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Screening for HBsAg in women at delivery and prevention of mother-to-child transmission of hepatitis B virus: experience at the University Hospital Complex "Le Bon Samaritain", N'Djamena, Chad

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Abstract

Hepatitis B virus (HBV) infection in pregnant women is a major contributor to persistent transmission and chronic disease, particularly in highly endemic countries. Mother-to-child transmission occurs mainly during delivery, exposing newborns to a high risk (>90%) of developing chronic infection. Prevention is most effective when the first dose of the HBV vaccine is administered within 24 hours of birth. The aim of this study was to screen women for hepatitis B surface antigen (HBsAg) at the time of delivery and to ensure that all newborns receive vaccination within 24 hours of birth. This descriptive cross-sectional study was conducted from October 30 to December 30, 2025, in the maternity, pediatric, and health center units of the University Hospital Complex "Le Bon Samaritain" (CHU-BS) in N'Djamena, Chad. The screening of women in labor for HBsAg was performed using a rapid diagnostic test, an ABON™ HBsAg immunochromatographic test (Abbott, Chicago, IL, USA), with a sensitivity of over 99% and a specificity of approximately 97%, according to the manufacturer. All live newborns during the study period whose parents had given informed consent were included. Data collection and analysis were performed using Excel and SPSS version 23.0 software. A total of 203 women and 214 newborns were involved in the study, the difference being due to 11 twin deliveries (5.42%). The mean age of the women was 26.37 years, ranging from 15 to 40 years. The most represented age groups were 20-25 years and 26-30 years, each accounting for 28.57% of the participants. The overall HBsAg prevalence was 12.32%. Homemakers were the most represented occupational group (35.96%), followed by students (30.55%). The highest prevalence was observed among students (5.42%), followed by homemakers (4.43%), while healthcare personnel had the lowest prevalence (0.00%). The prevalence of HBV remains very high among women at delivery, placing newborns at a significant risk of mother-to-child transmission. It is therefore essential to strengthen preventive measures, particularly by introducing the first dose of the hepatitis B vaccine at birth for all newborns, in order to reduce perinatal transmission and effectively protect infant health.

Key words: mother-to-child transmission; vaccination at birth; viral hepatitis B; pregnant women; CHU "Le Bon Samaritain", N'Djamena; Chad.

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Introduction

Hepatitis B remains a major public health challenge in Africa, particularly in low-income countries such as Chad. Hepatitis B virus (HBV) infection is a systemic viral disease with primary hepatotropism, characterized by liver inflammation. The incubation period for acute hepatitis B is 75 days on average, but may vary from about 30 to 180 days.[1] HBV infection among pregnant women represents a major determinant of sustained viral transmission and chronicity, especially in regions with high endemicity. Vertical transmission plays a key role in maintaining HBV endemicity, with over 90% of infected neonates progressing to

chronic infection and facing a high risk of long-term complications.[2] Mother-to-child transmission occurs mainly during delivery due to contact with infected maternal fluids. Breastfeeding is not a major route of transmission when appropriate prophylaxis is provided.[3]

Primary prevention through vaccination is fundamental in eliminating HBV transmission and, consequently, in preventing serious conditions such as cirrhosis, fulminant hepatitis, and hepatocellular carcinoma caused by the HBV. As recommended by the World Health Organization (WHO), the prevention of mother-to-child transmission of the HBV is maximized when the birth dose of HBV vaccine is administered within 24 hours of delivery.[3] The WHO therefore recommends administering a dose of hepatitis B vaccine within 24 hours of birth, particularly in highly endemic countries, including Chad.[4]

In addition to vaccination, professional societies also recommend the administration of hepatitis B immunoglobulin (HBIG) to newborns at high risk of mother-to-child transmission, as the combination of the hepatitis B vaccine and HBIG given at birth further reduces the likelihood of chronic infection compared with vaccination alone (estimated efficacy of 85-95%). However, this passive prophylaxis is not available in Chad, mainly due to its high cost and limited availability in resource-limited settings.[5] However, the implementation of this recommendation remains suboptimal with delayed introduction and uneven vaccination coverage. Moreover, even when administered within the recommended time frame, the birth dose does not fully eliminate the risk of mother-to-child transmission.[6] The HBV vaccine was introduced into the routine Expanded Program on Immunization (EPI) in Chad in 2008. The current national immunization schedule relies on a combined diphtheria-tetanus-C Pertussis-Hepatitis B-Haemophilus influenzae type b (DTP-HepB-Hib) vaccine administered at 6, 10, and 14 weeks of life. However, initiation of vaccination at six weeks does not provide prevention against perinatal HBV infection, leaving a critical window of vulnerability in the early neonatal period.[7] In response, the Ministry of Public Health of Chad has included in its strategic plan the introduction of a birth dose of HBV vaccine into the national EPI schedule.[8] It is in this context that the present preliminary study was conducted, with the aim of vaccinating all newborns within 24 hours of birth and systematically screening pregnant women, in order to provide evidence to guide Chadian health authorities in their decision on whether to introduce a hepatitis B vaccine birth dose into the routine immunization schedule.

Materials and Methods

This descriptive cross-sectional study was conducted over two months from 30 October to 30 December, 2025, in the maternity department, pediatric department, and health center of the University Hospital Complex “Le Bon Samaritain” (CHU-BS) in N’Djamena, Chad. The study included all newborns delivered during the study period whose parents had given their consent to participate, as well as pregnant women who had undergone hepatitis B screening (HBsAg).

Children whose parents did not consent to vaccination were excluded from the study. It should be noted that no cases of refusal were recorded in this study.

A structured system for screening and counseling was implemented at CHU-BS in N’Djamena, including systematic HBsAg testing for all women admitted in labor. We observed that half of the women included in our study were not screened during prenatal consultations. Before testing, participants received information on the consequences of the infection, followed by signing an informed consent form and pre-test counseling. Results were communicated individually, along with tailored post-test advice. A question-and-answer session was provided for the parents, during which the principal investigator addressed all their concerns. Through this exchange, parents received all the necessary information about the risks if the newborn was not vaccinated at birth. Consequently, all parents agreed to have their child vaccinated.

HBsAg screening was performed using a rapid diagnostic test, an ABON™ HBsAg immunochromatographic test (Abbott, Chicago, IL, USA), with a reported sensitivity >99% and specificity of approximately 97%, according to the manufacturer. The patient’s fingertip was cleaned with alcohol, and 75 µL of capillary blood were collected and placed on the cassette, which had been previously labeled with the patient’s code. A drop of buffer was then immediately added to allow blood migration. Results were read and interpreted between 15 and 30 minutes. All analyses were conducted in accordance with the manufacturer’s instructions.

HBsAg-negative women were advised to receive the hepatitis B vaccine and to complete the full three-dose schedule: the first dose on day 0, the second dose one month after the first, and the third dose six months after the first injection. The vaccine should be administered intramuscularly, preferably in the deltoid muscle. Seroprotection is defined by an anti-HBs antibody level ≥10 mIU/mL. For HBsAg-positive women, measuring the hepatitis B viral load was strongly recommended, as it helps assess the risk of mother-to-child transmission and guide clinical management. However, within the context of the study, not all HBsAg-positive participants underwent this analysis. Nevertheless, the recommendation for viral load testing was incorporated as a key element of the protocol, highlighting the importance of comprehensive biological monitoring to optimize the prevention of vertical transmission. The vaccine administered was the pediatric form of 10 µg/0.5ml Engerix B, and was injected into the anterolateral aspect of the thigh of newborns after cleaning the injection site with cotton wool soaked in water. Alcohol use was avoided due to its potential to reduce the effectiveness of the vaccine. For infants, the vaccination schedule consists of four doses: the first dose within 24 hours of birth, followed by the other three doses coinciding with the pentavalent vaccination (diphtheria-tetanus-C Pertussis-Hepatitis B-Haemophilus influenzae type b [DTP-HepB-Hib]) at 6, 10, and 14 weeks in the EPI established in Chad since 2008.[9]

The research did not involve any human manipulation and participant confidentiality was strictly respected. In accordance with medical ethics principles, all required approvals were obtained prior to the study initiation. Authorization was granted by the Chad National Bioethics Committee, as well as by the general administration of the CHU-BS, and the head of the maternity ward, pediatric department, and health center. Data collection and analysis were performed using Excel and SPSS version 23.0 software.

Ethical considerations

Ethical clearance was obtained from the National Bioethics Committee of Chad (CNBT) under number 0012/MESRS/SE/SG/CNBT/SG/2024. Informed consent was obtained from all participants in accordance with the approval of the National Bioethics Committee of Chad. The objectives of the study were explained to the participants. A unique and anonymous study identification number was assigned to each participant. Each participant was informed of the results and the measures to be taken.

Results

Sociodemographic characteristics and prevalence of HBsAg carriage

A total of 203 women and 214 newborns participated in the study, as there were 11 sets of twins, representing 5.42% of births during the study, including one set of identical twins, 3 sets of fraternal twins, and 7 sets of non-identical twins. All newborns were vaccinated within 24 hours of birth. The average age of the women was 26.37, ranging from 15 to 40. The most represented age groups were 20 to 25 and 26 to 30, each accounting for 28.57%. The study showed that among the 203 women screened, 12.32% were HBsAg positive. The most common occupation was housewife (36.95%), followed by student (30.54%). The majority of newborns were male (54.67%) (Table 1).

Prevalence by occupation

Analysis of the data revealed 25 (12.32%) women carrying the hepatitis B surface antigen (HBsAg) among the 203 screened. Prevalence varied according to occupation (Figure 1): it was highest among students (5.42%), followed by housewives (4.43%). The lowest prevalence was recorded among healthcare workers (0.00%). This difference may be explained by the often-asymptomatic nature of HBV infection as well as insufficient awareness of its mode of transmission, prevention, risks, and consequences in both educational and household settings.

Discussion

Out of a total of 203 women who delivered at CHU-BS between 30 October and 30 December 2025, no refusals were recorded either for HBsAg screening or administration of the first dose of hepatitis B vaccine to newborns within 24 hours of birth.

HBsAg-positive women received counseling that included the need for viral load testing and liver function assessment (transaminases). They were then referred to the Infectious Diseases Department of CHU-BS for appropriate management. HBsAg-negative women received preventive counseling, including recommendations to be vaccinated against hepatitis B according to the schedule (first dose: day 0; second dose: 1 month after the first dose; third dose: 6 months after the first dose). The prevalence of HBsAg among screened women was 12.33% (n=25/203). These findings are consistent with those reported by Routoube *et al.* (2025),[10] who observed a prevalence of 10.66% among pregnant women in the southern district of N'Djamena, as well as with data from the Guelendeng health district (Mayo-Kebbi East Province), where a prevalence of 13% was reported.[11] Overall, these results confirm the WHO estimates, which classify Chad as a high-endemic country for HBV infection (prevalence ≥8%) in the general population.[12]

It is important to highlight the excellent acceptability of the prevention strategy implemented in this context, as evidenced by a 100% maternal consent rate for administering the birth dose of the hepatitis B vaccine to their newborns. This level of acceptability is higher than that reported in several settings, where refusals or vaccine hesitancy persist,[13] sometimes due to misperceptions of risk or insufficient access to accurate information. This finding reflects the effectiveness of pre- and post-test information and counseling sessions, increased patient awareness of the risks of mother-to-child transmission, and the integration of vaccination into the immediate care pathway in the delivery room. The high level of adherence observed in our study represents a major lever for achieving hepatitis B elimination goals and supports the strengthening of integrated approaches combining screening, counseling,

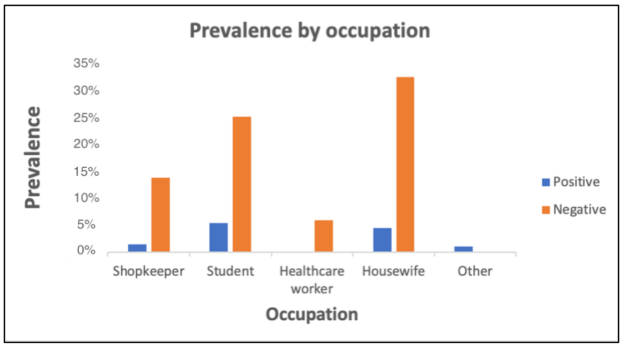

Figure 1. Prevalence of HBsAg by occupation among screened women.

Table 1. Sociodemographic characteristics and prevalence of HBsAg carriage.

Characteristics		n (%)
Age	15-19	31 (15.27)
	20-25	58 (28.57)
	26-30	58 (28.57)
	31-35	39 (19.22)
	36-40	17 (8.37)
Socio-professional level	Housewife	75 (36.95)
	Healthcare worker	12 (5.91)
	Student	62 (30.54)
	Shopkeeper	31 (15.27)
	Other	23 (11.33)
HBsAg status of the woman	Positive	25 (12.32)
	Negative	178 (87.68)
Sex of the newborn	Male	117 (54.67)
	Female	97 (45.33)

HBsAg, hepatitis B surface antigen.

and vaccination within obstetric care settings. The average age of participants was 26.37 years (range: 15-40 years). The most represented age groups were 20-25 years and 26-30 years, each accounting for 28.57%. This data is consistent with that obtained in Benin (26.73±5.68 years).[14] These age groups show that the Chadian population is predominantly young and of childbearing age.

In terms of socio-professional status, housewives were the most represented group with 35.96%, followed by students/pupils with 30.55%. The highest prevalence was among students/pupils (5.42%), followed by housewives (4.43%). No healthcare workers were infected; this absence of cases could be explained by a higher level of knowledge about the infection, better risk perception, and greater adherence to prevention and control measures, including vaccination, the implementation of standard precautions, and the systematic use of personal protective equipment in the hospital setting. It may also be related to regular awareness and health education activities targeting this professional group, thereby reinforcing the adoption of preventive behaviors.

Access to HBV screening during pregnancy remains largely inadequate in Africa,[15] and pilot intervention programs aimed at preventing mother-to-child transmission of HBV have only recently begun in some African countries, particularly Chad. Data from clinical cohorts are needed to assess the opportunities and barriers to implementing prevention of mother-to-child transmission of HBV in Sub-Saharan Africa.

Our study reveals that the primary obstacle to strengthening prevention of mother-to-child transmission for HBV remains the lack of HBsAg screening. However, the HBsAg test was systematically prescribed by healthcare workers. This lack of screening may be explained either by insufficient counseling on HBV infection or by the cost of the test, which is perceived as financially inaccessible by some women. Screening in the delivery room made it possible to catch up with more than 50% of women who had not been screened during antenatal care visits. Health workers did not counsel these women about HBV infection, either because it increases their workload in perinatal care services or because they are not financially motivated. As mentioned, the motivating factors for health workers include social interaction and recognition, as well as economic considerations.[16]

Currently, only a limited number of countries in Sub-Saharan Africa offer the birth dose of the monovalent vaccine. In countries where the birth dose policy has not yet been universally implemented, such as Chad, a personalized immunization proposal with vaccine administration at birth may be considered for children exposed to HBV or born to mothers with unknown HBV status.

In Chad, the prevention of mother-to-child transmission of hepatitis B could be strengthened by including viral hepatitis among the diseases covered free of charge for pregnant women and young children, and by developing integrated human immunodeficiency virus (HIV)-hepatitis programs. We did not combine this screening with HIV testing, as HIV screening is already largely systematic and free of charge within antenatal care services. Furthermore, HIV is generally well known among pregnant women, unlike HBV, which remains insufficiently integrated into health programs, is largely unfamiliar to patients, and is often at their own expense. It is urgent to implement a national policy for systematic vaccination of newborns within 24 hours of birth, supported by local data and awareness campaigns targeting policymakers, healthcare professionals, and international partners. Integrating this measure into existing maternal and child health programs, with appropriate monitoring and evaluation, would ensure its sustainability and a tangible impact on child health.

Perspectives

To ensure the complete administration of the vaccination schedule, a structured follow-up protocol is planned to minimize loss to follow-up. This follow-up will include, in addition to routine vaccination visits, a control blood test at 6 to 8 months of age, comprising the detection of HBsAg and the quantitative measurement of anti-HBs antibodies, in order to assess the effectiveness of vaccination and the infant's immune protection. The children will be regularly followed up until the age of 5 years to monitor the persistence of immune protection and to detect any potential infection.

Limitations of the study

This study has certain limitations. On the one hand, the absence of HBV viral load testing in women who tested positive meant that they could not be clinically monitored or treated, as the cost of viral load testing is not affordable for all patients. Secondly, the lack of awareness of hepatitis B among pregnant women during prenatal consultations may have influenced the screening of pregnant women before delivery. Finally, the low level of involvement of healthcare personnel in prevention and health education activities is an additional limitation that may affect the overall effectiveness of HBV control strategies.

Conclusions

Our study highlights significant gaps in the prevention of mother-to-child transmission of HBV in Chad. It is crucial to allocate sufficient resources for screening, management, and prevention of this infection, particularly by ensuring universal access to the first dose of the vaccine at birth to protect exposed newborns. Moreover, the government should ensure comprehensive care for pregnant women, with a nationally accessible antenatal screening program that includes high-incidence but preventable diseases, through appropriate management and the availability of vaccines, whose cost remains low relative to the public health benefits. Such an integrated approach would strengthen maternal and child health while sustainably reducing the transmission of preventable infections, thereby maximizing the impact of preventive interventions at the national level.

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Availability of data and materials: the datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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