ORIGINAL ARTICLE

Seroprevalence of Hepatitis B Infection among Antenatal Women in a Tertiary Care Center in Eastern UP and Assessment of the Associated High-risk Factors

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Abstract

Introduction: Hepatitis B virus (HBV) infection is seen in more than 300 million people worldwide and is a common cause of liver disease and liver cancer. There is a lack of large-scale population-based studies on the prevalence of HBV in India. In endemic areas, HBV infection occurs mainly during infancy and early childhood, with mother-to-child transmission (MTCT) accounting for approximately half of the transmission routes of chronic HBV infections. Immunoprophylaxis to newborns is an excellent way to block natal transmission and hence to decrease the overall carrier rate. This study aimed to assess the prevalence of Hep B infection among pregnant females and to identify the high-risk factors.

Materials and methods: All pregnant women attending the OPD as well as the emergency OBGY Department of Baba Raghav Das (BRD) Medical College, Gorakhpur, during the period from July 1, 2020, to June 30, 2021, were tested for hepatitis B surface antigen (HBsAg) and those who came out to be positive were further enrolled as cases in the study. Two hundred and sixty-five HBsAg-negative pregnant women were taken as controls for the study. A detailed history was taken and data analyzed.

Results: In our study, the seroprevalence of HBsAg-positive pregnant patients was found to be 1.15% in our study area. Tattooing was found to be a significant risk factor for hepatitis B infection in our study. Those with previous history of parenteral drug use, piercings, and blood transfusions were found to be at an increased risk for hepatitis B infection.

Conclusion: Although our area falls in the low endemicity category for hepatitis B, there is a need for routine vaccination against HBV. It is necessary to create awareness on the routes of transmission especially in the rural areas and among the lower socioeconomic classes. Universal screening of all pregnant women for HBV infection is needed in order to prevent the evolution of new carriers.

Keywords: Antenatal, Hepatitis, Mother-to-child transmission, Vaccination.

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Introduction

Hepatitis B virus (HBV) infection is seen in more than 300 million people worldwide and is a common cause of liver disease and liver cancer. HBV infection leads to a wide spectrum of liver disease ranging from acute (including fulminant hepatic failure) to chronic hepatitis, cirrhosis, and hepatocellular carcinoma.[1]

Prevalence of HBV infection shows great variability worldwide.[2] There is a lack of large-scale population-based studies on the prevalence of HBV infection in India. Most of the available data are based on blood bank and antenatal screening that has inherent biases and may not truly reflect the prevalence in the general population. However, the prevalence of chronic hepatitis B (CHB) in general population in India may be between 1.4 and 2.7%.[3]

In endemic areas, HBV infection occurs mainly during infancy and early childhood, with mother-to-child transmission (MTCT) accounting for approximately half of the transmission routes of chronic HBV infections. The development of chronic infection is very common in infants. For a newborn infant whose mother is positive for both HBsAg and HBeAg, in the absence of postexposure immunoprophylaxis, the risk for chronic HBV infection is 70–90% by the age of 6 months. Prevention of MTCT is an essential step in reducing the global burden of chronic HBV. Natal transmission accounts for most of MTCT, and providing immunoprophylaxis to newborns is an excellent way to block natal transmission and hence to decrease the overall carrier rate.[4]

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Hepatitis B also spreads by needlestick injury, tattooing, piercing, and exposure to infected blood and body fluids, such as saliva and, menstrual, vaginal, and seminal fluids.[5]

Infection in adulthood leads to chronic hepatitis in less than 5% of cases, whereas infection in infancy and early childhood leads to chronic hepatitis in about 95% of cases. All pregnant women should be tested for HBsAg during an early prenatal visit (e.g., first trimester) in each pregnancy. Also, all HBsAg-positive pregnant women should be tested for HBV DNA to guide the use of maternal antiviral therapy

during pregnancy.[6] This will help to ensure that their infants will be identified for timely immunoprophylaxis.

This study aims to assess the prevalence of Hep B infection among pregnant females and to identify the high risk factors leading to infection in order to reduce the overall carrier rate of hepatitis B infection.

Materials and Methods

This study was a prospective, observational, and analytical study. The study was conducted in the OBGY Department of Baba Raghav Das (BRD) Medical College, Gorakhpur, for a duration of 1 year from July 1, 2020, to June 30, 2021.

All pregnant women attending the OPD as well as the emergency department were tested for HBsAg and those who came out to be positive were further enrolled as cases for risk factor assessment in the study. Two hundred and sixty HBsAg negative women were taken as controls for risk factor assessment for the study.

The study was approved by the ethics committee of BRD Medical College, Gorakhpur (UP), and informed consent was taken from patients prior to the study.

A detailed history was taken using a questionnaire prepared by us in order to determine the risk factors involved. Data thus obtained were analyzed and results noted.

Observation

During the study period of 1 year from July 1, 2020, to June 30, 2021, the total number of antenatal women visiting tertiary center was 5,605 and total number of hepatitis B-positive antenatal women was 65. These 65 women were taken as cases and another 260 women who were negative served as controls. This formed the basis of further analysis.

So, the seroprevalence of hepatitis B-positive antenatal in our study was found to be 1.15% (Table 1).

Table 2 shows that among the cases, 52% women were in the age-group 20–25 years, 40% in the age-group 26–30 years, 4.6% in the age-group 31–35 years, and 2% in the age-group 36–40 years, whereas among the controls, 52% were in the age-group 20–25 years, 38% in the age-group 26–30 years, 7.6% in the age-group 31–35 years, and 1.9% in the age-group 36–40 years. Mean age being 25.75 ± 3.39 years in case and 25.96 ± 3.86 years in control. The mean age of cases and controls was 25.75 ± 3.39 and 25.96 ± 3.86, respectively. The cases and controls were similar in terms of age.

Table 3 shows that among cases, 35.3% patients were primi, 35.3% with gravida 2, 4.6% with gravida 3, 9.2% with gravida 4, and more, whereas in control group, 37% patients were primi, 33% with gravida 2, 15.3% with gravida 3, only 13.4% with gravida 4, and more. There was no significant difference between cases and controls in terms of gravida status.

Table 4 shows that around 98.4% of cases were housewives by profession and only 1.54% were doing trained job, whereas 98% controls were housewives and 0.01% were doing trained job. There was no significant difference between cases and controls in terms of occupation.

Table 5 shows that in cases 84.6% of the antenatal woman were illiterate, 13.8% were educated till 10th standard, and around 1.54% were educated after 10th standard and in controls 86.5% antenatal women were illiterate, 11.9% were educated till 10th standard and around 1.5% were educated after 10th standard. There was no significant difference between the cases and controls in terms of education.

Table 6 shows that, among cases, only 1.54% of women were from upper class, 12.3% were from upper middle, 12.3% from lower middle, 27.6% from lower upper, and 46.1% from lower socioeconomic status whereas in control group, 3.4% women were from upper class, 10.3% from upper middle class, 27.3% lower middle, 29.6% from lower upper class, and 29.2% from lower socioeconomic status. It was seen that significantly more cases were from lower and lower upper class.

Table 1: Seroprevalence of hepatitis B-positive antenatal women during the study period

Time period	*Total number of antenatal women visiting tertiary center*	*Total number of hepatitis B-positive antenatal women*	*Seroprevalence of hepatitis B-positive antenatal women* $= \frac{\text{Total No. of hepatitis B positive antenatal women}}{\text{Total No. of antenatal women vising tertiary care}} \times 100$
From July 1, 2020, to June 30, 2021	5,605	65	$= \frac{65}{5{,}605} \times 100 = 1.15\%$

Table 2: Maternal age

Age	*Cases (N = 65)*	*Controls (N = 260)*	*p value*
20–25 years	34 (52%)	136 (52%)	>0.05 = not significant
26–30 years	26 (40%)	99 (38%)	>0.05 = not significant
31–35 years	3 (4.6%)	20 (7.6%)	>0.05 = not significant
36–40 years	2 (3%)	5 (1.9%)	>0.05 = not significant
Mean	25.75 ± 3.39	25.96 ± 3.86	

Table 3: Gravida status

Gravida	*Cases (N = 65)*	*Controls (N = 260)*	*p value*
1	23 (35.3%)	97 (37%)	>0.05 = not significant
2	23 (35.3%)	88 (33%)	>0.05 = not significant
3	13 (4.6%)	40 (15.3%)	>0.05 = not significant
≥4	6 (9.2%)	35 (13.4%)	>0.05 = not significant

Table 4: Occupation

Occupation	*Cases*	*Controls*	*p value*
Housewife	64 (98.4%)	257 (98%)	>0.05 = not significant
Trained job	1 (1.54%)	3 (0.01%)	>0.05 = not significant

Table 5: Education

Literacy	*Cases*	*Controls*	*p value*
Illiterate	55 (84.6%)	225 (86.5%)	>0.05 = not significant
Up to 10	9 (13.8%)	31 (11.9%)	>0.05 = not significant
>10	1 (1.54%)	4 (1.5%)	>0.05 = not significant

Table 6: Socioeconomic status

Class	*Cases*	*Controls*	*p value*
Lower	30 (46.15%)	76 (29.2%)	0.026 (<0.05 = significant)
Lower upper	18 (27.69%)	77 (29.6%)	0.076 (<0.05 = not significant)
Lower middle	8 (12.3%)	71 (27.3%)	0.012 (>0.05 = significant)
Upper middle	8 (12.3%)	27 (10.3%)	0.655 (>0.05 = not significant)
Upper	1 (1.54%)	9 (3.4%)	0.422 (>0.05 = not significant)

Table 7: Background

	Cases	*Controls*	*p value*
Rural	57 (87.69%)	200 (76.9%)	=0.05 significant
Urban	8 (12.31%)	60 (23.0%)	=0.05 significant

Table 8: Husband status

Status	*Cases*
Negative	53 (81.5%)
Positive	0
Not known	12 (18.4%)

Table 9: Comparison of risk factors

	Cases	*Controls*	*Odds ratio*	*p value*
H/o parenteral drug use	62 (95.3%)	235 (90.7%)	2.19	>0.05 = not significant
Needle sharing	0	0		
I/V drug abuse	0	0		
Contact with blood of infected person	0	0		
Tattooing	38 (58.4%)	31 (11.9%)	10.3	<0.05 = significant
Piercings	64 (98.4%)	246 (94.9%)	3.64	>0.05 = not significant
Contact H/o family/friends	0	0		
H/o blood transfusion	6 (9.23%)	10 (3.8%)	2.54	>0.05 = not significant
H/o any previous surgical procedure	26 (40%)	135 (52%)	0.61	>0.05 = not significant
STI	20 (30.7%)	83 (32%)	0.94	>0.05 = not significant

Table 10: HBV DNA viral load

HBV DNA viral load	*Cases*
<100	12 (18.4%)
100–1,000	14 (21.5%)
1,000–10,000	2 (3.0%)
>10,000–2 lakhs	6 (9.2%)
>2 lakhs	1 (1.5%)
Not known	26 (40%)

Table 7 shows that in cases 87.69% were belonging from rural background and 12.3% were from urban background and in controls 75.7% were from rural background, and 24.2% were from urban background. There were significantly a more number of cases from rural population.

Table 8 shows that in 81.5% cases husband status was negative, and in 18.4% cases husband status was not known. There was no case with husband status positive.

Table 9 shows risk association among cases and controls with the help of odds ratio and *p* value. The odds ratio of parenteral drug transfusion is two times greater among cases than among control patients. The odds ratio of tattooing is 10 times greater among cases than among control patients. The odds ratio of piercing is three times greater among cases than among control patients. The odds ratio of blood transfusion is two times greater among cases than among control patients. The odds ratio of STI is two times greater among cases than among control patients. Among all of these exposures, tattooing is statistically significantly associated with illness.

Table 10 shows that among 12 (18.4%) HBVDNA viral load is <100, between 100 and 1000 is 14 (21.5%), between 1,000 and 10,000 is 2 (3.0%), between 10,000 and 2 lakhs is 6 (9.2%), >2 lakhs in 1 (1.5%), and in 26 (40%) of the patients the HBV DNA viral load could not be done.

Discussion

HBV infection is one of the serious health problems worldwide. Based on the carrier rate, WHO categorizes Hep B endemicity into high, intermediate, and low endemicity.[2] In our study, the seroprevalence of HBsAg-positive pregnant patients was found to be 1.15% in our study area which is categorized as low endemicity.

This finding was similar to another study done in northern India by Sibai et al. where the seroprevalence of HBsAg-positive antenatal females was 1.11%[2] as well as one more study done in northern India by Garg et al.[7] where the prevalence of hepatitis B-positive antenatal women was found to be 2.04%. Similarly, a study done by Rajendiran et al.[8] in South India showed a seroprevalence of 1.01% whereas another study done in northern India (Allahabad) by Dwivedi et al.[9] reported a seroprevalence of 0.9% and a study done by Prakash et al.[1] reported seroprevalence of 0.83%.

In contrast, a study done by Prakash et al.[10] in northern India reported a high prevalence of 9.5%.

The wide variation in HBV infection seroprevalence in different regions may be due to differences in geographical conditions, sociocultural practices, and socioeconomic status.

One risk factor that was found to be significant in this study was tattooing. Body tattooing is a traditional practice in India. During our study, we found that in eastern UP (i.e., our study population) tattooing was a standard culture before marriage of girls in certain castes. This tattooing was done by unskilled local men under unsanitary conditions. This could be the reason for such strong significance of tattooing with hepatitis B infection. Other studies that corroborated this finding are studies done by Luksamijarulkul et al.,[11] Demeke et al.,[12] and Zenbe et al.[13] Study done by Demeke et al. showed that pregnant women who had traditional tattooing practice had five times higher risk of being seropositive for HBV infection than pregnant women who had not practiced tattooing. This may be due to improper cleaning and sterilization of instruments used for the tattooing procedure. Also, unvaccinated people are at a greater risk for HBV infection if they are tattooed under unsterile conditions.

Also, it was shown that in most cases (81.5%), husband status was negative. The reason for this could be low infectivity of the cases as evidenced by low viral load (most of the cases had HBV DNA viral load of less than 2 lakhs).

There was no statistical significance between other risk factors like h/o iv drug use, piercings, family history, needle sharing, previous history of surgery, STI, and h/o contact with infected blood.

However, even though statistical significance was not found, but it was noted that those with h/o parenteral drug use were 2.19 times more likely to develop HBV infection while those with piercings and those with H/o blood transfusions were 3.64 times and 2.54 times more likely to get infected with HBV infection respectively.

Conclusion

Although the seroprevalence of HBV infection among antenatal women in the study area falls in the low endemicity category, there is a need for routine vaccination against HBV. Tattooing was found to be a significant risk factor for HBV infection. Tattoos have become more common among young adults. The unequivocal risk of transmission of HBV infection by tattooing is certain and can be prevented if tattooing is performed by trained artists using adequate equipment under adequate sanitary conditions. Hence, there is a need for creating awareness by medical and para-medical staff on the routes of transmission especially in the rural areas and among the lower socioeconomic classes where tattooing using unsterile instruments is high. Universal screening of all pregnant women for HBV infection is needed in order to prevent MTCT and hence to reduce the evolution of new carriers and thereby bring down the prevalence of HBV infection rate to the lowest possible.

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