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Prevalence of Hepatitis B Virus Infection in Antenatal Women in a Tertiary Care Hospital

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A B S T R A C T

Hepatitis B virus (HBV) infection is a major global health problem. It causes chronic infection and high risk of mortality from cirrhosis and liver cancer. Antenatal women with HBV infection may transmit the virus vertically to neonates during pregnancy or delivery. Hepatitis B surface antigen (HBsAg) is the first serological marker of HBV infection. Screening of antenatal mothers for HBsAg would help in at risk of transmitting the infection to infants. Hence this study was conducted to determine the prevalence of Hepatitis B infection in antenatal women. The main aim and objectives of this study to determine the prevalence of HBsAg positivity in antenatal women. This was a descriptive study done at Department of Diagnostic Microbiology, Government Mohan Kumaramangalam Medical College, Salem. This study was carried out among 100 antenatal mothers attending Obstetric department from July 2022 to September 2022. Blood specimen was collected from the women were tested for the presence of HBsAg using Enzyme Linked Immuno Sorbent Assay (ELISA). It was observed that the highest number of antenatal mothers attending Obstetric department was in the age group of 21 to 30 years (51%). 43% of the antenatal women were multigravidae and 50% of women visited during the last trimester. It was found that 2(2%) of 100 antenatal mothers were positive for Hepatitis B surface antigen. Screening of antenatal women for HBV infection is of significant help to decrease the risk of vertical transmission to the newborn babies born to HBsAg positive mothers by giving timely post exposure prophylaxis and continuous followup. This would help in decreasing the morbidity and carrier state.

Introduction

Hepatitis B infection is one of the major global health problems worldwide. Hepatitis B virus belongs to the family "Hepadnaviridae". It is an enveloped DNA virus which infects the liver causing liver inflammation and hepatocellular carcinoma. Hepatitis B virus infections are 100 times more contagious than HIV (Jahan *et al.*, 2020). According to the World Health Organization (WHO), 296 million individuals are having chronic hepatitis B infection and 1.5 million new infections per year. In India number of carrier of HBV infection is 40 million (Jahan *et al.*, 2020; Bose *et al.*, 2018).

The prevalence of chronic HBV infection was estimated to be 3.5% among women of reproductive

age globally (Mustapha *et al.,* 2020). The prevalence of HBV infection is highly variable in different parts of the world. The World Health Organisation (WHO) has classified HBV prevalence into high endemicity (>8%), intermediate endemicity (2 - 7%) and low endemicity (<2%) (Bose *et al.,* 2018). HBV prevalence in India is in the intermediate range. In India prevalence of hepatitis B infection in pregnant females varies from 0.2% to 7.7% (Jahan *et al.,* 2020; Chatterjee *et al.,* 2009).

Viral hepatitis during pregnancy is associated with high risk of complications in the mother and high rate of transmission to the newborn. Fetal and neonatal hepatitis acquired from mother during pregnancy lead to impaired cognitive and physical development in latter life of the children (Yohanes *et al.,* 2016).

The risk of vertical transmission depends on the time at which pregnant woman acquired HBV infection. 10% of neonates become HBsAg positive when antenatal mothers acquired the HBV infection during 1st trimester of pregnancy and 80 to 90% of neonates become HBsAg positive if mother acquired the infection during 3rd trimester of pregnancy without post exposure prophylaxis (Sharma *et al.,* 2018).

90% of babies born to carrier mothers become carriers and are at a very high risk of developing chronic liver diseases at a younger age and they are the most important reservoirs of infection in the community (Bose *et al.,* 2018).

Infection can be transmitted through transplacental route during pregnancy, natal route during delivery, or postnatal route through breast milk.

Transplacental transmission of HBV to the fetus may be due to hematogenous route or cellular transfer. The placental tissue is infected by the high titer of HBV present in maternal blood and transplacental transmission occurs from mother to fetus through the villous capillary endothelial cells (Garg *et al.,* 2017; Jahan *et al.,* 2020).

The transmission of hepatitis B virus is due to the transfusion of infected blood and its products, urine, semen, sweat, saliva, tears, breast milk, vaginal secretions, pathological effusions, intravenous drug use, unsafe therapeutic injections, occupational injuries, or nosocomial transmission during health care-related procedures, such as surgery, hemodialysis, and organ transplantation. Injection drug abuse is not as widespread in India (Garg *et al.,* 2017).

Hepatitis B surface antigen (HBsAg) also known as Australia Antigen is a major serological marker of Hepatitis B virus (HBV) infection (Sathiyakala Rajendiran *et al.,* 2017).

Immunization is the cornerstone of effective prevention for HBV transmission. If mother is positive to the HBsAg, after the delivery, babies should be given immunoprophylaxis in the form of active immunization and passive immunization with Hepatitis B immunoglobulin and 3 doses of Hepatitis B recombinant vaccine respectively, thereby preventing them from being chronically infected by the virus (Jahan *et al.,* 2020; Yohanes *et al.,* 2016).

Due to paucity of such type of study in this region, the present study was aimed to determine the seroprevalence of hepatitis B surface antigen among antenatal women and also screening of pregnant women may indirectly help the healthcare providers as they can use universal precautions when handling such patients.

Materials and Methods

Study population

Antenatal women attending Obstetric department including both inpatient and outpatient.

Study design

It was a descriptive study.

Place of study

Department of Obstetrics and Gynaecology, Department of Diagnostic Microbiology, Government Mohan Kumaramangalam Medical College, Salem District, Tamil Nadu

Period of study

3 months (July 2022 to September 2022)

Sample size: 100

Inclusion criteria

All antenatal mothers above 18years attending Obstetric department

Exclusion criteria

Antenatal mother who was not willing to participate in the study.

After proper counselling and taking informed written consent, a detailed history was taken regarding their age, gestational age, parity, area of residence, history of jaundice, blood transfusion, abortion and tattooing.

3ml of venous blood sample was collected from antenatal mothers under strict aseptic precautions in a well labelled plain vacutainer tube. Serum was separated after the tubes were allowed to stand for 30 minutes and centrifuged for 15mins at 3000rpm.

The sera were then screened for HBsAg by using HEPALISA, a 3rd generation Enzyme Linked Immunosorbent Assay (ELISA) method (J. Mitra and Company Private Limited, India). The HEPALISA is a solid phase ELISA based on direct sandwich principle.

The microwells are coated with monoclonal antibodies with high reactivity for HBsAg. According to manufacturer's instruction 100 µl negative controls (wells A1 and B1), 100 µl positive controls (wells C1 and D1) and 100 µl samples (well E1 onwards) were added in the respective wells followed by addition of 50 µl working enzyme conjugate and then the plate was covered and incubated at 37ºC for 60 minutes. The plate was then washed with working wash buffer 6 times followed by the addition of 100 µl working substrate solution in all the wells and the plate was covered and incubated at room temperature (20-25ºC) for 30 minutes in dark. Finally, 100 µl stop solution was added to each well and the absorbance was read at 450 nm in an ELISA reader within 30 minutes. The Cut-off value was calculated by formula: mean absorbance of Negative control (NC)+0.1. Samples with absorbance value less than the cut-off value were considered as non- reactive, whereas, those with absorbance value equal to or greater than the cut-off value were considered as reactive by the criteria of HEPALISA commercial kit.

Results and Discussion

Out of 100 pregnant women blood sample were screened for HBsAg by ELISA, 2(2%) were found to be positive.

It was observed that maximum number of antenatal mothers were in the age group of 21 to 25 years (54%)

It was observed that maximum number of antenatal mothers were in third trimester of pregnancy.

Multigravid antenatal mothers (58%) were more predominantly visited Obstetric antenatal care than primigravid mothers.

The prevalence of HBsAg positivity varies widely in different parts of the India. It depends on a variety historical, behavioural, environmental type of population studied, genetic factors, socioeconomic status and other risk factors. In India, the prevalence of HBsAg positivity in pregnant women has been reported to range from 0.2% to 7.7%. Previously done studies has shown that prevalence rate of HBsAg positivity varies between 2.3 and 6.3% in

pregnant women (Biswas *et al.*, 1989; Jahan *et al.*, 2020).

Among 100 antenatal mothers tested for HBsAg, 2 were found to be positive in our study. Seroprevalence of HBsAg positivity in antenatal mothers in our study was 2%. HBV prevalence is in the intermediate range as per WHO classification.

This was in agreement with a study by Pande *et al.*, (2011) was 1.1%, 0.9% was reported by Dwivedi *et al.*, (2011). In contrast to our study carried out by Mittal *et al.*, (1996); Gill *et al.*, (1995); Nayak *et al.*, (1987) and Khakhkhar Vipul *et al.*, (2012), reported higher seroprevalence rate of 6.3 %, 5%, 3.7% and 3.07% respectively in their studies from India.

Prakash *et al.*, (1998) reported a high prevalence rate of 9.5% in a study in North India. In few studies from India, as by Chatterjee *et al.*, (2009) (0.82%) and Shazia Parveen *et al.*, (2012) (0.61%), the seroprevalence rate reported were lower than the present study.

The seroprevalence of hepatitis B in pregnant women varies from country to country. The prevalence of sero-positive HBsAg among pregnant women in our study can be also comparable with 1.6%, 1.47% as reported in Saudi Arabia (Alrowaily *et al.*, 2008) and Southeastern Turkey (Yavuzcan *et al.*, 2011) respectively.

Prevalence rate of 10% of HBV was found among pregnant women in Hong Kong (Tong *et al.*,2005), 12% in Taiwan (Hepatitis B Virus e Antigen Variants, 2005), 17.3% in Burkina Faso (Lin *et al.*, 2003) and 7.3% in Nigeria (Collenberg *et al.*, 2006). Perinatal infection is a major route of infection in developing countries. These variations in seroprevalence may be due to difference in socioeconomy and behavioral and cultural practices between 15 and 45 years of age.

Regarding age, in the present study, high HBsAg seropositivity rate in pregnant women was found in age group 21-25 years, which was in agreement with the study of Ambade *et al.*, (2014); Adegbesan-Omilabu *et al.*, (2015); Dwivedi *et al.*, (2011); Smita Thakkarwad *et al.*, and Khakhkhar Vipul *et al.*, (2012). Rajendiran *et al.*, (8) reported that the prevalence of HBV infection was highest in the age group 26- 30(46.1%). Another study done by Chernet *et al.*, (2017), reported highest positivity in 35-44 years (7.6%) age group followed by positivity seen in 25-34 years (4.7%) age group.

The mean age of HBsAg positivity in pregnant mothers reported by Fomulu *et al.*, (2013) was 26.9 years' age group and by Vazquez-Martinez *et al.*, (2003) was 26 years and by Rashid *et al.*, (2014) was 28.5 years. Bayo *et al.*, (2014) also reported that the age of HBV infection was higher in women aged 20 years or younger (20%) compared with older women (8.7%) in Uganda.

In relation to trimester of pregnancy, the maximum HBsAg seropositivity was seen during third trimester of pregnancy in our study which was in accordance with the findings of Khakhkhar Vipul *et al.*, (2012). In contrast to our study highest seroprevalence of HBsAg positivity was found in second trimester by Padmavati Palange *et al.*, (2018) and Mehta *et al.*,.

Screening of antenatal mothers for HBV infection is an effective strategy to reduce the risk of vertical transmission. The HBsAg seropositivity rate of 2% in antenatal mothers in this study recommends and supports appropriate antenatal screening for HBV infection. The US Preventive Services Task Force found convincing evidence that screening of Antenatal mothers for HBV infection substantially reduces perinatal transmission of HBV and the subsequent development of chronic infection.

Table.1 Distribution of antenatal mothers on their basis of reactivity to HBsAg

No. of antenatal mothers tested	No. of positive cases
200	2(2%)

Table.2 Gestational age of antenatal mothers (N=200)

Gestational age	No. of antenatal mothers	Percentage
First trimester	13	13%
Second trimester	37	37%
Third trimester	50	50%

Fig.1 Age wise distribution of antenatal mothers (N=200)

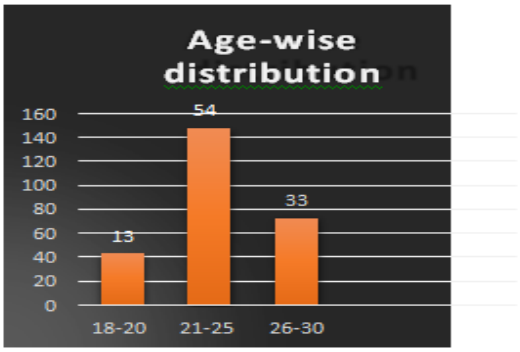
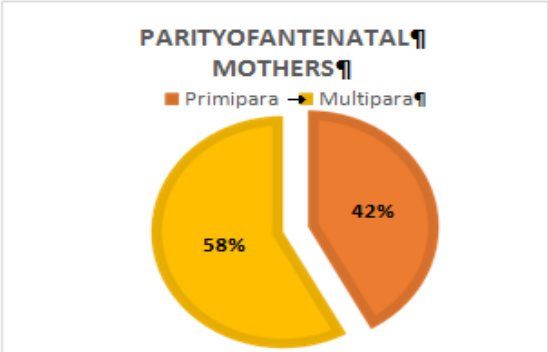


Fig.2 Parity of antenatal mothers



As per Center for Disease Control and prevention (CDC) guidelines, pregnancy is not a contraindication for Hepatitis B vaccination. Limited data suggest that developing foetuses are not at risk for adverse events when hepatitis B vaccine is administered to pregnant women. Hepatitis B vaccine contain noninfectious HBsAg and should cause no risk of infection to the fetus. So pregnant women who are identified as being at risk for HBV infection during pregnancy (e.g., having more than one sex partner during the previous 6 months, been evaluated or treated for an STD, recent or current injection drug use, or having had an HBsAg-positive sex partner) are recommended to get vaccinated (CDC, 2006; CDC, 2005).

Following universal precautionary steps can reduce transmission of HBV infection in health care settings. Prevention of needle stick injuries and post exposure prophylaxis need to be educated among

healthcare workers by alerting them about transmission of infection.

The Government of India has included HBV vaccine in the national universal immunization program in the entire country in 2011–2012. The babies born to HBsAg reactive mothers should immediately receive post exposure prophylaxis consisting of simultaneous administration of Hepatitis B vaccine in one arm and 0.5 mL Hepatitis B immunoglobulin in another arm within 12 hours of birth. This would prevent infection in this age group, thereby, help in decreasing the overall carrier rate and development of chronic liver disease and hepatocellular carcinoma later in life.

There are some limitations in our study. I have screened subjects only for HBsAg as a marker of HBV infection. If other markers of viral replication such as HbeAg and HBV DNA could be tested, then the study would have been more fruitful as presence of HBeAg in HBsAg positive pregnant women increases the risk of perinatal transmission.

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