

Hepatitis B chronic infection among pregnant women attending the antenatal care in Bor State Referral Hospital, South Sudan

Tereza Ajoh Jok and Shalini Ninan
Cherian

Jonglei Health Sciences Institute, Bor,
South Sudan

Correspondence:
Shalini Ninan Cherian
Email: principal.jhsi@gmail.com

Submitted: May 2023
Accepted: July 2023
Published: August 2023

ABSTRACT

Introduction: Hepatitis B virus (HBV) is a major public health problem affecting 400 million people worldwide, and is a common cause of chronic liver failure (cirrhosis) and hepatocellular carcinoma. Sixty-eight percent of infected people are from the African and Pacific regions. Vertical transmission from mother to newborn baby is one of the mechanisms by which chronic hepatitis virus infection spreads, besides infections from contaminated needles and syringes and sexual contact. Hepatitis B chronic infection is endemic in many poor countries, especially in Africa.

Method: A cross-sectional study was conducted between July and August 2021. Pregnant women attending the antenatal care (ANC) in Bor State referral hospital, South Sudan, were interviewed to collect information on their socio-demographic characteristics and risk factors for hepatitis B infection. The objective was to determine the seroprevalence of hepatitis B chronic infection through blood testing. Prevalence ratios for certain risk factors were calculated.

Results: Two hundred pregnant women were enrolled. The Prevalence Rate for chronic infection with hepatitis B virus, diagnosed using the rapid immunochromatographic assay for Hepatitis B surface antigen (HBsAg), was 8.5%. (95% CI; 4.7% - 12.3%). None of the suspected risk factors studied were found to be significantly associated with testing positive for HBV, except for a history of previous jaundice.

Conclusion: The prevalence of HBV chronic infection among pregnant women in Bor, Jonglei State, is high hence there is a need for established public health interventions that can lead to a reduction of HBV vertical transmission. Treatment of pregnant women with HBV chronic infection using anti-viral medications during pregnancy might curb the vertical transmission rates.

Key words: Hepatitis B virus, chronic infection, sero-prevalence, immunochromatography, prevalence ratio, South Sudan

Citation: Jok and Cherian. Hepatitis B chronic infection among pregnant women attending the antenatal clinic in Bor State Referral Hospital. South Sudan Medical Journal 2023;16(3):87-92 © 2023 The Author(s) License: This is an open access article under [CC BY-NC](https://creativecommons.org/licenses/by-nc/4.0/) DOI: <https://dx.doi.org/10.4314/ssmj.v16i3.2>

INTRODUCTION

Hepatitis B virus (HBV) is a deoxyribonucleic acid (DNA) virus that belongs to the family of *Hepadnaviridae* that causes acute and chronic diseases of the liver. HBV infection is a dangerous worldwide public health problem, which usually affects the liver and may cause acute hepatitis, fulminant hepatitis, hepatic encephalopathy and chronic conditions like liver cirrhosis and hepatocellular carcinoma (HCC).

HBV can be spread through blood, serum, semen, and vaginal secretions as well as from mother to new born. It also gives rise to a carrier state (chronic infection state) where the asymptomatic person can pass the infection to others.^[1] HBV is

one of the infections that should be screened for during antenatal check-ups of the mother to reduce the risk of vertical transmission to the infant,^[2] a recommendation endorsed by various countries to reduce hepatitis B new infections. The World Health Organization (WHO), in its Global Health sector strategy, suggested a reduction of hepatitis B and C new infections by 90% and hepatitis deaths by 65% by the year 2030.^[3]

In 2015, WHO estimated that 257 million persons or 3.5% of the population are living with chronic HBV infection. Of these, 68% are from the African and Pacific regions with 2.7 million people are co-infected with HIV.^[3] Vertical transmission from mother to newborn baby is commonly caused by chronic hepatitis virus infection in the expectant mother. This is a great health problem in endemic areas, and especially in Africa where resource allocation for hepatitis screening programmes is limited.

In the WHO Hepatitis Global Report 2017, most of the infants born to untreated HBV-infected mothers become infected during birth. Hence, one of the most effective ways to reduce vertical transmission is by vaccination of newborns immediately within 24 hours of life. It has been reported that the risk of getting chronic liver disease is more if the infection is acquired during childhood.^[3,4] Furthermore, this report states that those living with HBV infection are persons born before hepatitis B vaccination at birth was available and that the infection was usually due to vertical transmission.

METHOD

The research proposal was approved by Jonglei Health Sciences Institute Research Ethics Board. A cross-sectional design was used to determine the sero-prevalence of HBV infection among pregnant women who were attending the antenatal care (ANC) in Bor State Referral Hospital (BSRH) using a one-time rapid immune-chromatographic assay for hepatitis B surface antigen (HBsAg).

The objectives were to determine the number of women who will require treatment during pregnancy and the number of newborns who will require birth-dose of hepatitis B vaccine to prevent vertical transmission, and to find the most common risk factors associated with seropositivity for HBV chronic infection.

BSRH is a public hospital in Jonglei State and is one of the two teaching hospitals in greater Jonglei. It is the main referral centre in the state with 11 counties and a population of more than one million. It receives patients from the neighbouring Lake State, Pibor Administrative Area and a few foreigners. The hospital handles an average of 1,000 deliveries per year and, in the antenatal clinic, an average of 30 women are seen daily from Monday to Friday.

The study population was all pregnant women attending the ANC at BSRH. Starting 1st July 2021, all mothers who came for antenatal booking were counselled for hepatitis B screening in addition to the routine screening. Those who gave consent to be a part of the study were recruited.

The sample size was determined from data available in the country in 2021 that found that the sero-prevalence of HBV infection among pregnant women was 11%.^[5] The sample size of 200 women was chosen to determine the prevalence of hepatitis B in pregnant women with a possible 5% error and a CI of 95%. So, the first two

Table 1. Socio-demographic characteristics of the women (N = 200)

Variable		Frequency n (%)
Age (years)	15-19	52 (26.0)
	20-24	68 (34.0)
	25-29	44 (22.0)
	30-34	30 (15.0)
	35-39	6 (3.0)
Education	Illiterate	81 (40.5)
	Primary	77 (38.5)
	Secondary	36 (18.0)
	College and more	6 (3.0)
Occupation	Housewife	166 (83.0)
	Daily labourer	17 (8.5)
	Salaried	16 (8.0)
	Students	1 (0.5)
Residence	Urban	136 (68.0)
	Rural	64 (32.0)
Marital status	Married	185 (92.5)
	Single	0 (0.0)
	Divorced	2 (1.0)
	Widowed	13 (6.5)
Parity	Nullipara	56 (28.0)
	1-2	39 (19.5)
	3-4	44 (22.0)
	4-5	25 (12.5)
	>5	36 (18.0)
Gestation age	1-12 weeks	36 (18.0)
	13-28 weeks	126 (63.0)
	29-delivery	38 (19.0)

hundred pregnant women who consented were screened for hepatitis B using an immunochromatographic test to detect the presence of hepatitis B surface antigen. The required sample size was reached on 31st August 2021.

The study outcome was seropositivity using immunochromatographic testing, and the independent variables were potential risk factors for HBV infection, determined by administering a structured questionnaire during face-to-face interview of the women.

The data were entered into an Excel spreadsheet and analysed using SPSS.

RESULTS

Table 1 gives the socio-demographic characteristics of the 200 women interviewed.

HBV was positive in 17 out of 200 pregnant women indicating a prevalence of 8.5% (95% CI: 4.7% - 12.3%).

Risk factors for HBV infection

Although the sample size was not large enough to produce reliable statistically significant results, nine potential risk factors for acquiring hepatitis B infection were investigated using relative risk or prevalence ratio (PR). They were (see Table 2):

1. Previous delivery by a traditional birth attendant (TBA).
2. Previous surgical procedure.
3. Ear piercing or any other piercing.
4. Prior dental procedures.
5. Blood transfusions.
6. Having multiple sexual partners.
7. Family member with hepatitis B.
8. History of jaundice.
9. Currently positive for HIV.

The analysis compared exposed persons (persons with risk factors) who had the disease (developed hepatitis B) with the proportion of non-exposed (those with no risk factors) who did not have the disease (did not developed hepatitis B). The PR is the prevalence of the disease in the exposed over the prevalence of the disease in the unexposed. Values of PR greater than one indicate an increased risk, less than one, a reduced risk.

All the potential factors in Table 2 show PRs for hepatitis B infection above one, except body piercings, for which PR could not be calculated, and previous delivery by TBA, which had a PR just below one.

Table 2. Potential risk factors related to sero-positivity for hepatitis B surface antigen

Risk factor		Hep B +ve n	Hep B -ve n	Total n	PR (CI)	p-value
History of previous delivery by TBA	Yes	9	87	96	0.90 (0.32, 2.54)	0.842
	No	5	43	48		
History of previous surgery	Yes	1	13	14	0.83 (0.12, 5.81)	0.851
	No	16	170	186		
History of ear piercing	Yes	17	183	200		
	No	0	0	0		
History of dental procedure	Yes	10	83	93	1.64 (0.65, 4.15)	0.292
	No	7	100	107		
History of blood transfusion	Yes	3	11	14	2.85 (0.93, 8.75)	0.068
	No	14	172	186		
History of multiple partners	Yes	2	16	18	1.35 (0.33, 5.43)	0.674
	No	15	167	182		
History of family member having Hep B	Yes	5	33	38	1.78 (0.67, 4.74)	0.251
	No	12	150	162		
History of jaundice	Yes	9	53	62	2.50 (1.01, 6.18)	0.047
	No	8	130	138		
Currently tested + for HIV	Yes	1	4	5	2.44 (0.40, 14.97)	0.336
	No	16	179	195		

Table 3. Availability of essential tools in health facilities

Willingness to protect child	Frequency n (%)
No	10 (5.0)
Yes, if free	20 (10.0)
Yes, if less than 500SSP	15 (7.5)
Yes, if 500-1,000SSP	3 (1.5)
Yes, if >10,000SSP	2 (1.0)
Whatever the cost	150 (75.0)

SSP = South Sudanese pounds. 1 USD=600SSP.

Statistical tests of association between the risk factors and hepatitis B

Table 2 also shows confidence intervals and p-values for the PRs. Only prior history of jaundice was a statistically significant risk factor for chronic hepatitis B infection.

Women were asked about their willingness to prevent the child from getting hepatitis B infection - Table 3.

Seventy five percent of mothers were willing to spend any amount to prevent their children from acquiring hepatitis B. While 5% were not concerned if hepatitis B were passed on to their children or not, 10% were willing to take treatment to prevent transmission only if it was free. The remaining were willing to prevent the transmission only if it was affordable to them.

DISCUSSION

1. Prevalence of hepatitis B chronic infection among pregnant mothers

The overall prevalence rate of HBV chronic infections, as diagnosed by the presence of HBsAg, among pregnant women in this study was 8.5%. The global epidemiology of HBV infection has traditionally been described according to three categories of endemicity—high, intermediate, and low—depending on the proportion of the population that is seropositive for HBsAg. Countries with high endemicity are those where HBsAg seroprevalence is greater than or equal to 8%; countries with intermediate endemicity are those where seroprevalence is 2–7%; and those with low endemicity are those where seroprevalence is less than 2%.

Pregnant women are a good representation of a population hence according to this study the urban population of Bor town can be classified as an area of high endemicity for hepatitis B. Our prevalence of 8.5% is the same as among pregnant women in South Darfur State, Sudan, that was reported in a study in 2018-2019.^[6] Low prevalence in pregnant women has been reported in Libya, 1.5%,^[7] while in Rwanda a study reported 3.7%,^[8] a low intermediate prevalence rate.^[9] The highest prevalences reported were

from north Uganda, 11.8%,^[10] and Juba, South Sudan, 11% in 2017.^[11]

From this study and the standard rate of vertical transmission from other publications,^[12,13] we conclude that, in a population of 200 pregnant women with prevalence rate of 8.5% of chronic hepatitis B infection, eight infants are likely to be infected with HBV because of the absence of a strategy to prevent vertical transmission.

2. Risk factors associated with acquiring chronic hepatitis B infection

We did not find a significant relationship between mother's history of ear piercing and positive HBsAg using PR (100%). This is consistent with a similar study conducted in South Darfur state, Sudan^[6] in 2019 but was in contrast with the study conducted in Uganda in 2019.^[14] In the current study, pregnant women who had a home delivery by traditional birth attendants (TBAs) had a slight, but non-significant, decrease in HBV infection risk, in contrast to studies done in Northwest Ethiopia^[15] which showed a significant increased risk and also found that dental procedures, multiple sexual partners and household contact were predictors of HBV infection.

The association between having multiple sexual partners and HBV infection was also recorded in Ethiopia,^[16] Kenya,^[17] Nigeria^[18] and another study from Ethiopia.^[19] In our study, none of these risk factors were found to be statistically significant probably because of our small sample size.

Our choice of potential risk factors was driven mainly by knowledge of the ways that hepatitis B chronic infection is acquired.

Acute adult hepatitis is commonly due to hepatitis A virus. Acute hepatitis due to HBV is symptomatic with icterus/jaundice in one third of patients. Acute adult hepatitis (acquired by sexual practices or needle sharing) is less likely to lead to chronic infection when compared to childhood or perinatal acquisition of the virus.

Acute hepatitis B infection going on to become chronic infection depends of the patient's immunosuppression state, and on indicators of rapid viral replication as indicated by presence of Hep-e-antigen and Hepatitis B DNA activity.^[23]

CONCLUSION

With the Sustainable Developmental Goals and Global Health Sector Strategy including hepatitis B as one of the diseases to be targeted for eradication, there is a need to have a multipronged approach that includes wide spread vaccination and minimizing vertical transmission which is often neglected especially in the African region.

Screening all pregnant mothers for HBV chronic infection^[20]

and either providing the newborn infants with a birth dose of hepatitis B vaccine or providing anti-viral medications^[21] or both^[22] to all seropositive women should become part of a public health initiative in South Sudan.

References

1. Anthikad J, Sumanaswini P. Edition 2013, Textbook: Medical Microbiology for Nurses (including Parasitology), Jaypee and Brother Publishers, New Delhi.
2. Marshall JE. Myles textbook for Midwives 16th edition section 3. Screening mother and fetus in pregnancy p 203
3. World Health Organization Global Hepatitis Report 2017. <https://www.who.int/publications/item/9789241565455>
4. Alter MJ. Epidemiology of hepatitis B in Europe and worldwide. *J Hepatol* 2003;39(Suppl. 1):64– 9.
5. Kirbak ALS, Ng'ang'a Z, Omolo J, Idris H, Usman A, Mbabazi WB. Sero-prevalence for Hepatitis B virus among pregnant women attending antenatal clinic in Juba Teaching Hospital, Republic of South Sudan. *Pan Afr Med J.* 2017 Feb 20;26:72. <https://doi.org/10.11604/pamj.2017.26.72.11410>.
6. Mudardum AH, Mohammed AA. Prevalence and Risk Factors for Hepatitis B Infection among Pregnant Women attending Antenatal Clinic in UM Dafog Area, South Darfur State, Sudan. *Sudan Journal of Medical Sciences* 2019; 14(3) <https://doi.org/10.52981/sjms.v14i3.1491>.
7. El-Magrahe H, Furarah AR, El-Figih K, El-Urshfany S, Ghenghesh KS. Maternal and neonatal seroprevalence of Hepatitis B surface antigen (HBsAg) in Tripoli, Libya. *Journal Infection in Developing Countries.* 2010 Mar;4(03):168-70.
8. Umutesi J et al. Prevalence of hepatitis B and C infection in persons living with HIV enrolled in care in Rwanda. *BMC infectious diseases* 2017; 17(1):315. <https://doi.org/10.1186/s12879-017-2422-9>.
9. CDC. Travelers health: infectious diseases related to travel. Atlanta, GA: US Department of Health and Human Services, CDC; 2017.
10. Bayo P, Ochola E, Oleo C, Mwaka AD. High prevalence of hepatitis B virus infection among pregnant women attending antenatal care: a cross-sectional study in two hospitals in northern Uganda. *BMJ Open.* 2014 Nov 11;4(11):e005889. <https://doi.org/10.1136/bmjopen-2014-005889>.
11. Kirbak ALS, Ng'ang'a Z, Omolo J, Idris H, Usman A, Mbabazi WB. Sero-prevalence for hepatitis B virus among pregnant women attending antenatal clinic in Juba Teaching Hospital, Republic of South Sudan. *Pan Afr Med J.* 2017 Feb 20;26:72. <https://doi.org/10.11604/pamj.2017.26.72.11410>.
12. Vallet-Pichard A, Pol S. Hepatitis B virus treatment beyond the guidelines: special populations and consideration of treatment withdrawal. *Therap Adv Gastroenterol.* 2014 Jul;7(4):148-55 <https://doi.org/10.1177/1756283X14524614>.
13. Forbi JC, Iperepolu OH, Zungwe T, Agwale SM. Prevalence of hepatitis B e antigen in chronic HBV carriers in North-central Nigeria. *J Health Popul Nutr.* 2012 Dec;30(4):377-82. <https://doi.org/10.3329/jhpn.v30i4.13289>.
14. Hillary A et al. Prevalence and Factors Associated with Hepatitis B Surface Antigen Positivity among Women Receiving Antenatal Care at Mbarara Regional Referral Hospital. *J Trop Dis* 2019; 7: 321. <https://doi.org/10.35248/2329-891X.19.8.321>
15. Molla S, Munshea A, Nibret E. Seroprevalence of hepatitis B surface antigen and anti HCV antibody and its associated risk factors among pregnant women attending maternity ward of Felege Hiwot Referral Hospital, northwest Ethiopia: a cross-sectional study. *Virolog J.* 2015 Dec 2;12:204. <https://doi.org/10.1186/s12985-015-0437-7>.
16. Umare A, Seyoum B, Gobena T, Haile Mariyam T. Hepatitis B Virus Infections and Associated Factors among Pregnant Women Attending Antenatal Care Clinic at Deder Hospital, Eastern Ethiopia. *PLoS One.* 2016 Nov 29;11(11):e0166936. <https://doi.org/10.1371/journal.pone.0166936>.
17. Ngaira JA, Kimotho J, Mirigi I, et al. Prevalence, awareness, and risk factors associated with Hepatitis B infection among pregnant women attending the antenatal clinic at Mbagathi District Hospital in Nairobi, Kenya. *Pan Afr Med J.* 2016;24:315. <https://doi.org/10.11604/pamj.2016.24.315.9255>.
18. Adegbesan-Omilabu MA, Okunade KS, Gbadegesin A, Olowoselu OF, Oluwole AA, Omilabu SA. Seroprevalence of hepatitis B virus infection among pregnant women at the antenatal booking clinic of a Tertiary Hospital in Lagos Nigeria. *Niger J Clin Pract.* 2015 Nov-Dec;18(6):819-23. <https://doi.org/10.4103/1119-3077.163283>.

19. Anteneh ZA, Wondaye E, Mengesha EW. Hepatitis B virus infection and its determinants among HIV positive pregnant women: Multicenter unmatched case-control study 2021 (PLOS ONE 16(4): e0251084. <https://doi.org/10.1371/journal.pone.0251084>
20. Status of blood safety in the WHO African Region: Report of the 2006 Survey https://www.afro.who.int/sites/default/files/2017-06/status_blood_safety_who_african_region.pdf
21. World Health Organization. Prevention of mother-to-child transmission of hepatitis B virus: Guidelines on antiviral prophylaxis in pregnancy. 2020.
22. Peyton Thompson et al. Arresting vertical transmission of hepatitis B virus (AVERT-HBV) in pregnant women and their neonates in the Democratic Republic of the Congo: a feasibility study. *Lancet Global Health* 2021;9(11): e1600-e1609. [https://doi.org/10.1016/s2214-109x\(21\)00304-1](https://doi.org/10.1016/s2214-109x(21)00304-1)
23. Burns GS, Thompson AJ. Viral hepatitis B: clinical and epidemiological characteristics. *Cold Spring Harb Perspect Med*. 2014;4(12):a024935. <https://doi.org/10.1101/cshperspect.a024935>.