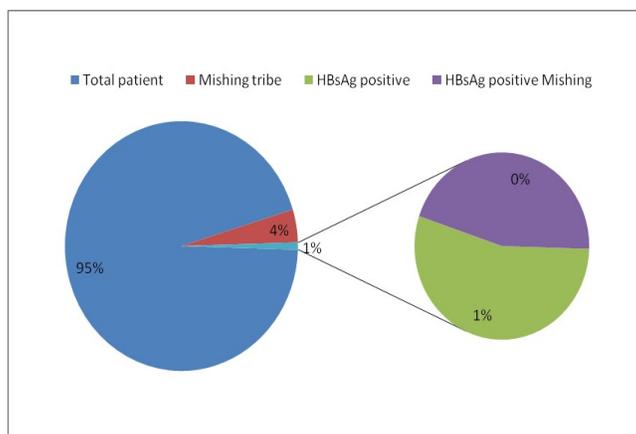


Figure 1 Seroprevalence of HBsAg among the hospital-based population

The age group distribution is shown in Table 1. Among 29 cases, (n=13; 44.82%) and (n=14; 48.27 %) had a history of surgery and blood transfusion, respectively

(Table 2). Out of these, 4(13.8%) tested positive for HBcAb, and 5(17.24%) tested positive for anti-HBcIgM (Table 1).

Table 1 HBsAg/ HBcAb/anti-HBcIgM - age-specific seroprevalence (Among 29 positive cases).

Age group (Years)	No. of HBsAg positive cases (%)	No. of HBcAb positive cases (%)	No. of anti-HBcIgM positive cases (%)	No. of co-infection of HBcAb and anti-HBcIgM positive cases (%)	P value (95% CI)
15-24	11(37.93)	2 (6.89)	2 (6.9)	0 (0)	0.225
25-34	14(48.27)	2 (6.89)	2 (6.9)	1 (3.44)	0.222
35-44	4 (13.7)	0 (0)	1 (3.44)	0 (0)	0.278

DISCUSSION

Early childhood HBV infection is susceptible to chronicity and persistence. Those who do not have a perinatal infection may subsequently come into touch with the virus through various maternal secretions.⁸ For the effective control of this infection, prevention strategies are essential, including universal vaccination and the use of immunoglobulin.

In this study, the overall rate of HBsAg in pregnant women was 0.54 %, similar to other studies conducted in India.^{9,10} Dwivedi et al. reported a prevalence rate of 0.9 % for HBsAg positivity in pregnant women, which was associated with a higher chance of vertical transmission.¹¹ A significant study in NE India, including 8575 pregnant women, reported that 3.7% carried the HBsAg virus, indicating a higher prevalence than our findings.¹² This might be because our study had fewer individuals than other studies that revealed a higher prevalence. It is observed that the seroprevalence of HBsAg differs between nations, which may be attributed to variations in climatic conditions, lifestyles, or detection methods. The current study recorded HBsAg seroprevalence of 10.04% among the Mising community, which is comparable to a study among the Idu Mishmi tribe in Arunachal Pradesh, where it was found that the point prevalence of HBsAg was 21.2%.⁷ 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%).¹³ Also, the systematic review and meta-analysis estimated the point-prevalence of HBV among Indian tribal populations as 11.85%.¹⁴ In our study, the Mising community, which had ancestors who lived in neighbouring regions of Tibet, had a high incidence that indicates HBV infection

could transmit through these connections. The prevalence rate reported in our study needs to explore the high prevalence of HBV infection in the scheduled tribes. Therefore, effective implementation and monitoring of the vaccination program needs to take action against infection in these insolvent areas.

The age group of 25–34 years had a high HBsAg seropositivity rate of 48.27% in the current study, which was similar to the findings of Dwivedi et al., and Garg et al., which signifies that young people have a high rate of HBV infection, possibly because they are sexually active in the reproductive age group.^{15,16} This may be related to the high vulnerability of younger women to sexually transmitted infections.

The prevalence rate of HBsAg in the study population who received a blood transfusion or underwent surgery was 48.27 % which is comparatively higher than the study conducted by Choudhary et al.¹⁷ A lack of donor education, rigorous donor selection criteria, inadequate serological screening protocols, and outdated blood collection and transfusion techniques may be the cause of the population's relatively higher frequency of HBV infection. Further study is required to ascertain the possibility of the sexual transmission route in the community.

The detection of HBcAb and anti-HBcIgM was done among 29 HBsAg-positive pregnant women, and prevalence was found to be (13.8%; 4/29), (17.24%; 5/29) respectively. Akinbami et al., also reported that 27 out of 267 positive donors (10.1%) tested positive for IgM anti-HB core in Nigeria, indicating active HBV infection.¹⁸ Kumar et al., reported that 11 blood donors tested reactive for anti-HBcIgM with a positivity rate of 0.43 % (1/11).¹⁹ Sharma et al. also found that anti-HBc was present in 12 out of 16

(75%) HBsAg-positive mothers, and 7 (58%) neonates acquired HBsAg infection.²⁰ Since anti-HBc in mothers' sera can easily traverse the placenta without a change in titre, it is also a helpful maker for the transplacental transmission of HBV. This study found that the presence of HBcAb and anti-HBcIgM in a single individual and both of them together is indicative of acute HBV infection, and HBsAg-positive pregnant ladies with a history of blood transfusions suggest that HBV infection might have been acquired through this.

The presence of HBcAb and anti-HBcIgM among the positive HBsAg pregnant women signifies that both serological markers should have been used to screen HBsAg-negative patients. Moreover, the HBsAg screening detection method can also be questioned, and thus molecular detection of HBV DNA should be done for the early detection of the virus. In addition, seropositive mothers should receive combined immunization and immunological prophylaxis for their high-risk newborns because most HBsAg infections are vertically transmitted. However, higher-order deliveries in India still happen in non-institutional areas; thus, this high-risk strategy may not be directly applicable.

CONCLUSION

The seroprevalence rate of HBV infection among pregnant women is comparable to other studies conducted worldwide, highlighting a persistent risk of HBV perinatal transmission and supporting the strengthening of the birth dose vaccine coverage against HBV. Moreover, the high

rate of HBV infection found in the same ethnic group supports other underlying factors, such as a lack of vaccine introduction in the national immunization schedule, risky sexual and medical practices, blood transfusion screening, etc. This study also indicates the need to include HBcAb and anti-HBcIgM in routine blood screening for transfusion, as HBV DNA testing of blood samples is not feasible at all centres. Therefore, it is important to conduct further research in the particular study area to understand the transmission dynamics.

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