

## Declining Trends in the Prevalence of Hepatitis B Virus Infection in Antenatal Women; Role of Vaccination

Pramod N. Sambrani\*, Divya A.\*\*, Asha B. Patil\*\*\*, Shobha Medegar K.R.\*\*\*\*, Harshika Y.K.\*\*\*\*

### Author Affiliation

\*Assistant Professor  
\*\*Post Graduate Student  
\*\*\*Professor and HOD, \*\*\*\*Tutor,  
Department of Microbiology,  
Karnataka Institute of Medical  
Sciences (KIMS),  
Hubballi, Karnataka 580022,  
India.

### Corresponding Author Divya A.,

Post Graduate Student,  
Department of Microbiology,  
Karnataka Institute of Medical  
Sciences (KIMS),  
Hubballi, Karnataka 580022,  
India.  
E-mail: [adivya0604@gmail.com](mailto:adivya0604@gmail.com)

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### Abstract

*Context:* Hepatitis B Virus infection is one of a serious public health problem worldwide and it is 50±100 times more contagious than HIV. Many of the carriers do not realize that they are infected with the virus rendering the HBV to be known as a “silent killer”. The transmission of hepatitis B virus (HBV) is parenteral, sexual and perinatal. Prevention of vertical transmission of HBV is extremely important, because HBV infection in early life usually results in a chronic carrier state. *Aim:* To study the prevalence of Hepatitis B surface Antigen (HBsAg) positive among pregnant women referred to Department of Microbiology, Karnataka Institute of Medical Sciences during the study period. *Materials and Methods:* The study is a prospective study conducted by collecting blood samples from 3223 antenatal women with age ranging from 21-30 years, attending the department of Microbiology during the study period. Screening of HBs Ag was done by rapid immunochromatographic method. *Results:* Out of 3223 antenatal women screened 48 were positive accounting for 1.49%. In the age group of 21-25 years 34 (1.45%), 26-30 years 13 (1.92%) and 31-35 years one (0.5%) antenatal women were positive. The highest prevalence was observed in the age group 26-30 years (1.92%). *Conclusion:* HBV during pregnancy is associated with a high risk of maternal complications, has a high rate of vertical transmission. The study suggests expansion of the Hepatitis B vaccination program to reduce the risk of HBV among pregnant women.

**Keywords:** Hepatitis B Virus; Antenatal Women; HBsAg; Universal Immunisation Programme.

### Introduction

Hepatitis B virus (HBV) is a double-stranded DNA virus belonging to the *Hepadnaviridae* family. Hepatitis B is a potentially life-threatening liver disease caused by HBV. It is a major global health problem and the most serious type of viral hepatitis. It can cause chronic liver disease and put people at high risk of death from cirrhosis of liver and liver cancer [1].

Hepatitis B virus (HBV) infection is a serious public health problem worldwide [2]. Prevalence of Hepatitis B in pregnant women worldwide is 0.25 to 1.5% whereas in India it is 0.2 to 7.7% [3]. Before HBV vaccine was integrated into the routine immunization programme, in India in 2002 and was scaled up nationwide in 2011, about 10% to 30% babies were becoming HBV carriers amongst mothers who were HBsAg positive but HBeAg negative. However, perinatal infection was higher (70% to 90%), when

mothers were also HBeAg positive. The possible routes of transmission for HBV from infected mothers to infants are; transplacental-in utero, natal-during delivery [4].

Transmission of HBV from carrier mothers to babies can occur during perinatal period, and is important factor in determining the prevalence of infection in highly endemic areas [5]. The present study was designed to assess the prevalence of hepatitis B infection, among otherwise healthy pregnant females.

### Materials and Methods

The present study is a prospective study. The study was conducted in the Department of Microbiology.

Five ml of blood sample was collected from all the pregnant women attending the OPD of Department of Microbiology with proper aseptic precautions. The serum was separated by centrifugation of 3000 rpm

for 15 minutes. The centrifuged serum samples were screened for Hepatitis B surface Antigen (HBsAg) using rapid immuno-chromatographic kits from Qualpro diagnostics.

### Results

A total of 3223 antenatal cases underwent screening for Hepatitis B surface Antigen during the study period. Out of which 48 were positive accounting for a seroprevalence of 1.49% (Table 1).

In the age group of 21-25 years 34 (1.45%), 26-30 years 13 (1.92%) and 31-35 years one (0.5%) antenatal women were positive. The highest prevalence was observed in the age group 26-30 years (1.92%) as shown in Table 1.

#### Statistical Analysis

SPSS software version 2.0

**Table 1:** Age-wise seroprevalence of HBsAg among pregnant women.

Age Group (years)	No. of Antenatal cases underwent screening for HBsAg	No. of HBsAg positive antenatal cases	Percentage of HBsAg positive antenatal cases (in %)
21 - 25	2346	34	1.45
26 - 30	677	13	1.92
31 - 35	200	01	0.5
Total	3223	48	1.49

(HBsAg: Hepatitis B surface Antigen)

**Table 2:** Comparison of prevalence of HBsAg among antenatal women before and after the introduction of HBsAg Vaccine (2002)

Name of the study done before 2002	Prevalence of HBsAg among ANC in the study (%)	Name of the study done after 2002	Prevalence of HBsAg among ANC in the study (%)
Nayak NC et al <sup>7</sup> (1987)	3.7%	Chatterji S et al <sup>13</sup> (2009)	0.82%
Biswas SC et al <sup>8</sup> (1989)	2.3%	Pandy et al <sup>14</sup> (2011)	1.1%
Gupta I et al <sup>9</sup> (1992)	2.48%	Dwivedi M et al <sup>5</sup> (2011)	0.9%
Gill HH et al <sup>10</sup> (1995)	5%	Sibia et al <sup>15</sup> (2016)	1.11%
Mittal SK et al <sup>11</sup> (1996)	4.6%	Rajendiren S et al <sup>16</sup> (2017)	1.01%
Prakash C et al <sup>12</sup> (1998)	9.5%	Mishra S et al <sup>3</sup> (2017)	1.09%

(HBsAg: Hepatitis B surface Antigen)

### Discussion

Hepatitis B virus is a DNA hepadnavirus. It is a 47-nm spherical virus that possesses several antigens of importance for diagnosis and pathogenesis. Several genotypes of hepatitis B virus have distinct clinical implications. Genotype B is found more commonly in infections that results in acute and chronic hepatitis and is a etiological agent of hepatocellular carcinoma.

Hepatitis B virus has a long incubation period (45-120 days) and is transmitted primarily by parenteral route. Other parenteral routes have included

acupuncture and tattooing. This virus can be transmitted by sexual contact and has produced epidemic disease in male homosexuals, prostitutes, and abusers of intravenous drugs. Perinatal infection occurs, but breast milk does not appear to play a role in transmission [6]. Hepatitis B Virus causes chronic and asymptomatic conditions which can be detected by laboratory methods alone.

Unlike HIV infection, hepatitis B infection is a vaccine preventable disease, hence has the potential for eradication of the disease through wide coverage of immunisation.

Hepatitis B vaccine was introduced in the routine immunisation Programme of India in June 2002 and scaled-up nationwide in 2011 under Universal Immunisation Programme (UIP). Hepatitis birth dose was introduced in the national programme in 2008. Hepatitis B vaccine is provided as one of the pentavalent vaccines (against diphtheria, pertussis, tetanus, hepatitis B and Haemophilus influenzae B infections) administered at 6, 10 and 14 weeks, in addition to birth dose for institutional births. The birth dose is administered using a monovalent vaccine.

Several studies done before the introduction of Hepatitis B vaccine in the universal immunisation programme (2002) show a higher prevalence when compared to studies done after the introduction of vaccine (Table 2) [3,5,7-16]

In our study, the prevalence of HBV among Antenatal cases is 1.49%. This is comparable to the seroprevalence of 1.09% reported by Mishra S et al [3] and colleagues (in the year 2017), 1.01% reported in a study by Rajendiren S et al [16] (in 2017), 1.11% reported by Sibia P et al [15] (in 2016), 1.1% reported by Pandey et al [14] (in 2011).

As studies before and after the introduction of immunisation against Hepatitis B show a decline in the prevalence of the disease, our study also shows a prevalence of 1.49%, which is in concordance with other studies after 2002.

As regards to age, in present study high HBsAg carrier rate in pregnant women was found in the age group 26-30 years (1.92%), followed by the age group 21-25 years (1.45%), then the age group of 31-35 years (0.5%) as shown in Table 1.

A possible reason for the slightly higher HBsAg prevalence in the 21-30 year-old age group is the fact that between these ages, many females are likely to get married and become pregnant. They are therefore likely to attend antenatal care centers for the first time, and thus, can be easily picked up by screening.

Internationally, studies have reported various prevalence rates among pregnant women. In Brazil, a prevalence of 1.64%, France 0.29%, Italy 1.1%, Saudi Arabia 2.44%, Pakistan 4.6%, India 2.3% and Turkey 2.1%. In the Persian Gulf, rates of 7.1% and 1.5% in United Arab Emirate have been reported. In Africa, rates of 3% to 4% in Tunisia, 5.6% in Sudan and an astronomically high rate of 25% in Zimbabwe have been reported [17].

This study only screened for HBsAg in pregnancy in our area. As vertical transmission is responsible for HBsAg infections in child who are more likely to become carriers and later in life may present with cirrhosis and hepatocellular carcinoma, it may be

enough if we screen all antenatal women and give combined immunization and immunoprophylaxis to the high risk infants born to seropositive mothers.<sup>18</sup> A combination of active and passive immune prophylaxis is the optimum strategy to prevent HBV infection in babies of HBsAg positive mothers. A combination of Hepatitis B immune globulin (HBIG) and Hepatitis B vaccination initiated within 24 hours of delivery have been shown to protect 85 to 95% of babies whose mothers were positive for HBsAg [19].

The study population included rural antenatal women, who were illiterate and had no awareness of transmission of the disease from mother to fetus. Social factors including early marriage and little formal education, lack of knowledge about hepatitis B infection and the importance of vaccination contribute significantly to a higher prevalence of STIs, including hepatitis B, among adolescent girls [20].

However in a country like India where a large number of deliveries are still non-institutional and laboratory facilities are not accessible to all, early detection of the disease is not feasible [21]. The other contributing factor is, parents mistake the Hepatitis B infection for other causes of jaundice, metabolic diseases and neglect the infection. So there is a need for aggressive health education about the disease and vaccination through health workers, media and street plays to people.

## Conclusion

The prevalence of hepatitis B infection among pregnant women attending Antenatal Clinic in our study is similar to the studies done after the introduction of vaccination in UIP. However even the prevalence of 1.49% can increase the pool of carriers and disease burden in the society. Hence aggressive health education and vaccination of all susceptible population are the main tools through which we can further reduce the prevalence of Hepatitis B virus infection in the society.

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