Original Research Article

A Retrospective study of HBsAg in Pregnancy: Prevalence and Correlates in the South West Region of Cameroon.

ABSTRACT

Background: Hepatitis B virus (HBV) infection is a public health problem worldwide with a high burden in Sub-Saharan Africa. This burden is more felt in the paediatric population, mother to child transmission (MTCT) being a major mode of infection. This study sought to determine the prevalence of hepatitis B surface antigen (HBsAg) positivity in pregnant women and to identify the factors associated with HBsAg positivity.

Methods: This was a retrospective study that involved third trimester pregnant women who attended antenatal care (ANC) and those in the post-partum period admitted at the maternity wards from 15th January to the 15th April, 2018. Data was collected using a structured questionnaire. HBsAg status was recorded from the participants result sheets of laboratory investigations requested at booking visit and from ANC registers. Data was analysed using SPSS version 23.

Results: Of the 349 women studied, 314 (90.0%) had previously screened during the ongoing pregnancy. The prevalence of HBsAg positivity among the screened women was 8.9% (95% CI: 5.4%- 12.4%). The prevalence was highest among the age group 20 to 25 years (10.7%) and in multiparous women (9.4%). A history of multiple sexual partners was associated with HBsAg positivity (OR: 10.9, CI: 1.5– 80.9, p: 0.04). However, none of the socio-demographic and obstetrical variables used in this study was associated with HBsAg positivity. HBV/HIV co-infection rate was 0.7%.

Conclusion: HBV infection was hyper- endemic in the southwest region of Cameroon. About one in ten pregnant women was infected with HBV infection. The scarcity of risk factors in

this group highlights the fact that hepatitis B screening in pregnancy should be made a routine practice and not only based on risk factors.

Key words*:* Retrospective study, Hepatitis B virus, pregnancy, prevalence, correlates, Cameroon.

1. INTRODUCTION

Hepatitis B virus infection (HBV) is a global public health problem with its burdens mainly in WHO Western Pacific Region and WHO African Region where 6.2% and 6.1% of the adult population is infected respectively [1]. Approximately 2 billion persons are infected worldwide of which 240 million are chronic carriers of hepatitis B virus (HBV) [2]. Sub-Saharan Africa is described as an area of high endemicity with an average prevalence above 8% [1, 3]. Few studies in Cameroon have evaluated the prevalence of HBV in different sub-populations reported as; 11.9%, 19.9% and 7.7% in the general population, among children, and among pregnant women respectively [4- 6]. Different studies have reported different rates of HBV infection in pregnant women across various regions of Cameroon estimated at 4.4% (in 2016), 9.7% (in 2014), 7.7% (in 2013) and 20.4% (in 2013) [4, 7 - 9]. Little is known on the prevalence of hepatitis B in pregnancy in the south-west region.

The risk factors for hepatitis B infection are linked to contact with body fluids of infected persons [1]. A study in Nigeria (in 2011) showed that the major risk factors were; previous history of tribal marks/tattoos, history of contact with previously infected HBV patients and occupation of the women [10]. However, in urban Cameroon (in 2013) only a history of contact with HBV was reported as a significant risk factor [5]. These risk factors need to be identified in each setting in order to design targeted preventive measures. This study was

carried out to determine the prevalence of HBV infection in pregnant women and to identify the risk factors in a semi- urban region of Cameroon to bridge this gap.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

This cross-sectional study was conducted in three health facilities in the south-west region between the 15th January to the 15th April, 2018. Two secondary health care centres and one primary healthcare centre were selected for the study based on their high antenatal care client turnout. The study sites were the District Hospital Kumba (primary); the Buea and Limbe Regional Hospitals (secondary). Buea regional hospital (BRH), Limbe regional hospital(LRH) and District hospital Kumba are all situated in the southwest region of Cameroon. The capital of the region is Buea. These three hospitals offer antenatal care services on a daily basis. The ANC services are offered by nurses working under the supervision of two obstetricians/gynecologists in each of these settings.

2.2 Study Population

The study population included all pregnant women attending clinic and women in the postpartum period admitted at the maternity ward in each of the selected centres. These women were informed about the study and requested to thumb print or sign a written consent once they understood the information. Only women who had attended at least one previous antenatal were included into the study. A purposive sampling method was used to recruit participants.

2.3 Sample Size Calculation

The minimum acceptable sample size was calculated using the Lorenz formula with a HBV prevalence of 20.4% (Ducancelle et al 2013) [8]. A minimum sample size of 271 was

obtained with a 95% confidence and 5% accuracy and considering a 10% non-respondent rate. During our study, we included 349 pregnant women.

2.4 Data Collection

An interviewer-administered structured questionnaire was used to collect data from both literate and illiterate participants. The questionnaire contained questions on sociodemographic characteristics, hepatitis B screening history during the previous antenatal visits and the history of risk behavior for HBV infection. Prior to the use of the questionnaire in study participants the questionnaire was pretested in 30 pregnant women in our setting with the aim of revising poorly structured questions, estimate the average time required to fill the questionnaire and thus validate the use of the questionnaire in our context. The data that was obtained in the pretested group was not included in the final analysis

The hepatitis B status of participants was obtained from their laboratory result sheet for requested tests during their antenatal booking visit and/or subsequent visits.

The risk factors were identified using the CDC hepatitis B risk assessment tool modified to suit our context.

2.5 Data Management and Analysis

Data were analysed using the Statistical Package for Social Sciences (SPSS) software version 23; frequency tables were created for proportions and Chi Square-test was used to determine differences between categorical variables. Significant variables from cross tabulation between HBsAg status and sociodemographic variables as well as risk behaviors were inserted into a binary logistic regression model. A p-value of < 0.05, was considered statistically significant.

3. RESULTS

3.1 Socio - Demographic Characteristics.

The socio- demographic characteristics of the 349 participants enrolled are summarized in Table 1. Their ages ranged from 16 to 43 years with a mean age of 27.4 ± 5.2 years. The

predominant age group was 25<30 years representing 35.0% of the general population. Majority of the participants had completed secondary school (53.0%). Eighty-six (24.6%) were students and a greater proportion of the participants 195 (55.9%) were employed. Majority of the participants were married (67.0%). All pregnant participants were in the third trimester with gestational ages ranging from 28 to 41 weeks and a mean gestational age of 32.2±4.1weeks. Most of the participants 192 (55.0%) were multigravidas when compared with 124 (35.5%) primigravidas and 33 (9.5%) grand multigravidas.

Table 1. Socio-demographic and obstetrical characteristics of participants (N=394).

Variables	Frequency (n = 394)	Percentage (%)
Age (years)		
< 20	18	5.2
20 < 25	91	26.1
25 < 30	122	35.0
30 < 35	96	27.5
≥35	22	6.3
Residence		
Urban	201	57.6
Rural	148	42.4
Religion		
Christian	338	96.8
Muslim	7	2.0
Atheist	0	0.0
Others	4	1.1
Marital status		
Single	115	33.0
Married / Cohabiting	234	67.0
Occupation		
Student	86	24.6
Employed	195	55.9
Unemployed	68	19.5
Educational level		

Primary	55	15.8
Secondary	185	53.0
University and beyond	108	30.9
Uneducated	1	0.3
Gravidity		
Primigravida	124	33.5
Multigravida	192	55.0
Grand multigravida	33	9.5

3.2 Prevalence of HBsAg

Of the 349 study participants, 314(90.0%) had been tested for HBsAg during their previous ANC visits. Of the 314 women who had been screened, 28 had tested positive for HBsAg giving a prevalence of 8.9% (95% CI: 5.4%- 12.4%). The prevalence of HBsAg was highest among the 20<25years age group and those living in rural residences (Table 2). Three hundred and nineteen (91.4%) of all participants had screened for HIV of which 26 (8.2%) had tested. Two of the twenty-eight HBsAg positive women were equally HIV positive giving a HIV/HBV co-infection rate of 0.7% among the population of women who had screened for both HBsAg and HIV (294 women).

Table 2. Age, Parity and HBsAg status of the pregnant women (N=349)

Variable	Frequency (N = 349)(%)	HBsAg Unknown(%)	HBsAg (-) (%)	Prevalence HBsAg(+)*
Age(years)				
< 20	18(5.2)	3(16.7)	14(77.8)	1(6.7)
20 <25	91(26.1)	7(51.6)	75(82.4)	9(10.7)
25 <30	122(35.0)	14(11.5)	100(82.0)	8(7.4)
30 <35	96(27.5)	11(11.5)	79(82.3)	8(9.4)
>35	22(6.3)	2(9.1)	18(81.8)	2(10.0)
Gravidity				
Primigravida	124(35.5)	1(0.8)	103(83.1)	9(8.1)
Multigravida	225(94.5)	2(0.8)	183(81.3)	19(9.4)

***the prevalence is calculated from those screened only, which is not equal to frequency in this case.**

3.3 Factors associated with HBsAg positivity.

None of the sociodemographic factors used in this study was significantly associated with HBsAg positivity (Table 3). A history of multiple sexual partners was associated with HBsAg positivity (OR: 10.9, CI: 1.5– 80.9, p: 0.04) with a prevalence of 50% in this group as compared to 8.4% in the group of single sexual partners (Table 4). Previous history of blood transfusion, contact with infected persons, surgical procedures and scarifications or tattoos, was not statistically significant routes of transmission of HBV (Table 4).

Table 3. Socio-demographic / Obstetrical Characteristics and HBsAg seropositivity in study participants. (N=349)

	HBsAg status		Odds ratio (95% C.I)	P- value
	Positive	Negative		
Age				
<35	26(8.8)	268(91.2)	0.9 (0.2- 4.0)	0.696
>35	2(10.0)	18(90.0)	1	
Residence				
Rural	16(12.4)	113(87.6)	1	
Urban	12(6.5)	173(93.5)	0.5 (0.2- 1.1)	0.07
Marital status				
Single	9(9.0)	91(91.0)	1.0 (0.4- 2.3)	0.972
Married	19(8.9)	195(91.1)	1	
Level of Education				
Educated	27(8.6)	286(91.4)	1	
Uneducated	1(100)	0(0)	11.6 (8.1- 16.6)	0.089
Gravidity				
Primigravida	9(8.1)	102(91.9)	0.9 (0.4- 2.0)	0.710
Multigravida	19(9.4)	184(90.6)	1	
ANC hospital				
Peripheral	14(9.9)	127(90.1)	1	
Regional	11(8.1)	124(91.9)	0.8 (0.4- 1.8)	0.606

Table 4. Risk behaviours and HBsAg seropositivity in study participants.

Risk behavior	HBsAg status		Odds ratio (95% C.I)	p- value
	positive	Negative		

Blood transfusion				
Yes	3(9.4)	29(90.6)	1.1(0.3 – 3.7)	1.000
No	25(8.9)	257(91.1)	1	
Scarifications				
Yes	15(10.6)	127(84.6)	1.4(0.6 – 3.1)	0.387
No	13(7.7)	155(92.3)	1	
Sexual partners				
1	26(8.4)	284(91.6)	1	
≥2	2(50)	2(50)	10.9(1.5- 80.8)	**0.041**
Contact with HBV				
Yes	3(12)	22(88)	1.8(0.5- 6.7)	0.413
No	17(7)	260(91.5)	1	
Previous surgery				
Yes	8(8.2)	89(91.8)	0.8(0.4- 2.1)	0.772
No	20(9.3)	196(90.7)	1	
Hx of STI				
Yes	7(11.1)	56(88.9)	1.4(0.5 – 3.3)	0.513
No	21(8.5)	227(91.5)	1	

4. DISCUSSION

Pregnancy is a period when most women of child bearing age are exposed to the health care system. It is therefore an opportunity for the health care providers to screen these women for diseases which could compromise the fetal well-being especially for a typically asymptomatic infection like HBV. Given that an infected mother could transmit this infection to her baby and that the prognosis of neonatal infection, we decided to carry out this cross-sectional study to determine the prevalence of HBV infection in pregnancy and the factors associated with infection.

The prevalence of HBV in pregnancy was 8.9%. This result is in accordance with the fact that Cameroon is hyper-endemic for HBV infection [1]. This result is similar to 9.7% found by Frambo *et al* (2014) in Buea health district [9]. In comparison with studies from other parts of Cameroon, our prevalence was similar to 7.8%, 7.7% and 10.2% reported by Kfutwah *et al* (2012 on blood samples collected 10 years earlier); Fomulu *et al* (2013) and Noubiab *et al* (2015) respectively [5,11, 12]. The slight difference may be because of

differences in ethnicity, socioeconomic status and the natural difference attached to different geographic zones. Specifically, the highest prevalence amongst these (10.2% in the North region) could be due to their excessive adherence to tradition with reluctance to medical services, their early ages at sexual debut due to early marriages, and their relatively higher level of polygamous family settings. Our prevalence was higher than 4.4% reported by Dionne - Odom *et al* (2016) [7]. This is probably due to the great diversity in their study participants from different geographical areas (rural, semi-urban and urban) with different prevalence in each group which when combined gave a relatively lower prevalence. This result was lower than 20.4% reported by Ducanelle *et al* (2013) and 15.2% reported by and Bonsi *et al* (2017) in two rural settings in the country [8, 13]. This may be due to the difficult access to health facilities due to poor roads and hilly and mountainous areas leading to reliance on traditional birth attendants associated with higher rates of infection. It may also be explained by the lower rate of literacy coupled with poor access to information and health education in the remote areas.

The mean age of HBsAg seropositivity was 26.9 years and the prevalence of HBsAg was highest 9 (10.7%) in the age group of 20 <25 years. Women aged >35 years also had a high prevalence 2 (10.0%). This result is in accordance with a mean age of HBsAg positivity of 26.9 years reported by Fomulu *et al* and somewhat tallies with the prevalent age group 25-29 years in their study [5]. The result equally tallies with an average age of seropositivity of 26 years reported by Vaquez Martinez *et al* in Mexico; and the prevalent age group of 20 – 24 years reported by Eke *et al* in Nigeria and Ngaira *et al* in Kenya [10,14,15]. This could be explained by the fact that most women by this age are likely to get married and become pregnant prompting presentation for the first time for ante-natal care where the HBV infected ones are likely to be picked up during screening.

The prevalence of HBsAg in pregnant women was high yet only one of the risk factors was significantly associated with HBV infection. This result tallies with Fomulu *et al* and Noubiab *et al* who found either one or two statistically significant risk factors to HBV infection in pregnant women [5, 12]. This is contrary to Frambo *et al* in Buea health district who found no significant risk factor [9]. This difference could be explained by their relatively small sample size. In this study, we found on univariate analysis that a history of multiple sexual partners was associated with HBsAg seropositivity. This is in accordance with Luma *et al* who had a similar finding [16]. However, on multivariate analysis, none of the factors assessed was significantly associated with HBsAg seropositivity in pregnancy. The low detection of risk factors could be attributed to the small sample size of the study population and recall bias. Similar findings were documented in a study carried out in Lagos, Nigeria [17]. This probably highlights the fact that Screening pregnant women for hepatitis B infection on the basis of risk factors might not be an effective public health approach in decreasing the prevalence of HBsAg seropositivity.

5. CONCLUSION

Hepatitis B virus infection is a public health problem in the South-West Region of Cameroon with a prevalence of HBsAg positivity of 8.9% in a population of pregnant women attending ANC. A history of multiple sexual partners was the only factor significantly associated with HBsAg positivity. The scarcity of risk factors in this group highlights the fact that hepatitis B screening in pregnancy should be made a routine practice and not only based on risk factors.

Limitation of study.

The retrospective design was the first limitation of our study, which could have led to recall bias among study subjects. Furthermore, being a hospital-based study, the results cannot be generalized to whole population.

Abbreviations/Acronyms

ANC: Antenatal care; **CI**: Confidence interval; **HBsAg**: Hepatitis B surface antigen; **HBV**: Hepatitis B virus; **MTCT**: Mother to child transmission; **WHO**: World Health Organization.

Availability of data and materials

The data sets supporting the conclusion of this study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Ethical clearance was obtained from the Faculty of Health Sciences Institutional Review Board (N° 2018/ 128/ UB/ SG/IRB/ FHS) of the University of Buea and administrative authorization from the Regional Delegation of Public Health for the South West Region of Cameroon. Participants had the study protocol carefully explained to them and participation was voluntary. Written informed or thumb print consent was obtained from all participants. The procedures used were standard procedures involving minimum risks.

References

1. World Health Organization. WHO hepatitis B. Geneva: WHO; 2017. Available from: http://www.who.int/mediacentre/factsheets/fs204/en/.[Accessed 28 Oct 2017]

2. Lavanchy D, Kane M. Global Epidemiology of Hepatitis B Virus Infection. Hepatitis B Virus in Human Diseases. 2016; p. 187–203.

3. Zampino R, Boemio A, Sagnelli C, Alessio L, Adinolfi LE, Sagnelli E, et al. Hepatitis B virus burden in developing countries. World J Gastroenterol. 2015; 21(42):11941–53.

4. Chiaramonte M, Stroffolini T, Ngatchu T, Rapicetta M, Lantum D, Kaptue L, et al. Hepatitis B virus infection in Cameroon: a seroepidemiological survey in city school children. J Med Virol. 1991;33(2):95–9.

5. Fomulu NJ, Morfaw FL, Torimiro JN, Nana P, Koh MV, William T. Prevalence, correlates and pattern of Hepatitis B among antenatal clinic attenders in Yaounde-Cameroon: is perinatal transmission of HBV neglected in Cameroon? BMC Pregnancy Childbirth. 2013;13(1):158.

6. Infectious Diseases of Cameroon: GIDEON Informatics, Google Books Cameroon: 2017 edition. Available from: https://www.gideononline.com/ebooks/disease/.

7. Dionne-Odom J,Mbah R, Rembert NJ, Tancho S, Halle-Ekane GE, Enah C et al.Hepatitis B, HIV, and Syphilis Seroprevalence in Pregnant Women and Blood Donors in Cameroon: a cross-sectional study. Infectious Diseases in Obst and Gynecol Volume 2016. Available from: http://dx.doi.org/10.1155/2016/4359401, Article ID 4359401.

8. Ducancelle A, Abgueguen P, Birguel J, Mansour W, Pivert A, Le Guillou-Guillemette H, *et al*. High Endemicity and Low Molecular Diversity of Hepatitis B Virus Infections in Pregnant Women in a Rural District of North Cameroon. PLoS ONE. 2013; 8(11).

9. Frambo AAB, Atashili J, Fon PN, Ndumbe PM. Prevalence of HBsAg and knowledge about hepatitis B in pregnancy in the Buea Health District, Cameroon: a cross-sectional study. BMC Res Notes. 2014;7(1):394.

10. Eke AC, Eke UA, Okafor CI, Ezebialu IU, Ogbuagu C. Prevalence, correlates and pattern of hepatitis B surface antigen in a low resource setting. Virol J. 2011 12;8:12.

11. Kfutwah AKW, Tejiokem MC, Njouom R.A low proportion of HBeAg among HBsAg-positive pregnant women with known HIV status could suggest low perinatal transmission of HBV in Cameroon | Virology Journal |. Available from: https://virologyj.biomedcentral.com/articles/10.1186/1743-422X-9-62.

12. Noubiap JJN, Nansseu JRN, Ndoula ST, Bigna JJR, Jingi AM, Fokom-Domgue J. Prevalence, infectivity and correlates of hepatitis B virus infection among pregnant women in a rural district of the Far North Region of Cameroon. BMC Public Health [Internet]. 2015 ;15(1).

13. PL026.Burden of Hepatitis B virus and the risk of vertical Transmission at the Penka Michel Health District.Cameroon:PL026; Mar2017.

14. Ngaira JAM, Kimotho J, Mirigi I, Osman S, Ng'ang'a Z, Lwembe R, 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).

15. Vázquez-Martínez JL, Coreño-Juárez MO, Montaño-Estrada LF, Attlan M, Gómez-Dantés H. Seroprevalence of hepatitis B in pregnant women in Mexico. Salud Pública México. 2003;45:165–70.

16. Luma HN, Eloumou SAFB, Ekaney DSM, Lekpa FK, Donfack-Sontsa O, Ngahane BHM, et al. Sero-prevalence and Correlates of Hepatitis B and C Co-infection Among HIV-infected Individuals in Two Regional Hospitals in Cameroon. Open AIDS J. 2016;10:199–208.

17. Rabiu KA, Akinola OI, Adewunmi AA, Omololu OM, Ojo TO. Risk factors for hepatitis B virus infection among pregnant women in Lagos, Nigeria. Acta Obstet Gynecol Scand. 2010;89 (8):1024-8.