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Seroprevalence of Hepatitis B in Pregnancy and Its Obstetrical and Perinatal Outcome: A Cross-Sectional Study

[1]Dr. Aparajita Singha, [2]Dr.Bivarani Goswami, [3]Dr. Shahidul Islam Borah
[1]Post Graduate Trainee, Department of Obstetrics and Gynaecology, Gauhati Medical College and Hospital, Guwahati, Assam
[2]MD Associate Professor, Department of Obstetrics and Gynaecology Gauhati Medical College and Hospital Guwahati,Assam
[3]MD Professor And Head, Department of Obstetrics and Gynaecology, Jorhat Medical College and Hospital

Corresponding Author

Dr. Aparajita Singha
Post Graduate Trainee, Department of Obstetrics and Gynaecology, Gauhati Medical College and Hospital, Guwahati, Assam

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Abstract

Background: Hepatitis B virus (HBV) infection remains a significant global health challenge, particularly in developing countries. In pregnant women, the virus not only affects maternal health but also increases the risk of vertical transmission to the neonate, which may result in chronic HBV infection.

Objective: To estimate the seroprevalence of hepatitis B virus infection among pregnant women and to assess the associated obstetrical and perinatal outcomes.

Methods: A cross-sectional study was conducted from October 2023 to October 2024 in the Department of Obstetrics and Gynaecology, Gauhati Medical College and Hospital. A total of 8,249 asymptomatic pregnant women were screened for hepatitis B surface antigen (HBsAg) using ELISA. Seropositive women underwent HBV DNA quantification and liver function testing. Maternal, obstetric, and neonatal data were analyzed using SPSS version 26.0.

Results: The seroprevalence of HBsAg was 2.49% (n=200). Most of the infected women were above 30 years of age (80%), belonged to rural areas (95%), and were from lower-middle-income backgrounds (77%). Elevated ALT was found in 76%, and 4% had HBV DNA levels exceeding 200,000 IU/mL. Cesarean delivery was performed in 49.5% of cases. Among the neonates, 43% were low birth weight, and 77% required NICU admission. Vertical transmission occurred in 3 neonates (1.5%) despite receiving birth dose vaccine and immunoglobulin.

Conclusion: This study emphasizes the importance of routine antenatal screening for HBV. Although the rate of vertical transmission was low, a considerable proportion of neonates required intensive care. Implementation of HBV DNA monitoring and antiviral therapy in high-risk pregnancies may further reduce neonatal HBV infection rates.

Keywords: Hepatitis B in Pregnancy, Seroprevalence, Perinatal Outcomes

INTRODUCTION

Hepatitis B virus (HBV) infection is a major global health concern, affecting approximately 254 million individuals worldwide, according to the World Health Organization (WHO). Chronic HBV infection is a leading cause of liver cirrhosis, hepatocellular carcinoma, and liver-related mortality. In low- and middle-income countries, including India, the disease burden is significantly higher due to limited healthcare infrastructure and incomplete immunization coverage.

The prevalence of HBV among pregnant women varies widely, with Indian studies reporting seroprevalence rates ranging from 0.2% to 7.7%. Pregnant women infected with HBV are at risk of transmitting the virus to their newborns, a phenomenon referred to as vertical transmission. Without preventive measures, such transmission rates can be as high as 90%, particularly in women with high HBV DNA levels and positive hepatitis B e antigen (HBeAg) status.

The consequences of vertical transmission are profound. Infants infected perinatally have a 90% chance of developing chronic HBV, leading to long-term liver complications. However, the risk can be significantly mitigated with timely screening, maternal antiviral therapy in select cases, and administration of hepatitis B immunoglobulin (HBIG) and vaccine to the neonate within 12 hours of birth.

In this context, understanding the epidemiological characteristics, risk factors, and outcomes of HBV in pregnancy is critical for guiding public health policies and clinical interventions. This study aims to assess the seroprevalence of hepatitis B among pregnant women in a tertiary care center in Assam and evaluate the associated obstetrical and perinatal outcomes.

MATERIALS AND METHODS

Study Design and Setting:

A cross-sectional observational study was conducted in the Department of Obstetrics and Gynaecology, Gauhati Medical College and Hospital (GMCH), in collaboration with the Department of Microbiology.

Study Duration:

October 2023 to October 2024.

Study Population:

All asymptomatic pregnant women attending antenatal care clinics at GMCH during the study period were eligible for screening.

Sample Size:

A total of 8,249 pregnant women were screened. Based on an expected prevalence of 7.7% and a precision of 5%, the minimum sample size required was calculated to be 200 HBsAg-positive cases.

Inclusion Criteria:

- Pregnant women aged >18 years.
- Asymptomatic at the time of presentation.
- Willingness to participate and provide informed consent.

Exclusion Criteria:

- History of chronic alcohol consumption.
- Known liver disease or obstructive jaundice.
- Coexisting major systemic illness or malignancy.

Data Collection:

Demographic and clinical data, including age, socioeconomic status, obstetric history, and risk factors for HBV (e.g., surgery, blood transfusion, tattooing), were collected using a predesigned proforma. Delivery details and neonatal outcomes were also recorded.

Laboratory Evaluation:

- HBsAg Detection: Serum samples were tested for HBsAg using a commercial sandwich ELISA kit.
- HBV DNA Quantification: All HBsAg-positive samples were further analyzed for viral load using real-time polymerase chain reaction (PCR).
- Liver Function Tests: ALT levels were recorded to assess hepatic inflammation.
- Neonatal Evaluation: Neonatal HBsAg testing was done using cord blood. Prophylactic administration of HBV vaccine and immunoglobulin was documented.

Statistical Analysis:

Data were compiled and analyzed using IBM SPSS version 26.0. Categorical variables were expressed as percentages, and associations between maternal HBV status and perinatal outcomes were assessed using chi-square tests. A p-value of <0.05 was considered statistically significant.

RESULTS

Out of the 8,249 pregnant women screened during the study period, 200 were found to be seropositive for HBsAg, yielding a seroprevalence rate of 2.49%.

Demographic and Socioeconomic Profile:

Table-1: Maternal age of patients

Maternal age	Number	Percentage
Maternal age <30 years	40	20%
Maternal age >30 years	160	80%
Total	200	100%

- 160 (80%) HBsAg-positive cases were above 30 years.
- 190 women (95%) were from rural areas; 154 (77%) from lower-middle-income backgrounds.
- 71.5% were housewives; 16% were illiterate.

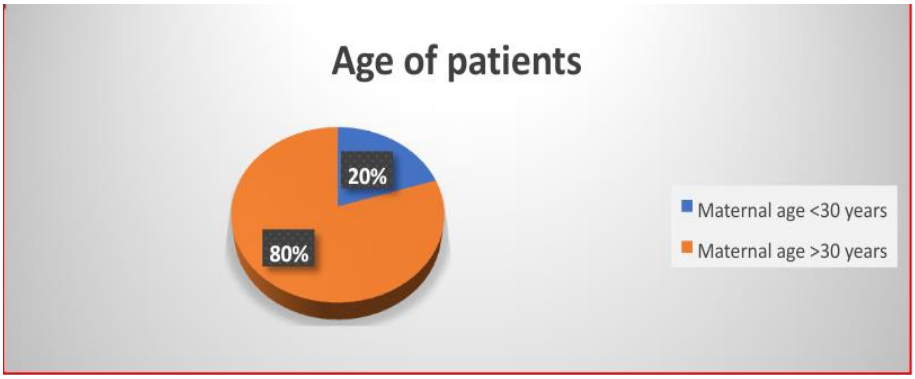

Fig 1 : Distribution of maternal Age

Risk Factors and Clinical Features:

- Previous history of blood transfusion: 6 women (3%).

Table-2: Blood transfusion history of patients		
Percentage	**Number**	**Percentage**
Yes	6	3%
No	194	97%
Total	200	100%

- Previous surgery: 5 women (2.5%).

Table-2: Previous history of surgery in patients		
History of previous surgery	**Number**	**Percentage**
Yes	5	2.5%
No	194	96.5%
Total	200	100%

- Tattooing or piercing: 11 women (5.5%).

Table-3: Tattoo/Piercing in patients		
Tattoo/pierced	**Number**	**Percentage**
Yes	11	5.5%
No	189	94.5%
Total	200	100%

- Intravenous drug use: 6 women (3%).

Table-4: IV Drug use history of patients		
IV drug use history	**Number**	**Percentage**
Yes	6	3%
No	194	97%
Total	200	100%

ALT Levels:

Table 5- ALT level in patients		
ALT level (U/L)	**Numbers**	**Percentage**
Less than 40	48	24%
41-80	73	36.5%
More than 80	79	39.5%

- ALT <40 U/L: 48 women (24%).
- ALT 41–80 U/L: 73 women (36.5%).
- ALT >80 U/L: 79 women (39.5%).

HBV DNA Viral Load:

Table-6: Severity of infection		
Hep B viral DNA load (IU/mL)	**Numbers**	**Percentage**
Not evaluated	37	18.5
Not detected (<10)	102	51
Less than 10,000	46	23
10,000-200,000	7	3.5
More than 200,000	8	4
Total	200	100

- Not evaluated: 37 (18.5%).
- Undetectable (<10 IU/mL): 102 (51%).
- <10,000 IU/mL: 46 (23%).
- 10,000–200,000 IU/mL: 7 (3.5%).
- 200,000 IU/mL: 8 (4%).

Obstetrical Profile:

Table-7: Mode of delivery in patients		
SVD	101	50.5
LSCS	99	49.5
Total	200	100

- Mode of delivery:
  - Vaginal delivery: 101 women (50.5%).
  - Cesarean section: 99 women (49.5%).

Perinatal and Neonatal Outcomes:

Table-8: Delivery outcome in p atients		
Delivery outcome	**Number**	**Percentage**
IUFD	4	2%
Live birth	196	98%
Total	200	100%

- Live births: 196 (98%).
- Intrauterine fetal deaths (IUFD): 4 (2%).
- Low birth weight (<2.5 kg): 86 neonates (43%).
- NICU admissions: 151 (77%); 45 neonates did not require NICU.
- Neonates testing HBsAg positive (cord blood): 3 (1.5%), all from mothers with HBV DNA >200,000 IU/mL.

Co-infections:

Table-9: Co infections in patients		
Infections	**Numbers**	**Percentage(%)**
Pulmonary Tuberculosis	1	0.5
Genital warts	2	1
Hep C	6	3
Hepatitis A	1	0.5
Hepatitis E	1	0.5
Varicella Zoster	2	1

HIV 1 And 2	13	6.5
Genital Warts	1	0.5
Herpes Zoster	1	0.5
Syphilis	8	4

- HIV 1 & 2: 13 cases (6.5%).
- Hepatitis C: 6 cases (3%).
- Syphilis: 8 cases (4%).
- Other co-infections (e.g., varicella, hepatitis A/E, TB): <1% each.

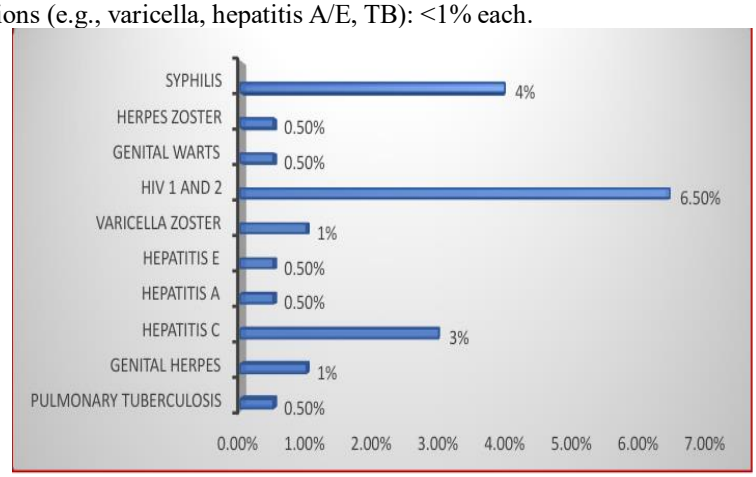

Fig 2: Distribution of Co-infections

Statistical Observations:

- The prevalence of vertical transmission was low (1.5%) and associated with high maternal viral loads (>200,000 IU/mL).

- High ALT levels (>80 U/L) and NICU admission showed strong association ($p < 0.05$) with maternal HBV positivity.

In conclusion, the study demonstrates a moderate burden of hepatitis B among pregnant women. Most mothers had low or undetectable HBV DNA levels, suggesting limited infectivity, yet the high proportion with elevated ALT levels and the NICU admission rate calls for routine liver function testing and neonatal vigilance. Universal screening, DNA profiling, and immunoprophylaxis for neonates continue to be crucial in limiting vertical transmission of HBV.

DISCUSSION

The findings from this study highlight a moderate seroprevalence of hepatitis B virus (HBV) infection among pregnant women attending a tertiary care hospital in Assam. At 2.49%, the prevalence aligns with similar studies conducted across India, reflecting the intermediate endemicity of HBV in this region. A notable aspect of the study was the significant proportion of seropositive women from rural and lower-middle-income backgrounds, which supports existing literature that associates higher HBV prevalence with limited healthcare access and socioeconomic disparity.

The observation that most seropositive women were above 30 years of age indicates the chronic nature of HBV in this population. Chronic HBV infection tends to persist due to poor awareness, lack of universal childhood vaccination in previous decades, and limited antenatal screening. Importantly, 76% of the women had elevated alanine aminotransferase (ALT) levels, and nearly 40% had levels exceeding 80 U/L, suggesting ongoing hepatic inflammation even in the absence of overt symptoms.

The virological profile showed that over 50% of the women had undetectable viral loads, and only 4% had levels exceeding 200,000 IU/mL. This is encouraging, as high viremia is a key determinant of vertical transmission. However, the fact that all three neonates who tested positive for HBsAg at birth were born to mothers with high viral loads underscores the need for timely identification and possible antiviral therapy during the third trimester. International guidelines, including those by WHO and ACOG, recommend antiviral prophylaxis in such cases to further reduce vertical transmission.

Obstetrical outcomes, including mode of delivery and incidence of IUFD, did not show substantial deviation from general population trends. However, neonatal complications were frequent: 43% were of low birth weight and 77% required NICU admission. This may reflect maternal hepatic status or the need for close monitoring of exposed infants. The low rate of vertical transmission (1.5%) is in line with global statistics when immunoprophylaxis is administered

within 12 hours of birth. This underscores the effectiveness of the combined use of hepatitis B vaccine and immunoglobulin.

Interestingly, co-infections were not rare; 6.5% of the women had HIV and 3% had hepatitis C, indicating the need for integrated antenatal screening protocols, especially in high-risk populations.

Overall, the results strongly support routine HBV screening as part of antenatal care. Given the significant proportion of women with elevated liver enzymes and the documented vertical transmission despite prophylaxis, targeted antiviral therapy for women with high viral load should be considered standard practice. This study adds to the growing body of evidence advocating universal screening, virological monitoring, and rigorous neonatal follow-up to eliminate perinatal HBV transmission.

Conflict of Interest: None declared
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