

The Prevalence of Hepatitis B Virus among Full-Term Mothers and their Infants at El-Obeid Teaching Hospital, Sudan

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Abstract

Background: The Hepatitis B virus causes dangerous liver illness. Infected pregnant women can infect their newborns and develop fulminant HBV. The study aimed to determine the prevalence of Hepatitis B virus among pregnant women and their newborns. **Methodology:** The study involved 226 randomly selected women from January to March 2023. **Results:** The results showed that 4.9% of pregnant women had HBV infection, with Caesarean Section being a significant risk factor. Around 27.3% of infected mothers transmitted HBV to their newborns. The age group 26-30 years had the highest prevalence rate of HBsAg, with urban residents having the highest prevalence. **Conclusion:** Caesarean section and urban resident were the most risk factors for infection with HBV. The study recommends laboratory-based screening and prophylactic vaccines to eliminate HBV from the general population.

Keywords: Prevalence Hepatitis B virus, term pregnant women, newborns, El-Obeid, Sudan.

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INTRODUCTION

Hepatitis B virus (HBV) is a global health concern, with 1.5 million new infections occurring annually, 300 million developing chronic illnesses, and 1 million dying annually [1-3]. The highest rates are in the Western Pacific [6.2%] and African regions [6.1%], with 3.3% in the Mediterranean [4]. The virus causes long-lasting liver illness and can be transmitted through various methods, including transfusions, blood contact, sexual contact, and vertical contact with body fluids [5-7]. Vertical transmission is one of the most effective methods, causing significant long-term effects. Infected babies born to HBV surface antigen (HBsAg)-positive mothers are 70-90% infected [6, 8]. Pregnant women can transfer the virus to their husbands during sexual contact and to their newborns during birth or soon after [9]. Infected pregnant women, especially HBsAg positive ones, can infect their newborns and develop fulminant HBV [10]. Viral hepatitis during pregnancy is a significant cause of maternal death in Sudan, leading to complications such as coagulation abnormalities, postpartum hemorrhage, organ failure, high maternal

mortality, stillbirth, neonatal fatalities, and severe liver illness. Early intervention and prevention are prioritized with universal screening in antenatal clinics and reproductive health programs [11-13]. This study investigated the risk factors, prevalence, and infant risk of hepatitis B virus infection in pregnant women referred to prenatal clinics.

MATERIALS AND METHODS

The study was conducted at El-Obeid Hospitals, using a cross-sectional hospital-based approach. A total of 226 pregnant women attending antenatal clinics and admitted for delivery between January and March 2023 were included in the study population. The data was obtained through direct interview questionnaires with participants, as well as interviews with investigators who collected socio-demographic information. Additionally, blood samples were collected from mothers and their newborns before vaccine delivery. The screening rapid test was utilized for the detection of HBsAg. It is worth noting that HBsAg rapid tests possess a restricted sensitivity, rendering them unsuitable for the identification of

HBsAg at low concentrations. We utilized the ToshoAIA900 enzyme-linked immunosorbent assay (ELISA) method to accurately verify and quantify the concentration of HBsAg, which was found to be 0.05 International Units/milliliter (IU/ml). As per the manufacturer's guidelines, concentrations above 0.05 IU/ml were classified as positive, while concentrations below 0.05 IU/ml were classified as negative. The data were entered into the Statistical Package for the Social Sciences for analysis. Statistical significance was determined by p-values of 0.05 or lower.

Ethical Consideration:

The research received approval and ethical clearance from the Ethics Review committee of the Ministry of Health, North Kordofan State. Each study participant also provided informed consent. The

confidentiality of the participants' data was strictly upheld during the laboratory analysis conducted by the laboratory staff.

RESULTS

Data on the socio-demographic characteristics of the study participants were collected from a sample of 226 recently delivered women, aged 17 to 45 years, with an average age of 28 years. A significant majority of participants, approximately 71%, fell within the age range of 26 to 30. A total of 135 participants, accounting for 60% of the total, resided in urban areas, while 91 participants, making up 40%, lived in rural areas. The occupation of the majority of 216 individuals (95%) was housewives Figure 1.

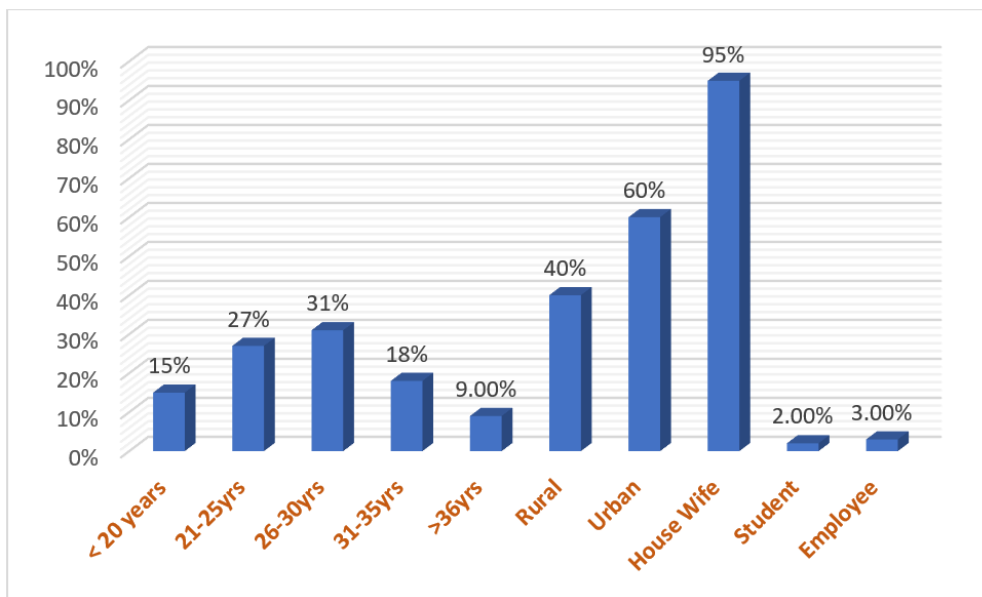


Figure 1: The socio-demographic characteristics of the study participants

Table 1 displays the concentration of HBsAg in the blood of mothers, indicating their positivity. The HB surface antigen (HBsAg) was found in 11 (4.9%) of the

mothers and in 3 (1.3%) of their babies. It was observed that 27.3% of infected mothers transmitted HBV to their newborns.

Table 1: HBsAg concentration in circulating mothers' blood (< 0.05 Negative, > 0.05 IU/ml Positive)

Mothers HBsAg concentration IU/ml	Frequency of Mothers HBsAg concentration	Frequency babies HBsAg concentration
< 0.05	215 (95.1%)	223 (98.7%)
0.05 - 1000	4 (1.8%)	3 (1.3%)
1001 - 2000	1 (0.44%)	0 (00%)
2001 - 3000	1 (0.44%)	0 (00%)
3001 - 4000	2 (0.9%)	0 (00%)
4001 - 17000	3 (1.3%)	0 (00%)
Total	226 (100%)	226 (100%)

Table 2 displays the prevalence of HBV infection categorized by age group, residence, and occupational status of individuals. In terms of age specific prevalence rates, it was found that the age group

of 26 - 30 years had the highest prevalence rate of HBsAg at 45.4%. This was followed by the age group of 20 years, which had a prevalence rate of 27.3%. Additionally, among urban residents' women, the

prevalence rate was highest at 63.6%, compared to 36.4% among rural residents' women. The findings indicated that housewives exhibited the highest level of

positivity across all 11 factors, with a 100% result Figure 2.

Table 2: Distribution of the study population infection by demographical characteristics

Variable	Positive (>0.05)	Negative (<0.05)	Total
Age			
< 20 years	3(27.3%)	31(14.4%)	34(15.0%)
21-25	1(9.1%)	59(27.5%)	60(26.6%)
26-30	5(45.4%)	66(30.7%)	71(31.4%)
31-35	1(9.1%)	40(18.6%)	41(18.1%)
>36	1(9.1%)	19(8.8%)	20(8.9%)
Total	11(100%)	215(100%)	226(100%)
Residence			
Rural	4(36.4%)	87 (40.5%)	91(40.3%)
Urban	7(63.6%)	128 (59.5%)	135(59.7%)
Total	11(100%)	215(100%)	226(100%)
Occupation			
House Wife	11(100%)	205(95.3%)	216(95.6%)
Student	00 (00%)	4 (02%)	4(1.8%)
Employee	00 (00%)	6 (2.7%)	6(2.6%)
Total	11(100%)	215(100%)	226(100%)

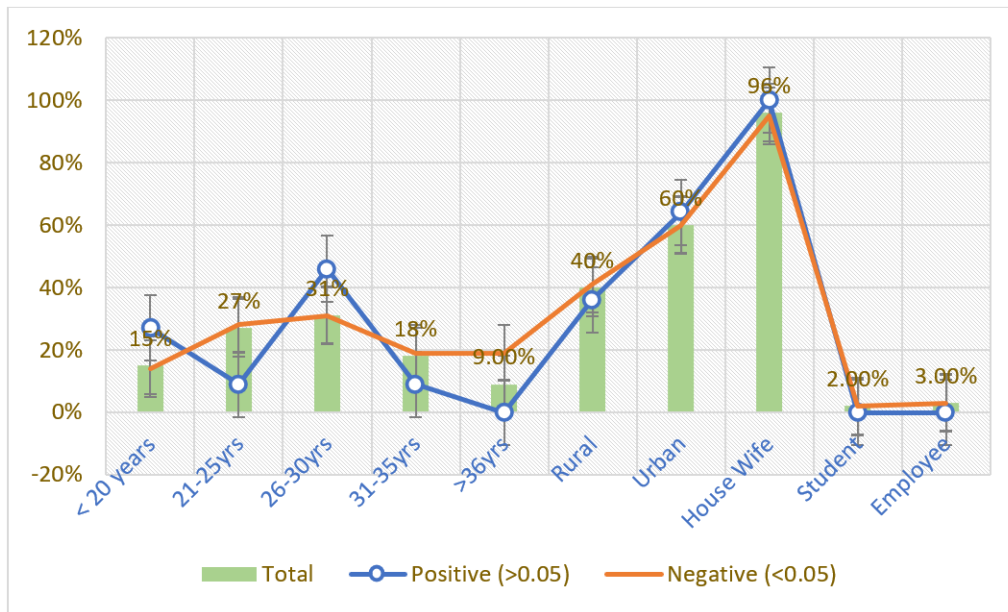


Figure 2: Prevalence of HBV among sociodemographic characteristics of the study population. The association between clinical conditions status and HBV infection among termed pregnant women

Figure 3 provides an overview of the correlation between the status of various clinical conditions and HBV infection in term pregnant women. The analyzed associated clinical conditions status and HBsAg infection showed that most of the expected risk factors, including delivery type, frequency of birth, history of blood transfusion, dental extraction, hospital admission,

surgical procedure, and vaccination, were found to be statistically insignificant ($P > 0.05$). Our research revealed a significant correlation between the method of delivery (specifically Caesarean) and the likelihood of hepatitis B infection in term pregnant women during childbirth. The statistical significance of this finding was established with a p-value of less than 0.05.

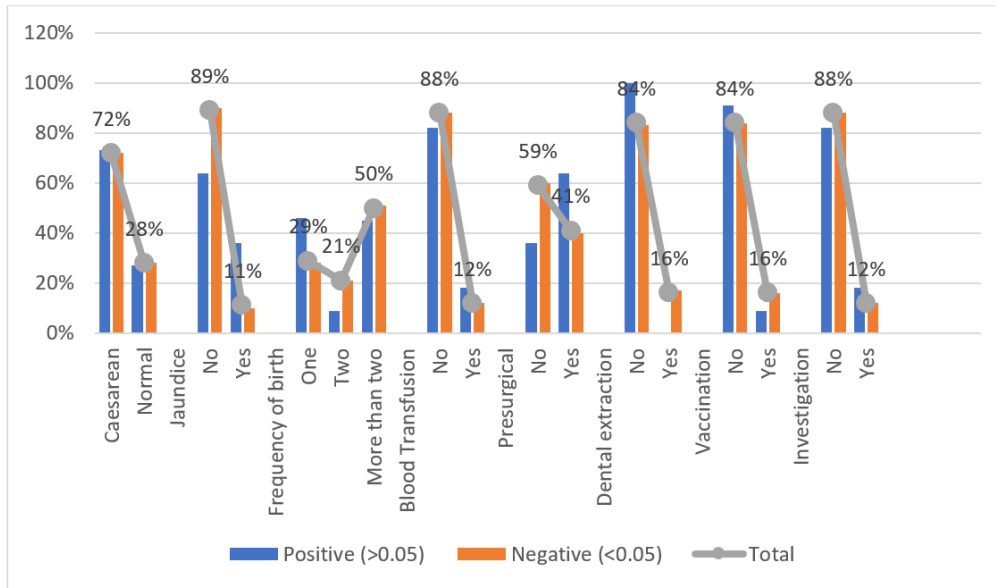


Figure 3: The association between clinical conditions and HBV infection of termed pregnant women.

DISCUSSION

It is important to note that pregnant women can potentially transmit illnesses to their newborn babies during birth or shortly after, as well as to their husbands through sexual contact [9]. This study aimed to determine the prevalence rate of hepatitis B among term pregnant women attending prenatal clinics and their children, as well as identify the factors associated with HBV infection.

The study involved testing 226 pregnant women who were admitted, specifically looking for HBsAg positive. The main focus was on determining the prevalence of HBV among pregnant women and the transmission of the virus to their neonates. The occurrence of mothers was found to be 4.9%, whereas newborns had a prevalence rate of 1.3%. Based on the WHO categorization, the prevalence of HBV among mothers in our sample was found to be at an intermediate level [14]. In this study, the prevalence of HBV was found to be lower compared to previous studies conducted among pregnant women at Khartoum Teaching Hospital, Sudan (7.5%) [11], Al Fashir town, North Darfur State (18%) [15], Juba South Sudan (11%) (16), and Hararghe, Eastern Ethiopia (8%) [17]. There may be various reasons for the differences observed between the current study and other reported studies. These reasons could include factors such as behavior, environment, vaccination, and other conflicts among hosts. Another possible explanation could be the variation in the overall prevalence of hepatitis B among the general population in different locations.

The study focused on the socio-demographic characteristics of pregnant women to determine the risk factors associated with the distribution of HBV infection and HBsAg seropositivity. The prevalence rate of 5 (45.4%) was highest among participants aged 26-30

years, with those aged 20 years following closely behind. The results of this study align with the findings from a previous study conducted in Wolaita Sodo, Ethiopia, which focused on pregnant women. In that study, it was observed that women between the ages of 25 and 29 had the highest prevalence of HBV infection [19]. The study revealed that there was a higher prevalence of infection among mothers residing in urban areas compared to infected women from rural areas. The results of our research align with previous studies conducted among pregnant women in various locations, including Khartoum Teaching Hospital in Sudan [11], Al Fashir town in North Darfur State, Sudan [15], and Wolaita Sodo, Ethiopia, where the majority of participants were urban residents [19]. The research group consisted mostly of housewives, comprising 95% of the participants. Among the various occupations, housewives had the highest prevalence rate of 100%. It is important for this group to have knowledge about HBV transmission, complications, immunization, and routine hepatitis B testing prior to pregnancy, as well as the impact on their newborns.

In previous studies conducted among pregnant women at Khartoum Teaching Hospital, Sudan [11], and Al Fashir town, North Darfur State, Sudan [15], the researchers observed an association between clinical conditions and HBV infection. They identified several risk factors, including the frequency of birth, history of blood transfusion, dental extraction, hospital admission, surgical procedure, and vaccination. In the present study, no significant association was observed between the risk variables and HBV infection. Similarly, no relationship was found between HBsAg seropositivity and these risk factors. Furthermore, the statistical analysis indicated that HBsAg seropositivity was not statistically significant (P value > 0.05). In addition, our study revealed that pregnant women who have previously

undergone a Caesarean delivery are more likely to be at a significant risk of developing hepatitis B infection during delivery, particularly among term pregnancies. The observed difference demonstrated statistical significance, with a P value of less than 0.05. One possible explanation suggests that the variation in risk factors for HBsAg among the pregnant women studied may be linked to the overall prevalence of hepatitis B in the general population.

Preventing the transmission of hepatitis B virus (HBV) from mother to child is a crucial aspect of strategies aimed at eliminating viral hepatitis. One of the key objectives in international public health is to significantly decrease new cases of HBV infection in children by 95%. The number 20 is represented as [20]. Our study revealed that a significant proportion, specifically 27.3%, of mothers with HBV transmitted the infection to their infants. Several factors were found to increase the risk of HBV transmission to newborns: There was a significant presence of the HBsAg in the maternal circulation, with high titers ranging from 3144 to 16760 IU/ml. It is worth noting that all infected babies were born to mothers who had a 100% exposure to previous surgical procedures and had a frequency of birth ranging from 2 to more than 2 times. Additionally, 67% of the mothers were exposed to blood transfusion, and all of them underwent caesarean delivery. Based on previous studies, it has been found that approximately 25% of newborns with the carrier gene will succumb to cirrhosis or hepatic cancer during their transition from childhood to adulthood [20, 21].

CONCLUSION

WHO reported moderate endemicity of HBV in 4.9% of pregnant women. Frequency of birth, blood transfusion history, dental extraction, hospital admission, surgical operation, and immunization were not significant HBV risk factors. A Caesarean section was the only major risk factor for pregnant women. We observed 27.3% of infected women had HBV-positive infants. High mother blood HBsAg titers, previous surgery, frequency of birth, blood transfusion, cesarean delivery type, non-vaccinated, and housewives placed neonates at risk for HBV transmission. We must detect HBsAg-positive pregnant women, enhance laboratory-based HBV screening, provide early preventive vaccines for pregnant women and their babies, and establish a strategy to remove HBV from the population.

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