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Prevalence and Factors Associated with Viral Hepatitis B and C at the Ebolowa Regional Hospital Center

Messakop Moayeth Yannick[1*], Lendem Isabelle[2], Bisay Souhe Ulrich[3], Atangana Ekobo Huguette[4], Mboua Ndenga Veronique[3], Bilo'o Leslie[5], Makemgue Louise Stephanie[4], Ndoumba Annick[4], Elah Clovis[6], Aboui Flaure[6], Ntone Samuel Vianey[4], Bengono Rody[3], Foumane Pascal[1], Ekono Guy Michel[7]

[1]Department of Gynecology and Human Reproduction, FMPS University of Ebolowa, Ebolowa, Cameroon
[2]Department of Biology, FS University of Ebolowa, Ebolowa, Cameroon
[3]Department of Surgery and Specialties, FMPS University of Ebolowa, Ebolowa, Cameroon
[4]Department of Internal Medecine, FMPS University of Ebolowa, Ebolowa, Cameroon
[5]Department of Paediatrics, FMPS University of Ebolowa, Ebolowa, Cameroon
[6]Ebolowa Regional Health Center, Ebolowa, Cameroon
[7]Department of Gynecology, FMPS University of Douala, Douala, Cameroon
Email: *yannickmessakop2@gmail.com

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Abstract

Introduction: Viral hepatitis B is a major problem during pregnancy because of its impact on maternal and foetal well-being. Our aim was to determine the prevalence and factors associated with viral hepatitis B during pregnancy at the Ebolowa regional hospital center (ERHC). **Methodology:** We conducted a descriptive and analytical cross-sectional study from June 2023 to June 2025, including all pregnant women seen at the Ebolowa regional hospital center during the study period who had undergone a rapid screening test for hepatitis B and C, confirmed by an ELISA test if positive. Sociodemographic, clinical, paraclinical and therapeutic data were collected and analysed using SPSS version 28.0 software, with a confidence interval of 95% and a significance threshold set at $p < 0.05$. **Results:** During the study period, 480 pregnant women were included. Of these, 38 women tested positive for hepatitis B surface antigen (HBsAg), for a prevalence of 7.9%, and 3 for Hepatitis C antibody (HCV-Ab), for a prevalence of 0.6%. The mean age of these hepatitis B virus-positive patients was 27.9 ± 4.7 years (range: 18 to 43 years). The highest prevalence of hepatitis B was in the 21-30 age group (59%), among housewives (62%), single women (60%) and multiparous women (54.5%). Family history of hepatitis B virus (OR = 2.1; CI [1.22 - 5.51], p = 0.001), single marital status (OR = 3.79; CI [2.63 - 7.52], p = 0.032) and age (21 - 30 years) (OR = 6.01; CI [2.40 - 20.21], p = 0.005) were the factors

independently associated with viral hepatitis B. **Conclusion:** Viral hepatitis B remains a health problem among pregnant women treated at the ERHC, and several risk factors were identified, in line with the literature.

Keywords

Prevalence, Associated Factors, Hepatitis B, Pregnant Women, Ebolowa

1. Introduction

Viral hepatitis remains a major health problem worldwide and especially in low income countries like Cameroon because of its widespread transmission, high cost of prevention and treatment. Hepatitis B (HBV) is an enveloped partially double stranded virus belonging to the family Hepadnavirus [1]-[3]. Transmission is mostly sexual, blood transfusions, and exchange of body fluids but perinatal transmission accounts for more than 50% of cases worldwide[1]. Usually this virus does not cross the maternal-foetal barrier admist breaks in this barrier during pregnancy or delivery. Materno-foetale transmission rate is high (90%) among pregnant women with Chronic HBV and positive HBV E antigen [4] [5].

Hepatitis C virus (HCV) infection is a significant global public health concern, affecting approximately 21% of individuals of childbearing age [1]. According to the WHO report in 2022 about 2.2 and 5.3 million HCV-positive babies are born worldwide each year [3]. Perinatal transmission is also possible during pregnancy as Mothers infected with HCV have been shown to have about a 7.2% risk of perinatal transmission. Hence screening should be sytematic during pregnancy and trisk factors sought.

In 2022, the World Health Organization (WHO) estimated that 254 million people lived with chronic hepatitis B with 1.2 million new infections and an estimated 1.1 million deaths that year [3]. The global prevalence of HBV was estimated at 4.1% and 6.7% among pregnant women [3]. This prevalence varies significantly from one region to the other but Africa and Asia carry the largest burden with rates often high reaching over 8 % or even higher in certain regions [3]-[7]. This variability might be linked to differences in diagnostic methods, study population type and regional endemicity. Notwithstanding the pool prevalence of Hepatitis B in pregnancy in Africa is 5.89% [8]-[23].

The national prevalence of hepatitis B in Cameroon was 11.2% in 2017 and prevalence among pregnant women varies by region and study but generally falls in a high endemic range with national estimates at 9.8% and estimates ranging from 5.4% to over 18% in certain regions. These high rates in Cameroon highlights the need for expanded screening and vaccination programs for pregnant women and newborns [7]. Fouelifack *et al.* in 2018 had a national prevalence of hepatitis C infection of 1.6% [24].

Several studies have concluded that the risk of hepatitis B seroprevalence increased with low income, blood transfusion, multiple sexual partners, ear pierc-

ings and tattoos and recommended widespread education on hepatitis B prevention [8]-[20]. The WHO aimed at eradicating Hepatitis B as a treat to health by 2030 and prevention of mother-to-child HBV transmission seems critical for the global elimination of viral hepatitis [2]. Systematic screening for hepatitis B surface antigen in pregnancy, tenofovir for the treatment of viral hepatitis from the 28th week of pregnancy, implementation of elimination of mother to child transmission intervention during labour, improvement of of 3 doses of hepatitis B vaccine and hepatitis B birth dose coverage alongside administering Hepatitis B Immunoglobulin to this infants within 12 hours of birth are measures to reduce mother to child transmission of HBV [2].

Cameroon introduced the hepatitis B vaccine and expanded immunisation program in 2005 and few studies have been carried out on the prevalence of hepatitis virus B in the south region of Cameroun with its headquarter, Ebolowa. We therefor aimed at determining the prevalence and associated factors to viral hepatitis B in pregnancy at the Ebolowa Regional Health Center.

2. Methodology

We conducted a descriptive and analytical cross-sectional study from June 2023 to June 2025 on women attending antenatal care at the Ebolowa Regional Health Center. We included all pregnant women attending antenatal care at the ERHC during the data collection period. Were excluded pregnant women who had received hepatitis B vaccine, those vaccined against hepatitis B and pregnant women who refused to give their written concern to take part in the study.

Sample size determination was done using a one-population proportion formula. n = (Zα/2)2 p (1 − p)/d2 assuming that:

- P = prevalence of hepatitis B virus taken from the study done by Evenge Nzechieu in Cameroon , Buea, 2023 which was 8.4%.
- α = 0.05,
- Z = Level of confidence interval 95% = 1.96,
- d = Degree of precession were used to obtain 361 pregnant mothers.

After obtaining a written concern from the patient, data was collected on a daily basis by a trained personnel using a pretested questionnaire. Data collected included sociodemographic data, clinical data and behavioral factors and practices. An experienced laboratory technician hence collected 5 ml of veinous blood from each participant and after centrifugation at 3,00 rpm for 5 mins carried out a rapid diagnostic tests to detect (RDT) hepatitis B. In case of positive RDT results was confirmed analysing serum samples for the presence of hepatitis B surface antigen using an ELISA reader (Mindray, China)

The collected data were checked for completeness, inserted in microsoft excel and exported to SPSS version 28.0 for analysis. Statistical significant association at the bivariate analysis were put in a multiple regression model to adjust for any possible confounders and results presented in the form of Tables, pie charts and graphs. Pearson's χ^2 test was used to compare prevalence of hepatitis in different groups. Our confidence interval was set at 95% for a significance threshold of $p < 0.05$. Ad-

justed Odds Ratio (AOR) with 95% confidence interval (CI) was used as a measure of association.

3. Results

3.1. Sociodemographic Profile of the Studied Population

During the study period, 480 pregnant women were included with a response rate of 100%. The mean age of our participants was 27.9 ± 4.7 years (range: 18 to 43 years). Most of them were single (60%), had a secondary level of education (57%). Our respondents mostly lived in an urban area (81.5%) and were government employees (43.2%). As illustrated on Table 1.

Table 1. Sociodemographic characteristics of pregnant women screened for viral hepatitis at the Ebolowa Regional Health Center.

Characteristics of women	
Mean age (years)	27.9 ± 4.7
Marital status, n (%)	
Maried	190 (39.5)
Single	288 (60.0)
Widow	2 (0.5)
Residence, n (%)	
Urban	392 (81.5)
Rural	88 (18.5)
Level of education, n (%)	
No education	50 (10.5)
Primary	65 (13.5)
Secondary	274 (57.0)
University	91 (19.0)
Age group, n (%)	
≤ 20	37 (7.7)
21 - 30	240 (50)
31 - 40	160 (33.3)
41 - 45	43 (9.0)
Profession, n (%)	
Unemployed	107 (22.3)
Private sector	166 (34.5)
Public sector	207 (43.2)

3.2. Clinical Profile of the Studied Population

When we considered their clinical characteristics, we found that most of our patients were primiparous (45%; 216/480) and were seen in the first trimester of pregnancy (50.2%; 241/480). On average, they had had 4.02 ± 1.70 sexual partners, and their mean age at first intercourse was 17 ± 2.0 years. The majority declared having had just one partner in the last six months (55%; 264/480), with no protection during their last intercourse (80%; 384/480). The use of condoms was rare, with only 28.7% (138/480) of our study population having ever used a condom during sex. Few of our patients had received a blood transfusion (10.6%; 51/480). The majority

of respondents had never been scarified or shared sharp objects (73.1%; 351/480) and had never had any unsafe injections (96%; 461/480). Twenty percent (96/480) disclosed having a family history of viral hepatitis. We also found that only 3.5% of our patients had been vaccinated against hepatitis B. AS shown on Table 2.

Table 2. Clinical characteristics of pregnant women screened for viral hepatitis at the Ebolowa Regional Health Center.

Characteristics of women	
Average number of pregnancies	2. ± 1.09
Parity, n (%)	
Primipara	216(45.0)
Paucipara	104(21.7)
Multipara	160(33.3)
Gestational age, n (%)	
First trimester	241(50.2)
Second trimester	145(30.3)
Third trimester	94(19.5)
Average number of sexual partners	4.02 ± 1.70
Number of sexual partners during the last six months, n (%)	
None	158 (33.0)
1	162 (55.0)
At least 2	58 (12.0)
Mean age at first sexual intercourse (years)	17.0 ± 2.00
Protection last sexual intercourse, n (%)	
No	384 (80.0)
Yes	96 (20.0)
Usage of condoms, n (%)	
Never	102 (21.3)
At times	240 (50.0)
Always	138 (29.7)
Past history of blood transfusion	
Yes	51 (10.6)
No	429 (89.4)
History of unsafe injection	
Yes	19 (4)
No	461 (96)
Family History of Hepatitis B infection	
Yes	96 (20)
No	384 (80)
Scarifications and share of sharp objects	
Yes	129 (26.9)
No	351 (73.1)
Previous dental procedures	
Yes	98 (20)
No	382 (79.5)
Vaccination against Hepatitis B	
No	175 (3.5)
Yes	463 (96.5)

3.3. Prevalence of Viral Hepatitis B and C in Pregnancy

Of these, 38 women tested positive for HBsAg, representing a prevalence of 7.9%, while three tested positive for HCV-Ab, representing a prevalence of 0.6%. We found no co-infection of HBV and HCV in our studied population. The highest prevalence of hepatitis B and HCV was found in the 21 - 30 age group (68.3%), in single women (80.5%), and in multiparous women (68.3%). See Tables 3-4.

Table 3. Seroprevalence of hepatitis B and C virus among pregnant women followed at the ERHC.

Outcome variable Status	Frequency (%) N = 480	95% CI
HBsAg		
Negative	442(92.09)	[33.10 - 98.99]
Positive	38 (7.91)	[2.91 - 18.38]
Anti- HCV antibodies		
Negative	477(99.4)	[40.34 - 186.91]
Positive	3(0.6)	[0.07 - 4.00]
Co-infection (HBsAg and HCV)		
Negative	480 (100)	[23.10 - 494.00]
Positive	0(0)	1
Overall prevalence of viral hepatitis		
Positive	41(8.54)	[6.10 - 46.11]
Negative	439 (91.46)	[3.00 - 100.04]
Co iinfection	0(0)	1

Table 4. Descriptive analysis and logistic regression of risk factors associated with Hepatitis B infections among pregnant women at the ERHC.

	Descriptive analysis			Logistic regression analysis			
	Chi-square			Univariate		Multivariate	
	Negative N = −439	Positive N = 41	p-value	OR (95% CI)	p-Value	a OR (95% CI)	p-Value
Characteristics	n (%)	n (%)					
Age brackets							
[≤20]	33(7.5)	4(9.8)		1		1	
[21 - 30]	212(48.3)	28(68.3)	**0.02**	4.50 (0.13 - 5.673)	**0.005**	4.40 (0.86 - 7.21)	**0.005**
[31 - 40]	155(35.3)	5(12.2)		1.02 (0.63 - 4.00)	0.10	1.01 (0.31 - 3.01)	0.33
[41 - 45]	39(24.6)	4 (4.3)		0.27 (0.11 - 2.10)	0.51	0.22(0.12 - 3.63)	0.41
Past history of blood transfusion							
No	409 (93.1)	20(48.7)	0.66	1		1	
Yes	30(6.8)	21(51.2)		2.56 (0.21 - 3.20)	0.08	2.66 (0.28 - 4.01)	0.10
Family history of hepatitis B infection			**0.003**				
No	373(84.9)	11 (26.8)		1		1	

Continued

Yes	66(15.9)	30 (73.2)		5.06 (0.01 - 3.66)	**0.003**	6.08 (0.2 - 11.67)	**0.001**
Marital status							
Married	43(62.3)	31(13.4)	**0.01**	0.31 (0.15 - 8.01)		0.33 (0.05 - 9.11)	
Single	255 (53.1)	33(80.5)		4.02 (0.55 - 13.01)	**0.0001****	2.0 (0.68 - 21.02)	**0.032**
Widow	2(0.5)	0(0)		1.		1.07 (0.90	0.68
History of unsafe injection							
No	431 (94.4)	30(73.1)	0.15	0.14 (0.06 - 5.00)		1	
Yes	8 (5.6)	11(26.9)		1.55 (0.35 - 11.13)	0.22	2.03 (0.49 - 18.28)	0.77
Parity							
Primipara	206(46.9)	10(24.3)		1		1	
Paucipara	101(23.1)	3 (7.3)	0.53	0.19 (0.33 - 3.50)		0.05 (0.02 - 1.55)	0.21
Multipara	132(30.0)	28(68.3)		3.09 (0.33 - 33.60)	**0.01**	2.05 (0.22 - 6.55)	
Multiple sexual partners							
No	407 (92.7)	15(84.8)		1		1	
Yes	32 (7.3)	26 (15.2)	**0.008**	2.42 (1.05 - 12.41)	**0.04**	1.04 (0.05 - 5.55)	0.47
Scarifications and share of sharp objects							
No	321(73.1)	30(73.1)		1		1	
Yes	118(26.9)	11(26.9)		1		1	

3.4. Associated Factors to Viral Hepatitis B and C Infection in Pregnancy

We found that being single (p = 0.0001), aged between 21 - 30 years (p = 0.005), having a family past history of viral hepatitis (p = 0.003), being a multipara (p = 0.01), and having multiple sexual partners(p = 0.04), were found to be significantly associated with viral hepatitis in pregnancy (P < 0.05). A past history of blood transfusion, scarifications and sharing sharp objects or unsafed injections did not significantly increase the risk of viral hepatitis B and C infection in our studied population. See Table 4.

In a multivariate analysis, family history of hepatitis B virus (AOR = 6.08; CI [0.22 - 11.67], p = 0.001), single marital status (AOR = 2.00; CI [0.68 - 21.02], p = 0.032) and age (21 - 30 years) (AOR = 4.40; CI [0.86 - 7.21], p = 0.005) were the factors independently associated with viral hepatitis in pregnancy among our studied population.

4. Discussion

Viral hepatitis remains the main cause of hepatitis in pregnancy. Early detection enables effective prevention of mother-to-child infection. WHO in 2016 defines 3 levels of endemicity low endemicity (less than 2% seropositive), intermediate

endemicity (2% to 7% seropositive), and high endemicity (>8% seropositive) [1]. The same report classifies HCV prevalence as high (>3.5%), Intermediate (1.5% 3.5%), and low (1.5%) [1]. Several studies done in Cameroon revealed that Cameroon is a highly endemic zone for hepatitis B and C infections [7] [13].

4.1. Prevalence of Viral Hepatitis B and C Infections in Pregnancy

In our study, the prevalence of HBsAg among pregnant women at the ERHC was 7.9%, reflecting Cameroon's high endemicity. This prevalence is consistent with the results of various studies conducted in several countries [15] [18] [20]. However, our results differ from those obtained by Nlinwe *et al.* in Bamenda, Northwest Region, Cameroon, who found a lower prevalence (4.98%) of hepatitis B virus infection among pregnant women attending Bamenda Regional Hospital [13]. Similarly, Goel *et al.* found an even lower prevalence of hepatitis B (0.72%) among pregnant women receiving care at a tertiary healthcare facility [17]. Conversely, the prevalence of viral hepatitis B among pregnant women in our study is lower than that reported by Hassan *et al.* in Somalia (11.24%) [14].

The reasons for the variations in the prevalence of HBV in different studies might be due to sociodemographic differences, differences in behavioural practices and cultural practices towards the risk of HBV and HCV infection. Examining our patients' clinical profiles, we found that the infrequent use of condoms and early age at first intercourse were common, possibly explaining this high prevalence.

The high prevalence of HBsAg in our study indicates the need to prioritise the southern region of Cameroon in the prevention of viral hepatitis, by raising awareness of the risk factors for hepatitis B and C among the general population. During antenatal visits, talks on these risk factors should be increased, and all pregnant women should be systematically screened for HBsAg and hepatitis C antibodies during their first visit.

The hepatitis B vaccination rate was low among our respondents, in line with several African studies [11]-[15]. Health professionals attending to pregnant women should raise awareness of the hepatitis B vaccine and offer it to those who are not infected. Policymakers could help reduce these problems by ensuring free screening and vaccination against the hepatitis B virus for pregnant women.

The prevalence of HCV in pregnancy was 0.6%, which is lower than the results obtained by Foelifack *et al* in Yaounde in 2018 [24] which was 1.7%. This difference could be due to the fact that our population seemed younger than theirs and it is well known that the baseline risk may be lower in a population like ours, because age is strongly associated with cumulative exposure over time. When considering our studied population clinical characteristics we noticed a low blood transfusions rate, low practice of common risk behaviours (scarification, sharing razors, unsafe dental work, tattooing/piercing, etc.) Hence the opportunities for HCV to spread are fewer. Nevertheless, the available data point toward a low-to-moderate HCV seroprevalence among pregnant women in Cameroon—likely in the range of ~1–

2% in some urban antenatal settings, though meta-analysis suggests that in broader or mixed settings it could be around 3%

4.2. Associated Factors to Viral Hepatitis B and C Virus

In a bivariate analysis, the following factors were significantly associated with viral hepatitis B and C infection: age group (21 - 30 years), marital status (single), family history of hepatitis B virus, multiparity, and multiple sexual partners. This is in line with the findings of several authors (6, 7, 15, 18).

On the contrary, risk factors identified by several other authors (15 - 20), such as dental extraction, blood transfusions, and scarifications, were not significantly associated with viral hepatitis B and C infection in our study.

The age group most affected by infection during pregnancy was 21 - 30 years. This age group is characterised by high promiscuity, which exposes them to various genital infections. However, Nlinwe *et al*. found a fairly high prevalence of HBV infection in the 27 - 38 age group among pregnant women in Bamenda [13]. Counselling on safe sexual behaviour in colleges and universities, where women of this age group can be found, seems necessary. This seems all the more important considering that the majority of our study population were women of this age group, most of whom declared infrequent condom use and no hepatitis B vaccination.

In our study, single women were found to be at a higher risk of developing HBV and HCV infections. This finding is supported by a study conducted by Mve *et al*. [7], who also noted that unmarried individuals engage in riskier sexual behaviour, making them more prone to STIs such as HBV [16].

Among the pregnant women in our study, those with a history of household contact with an HBV- or HCV-positive family member were significantly more likely to have these infections. These findings corroborate those of several other authors worldwide [7] [15] [18]. However, our results differ from those of Hassan *et al*. and Goel *et al*., who found no statistical significance between household contact and HBV infection [14] [17]. These differences may be due to variations in hygiene practices, vaccination rates, and the availability of HBV and HCV screening methods. In our African setting, closer interpersonal interactions and the sharing of cutlery and sharp objects are commonplace, thereby increasing the transmission of HBV. Health personnel should educate HBV-infected pregnant women about the importance of encouraging their family members to undergo routine screening and vaccination against HBV, as this could reduce the transmission of HBV within the household.

Having multiple sexual partners was significantly associated with HBV infection, in line with the findings of Robel *et al*. [18]. It is evident that unsafe sexual practices contribute to the spread of HBV. This could be explained by the fact that HBV can be present in blood, semen, and other bodily fluids exchanged during sexual contact. Differences in HBV and HCV prevalence in different studies may be due to variations in sexual health education, the availability of protective measures and access to STI management services. Our findings highlight the need

to prevent the transmission of HBV infection, primarily by encouraging behavioural changes to promote safer sexual practices. Having multiple sexual partners is a factor frequently cited in the transmission of hepatitis B [22] [23], and a cumulative number of sexual partners greater than two was the critical threshold associated with hepatitis B in pregnancy [23]. However, other studies found no association [15] [16] [20].

In line with the results obtained by Goel *et al*., our study found that multiparous pregnant women were at a higher risk of screening positive for HBV and HCV infections, which could be explained by them undergoing more medical interventions, such as caesarean sections, blood transfusions, and other invasive procedures, which could increase the risk of HBV and HCV infections. Also, due to several deliveries, multiparous women may have been exposed to unsafe procedures during delivery.

In a multivariate analysis after adjusting for other confounding factors, multiparity and having multiple sexual partners were no longer significantly associated to viral hepatitis B and C infection in pregnancy, while being a single pregnant woman, aged 21 - 30 and having a family past history of hepatitis B remained statistically significant.

4.3. Strengths and Limitations

Strengths of the study: We used ELISA diagnostic method which has high sensitivity and specificity to confirm HBV and HCV infections. The study also used a standardized questionnaire to collect information from the study participants.

Limitations of the study: The study was conducted at a point in time hence rendering causal association impossible. The study was a hospital based study which may not be generalizable to the entire population.

5. Conclusions

The seroprevalence of HBV infection among pregnant women in Ebolowa, Cameroon, is notably high, posing a significant public health concern, while HCV prevalence is low. Awareness of HBV vaccination should be increased and made available at no cost. Systematic screening during initial antenatal care visits is recommended, alongside preventative measures targetting this population. Targetted awareness campaigns should be organised for single women, aged (21 - 30) and family based screening programs put in place.

Promoting education on HBV transmission and prevention at clinics, employing aseptic techniques in healthcare, and avoiding sharing sharp materials are essential at homes. Further community studies are necessary to evaluate overall HBV prevalence and risk associations.

Authors' Contribution

Data design and acquisition: Messakop M.Y, Lendem I, Bisay S.U.B,

Data analysis and interpretation: Messakop M.Y, Aboui F, Mboua N.V, Bisay

S.U.B, Bilo'o L, Atangana E.H, Elah C, Ndoumba A, Aboui F

Editing of the article: Messakop M.Y, Makemgue LS, Lendem I

Critical review of intellectual content: Makemgue LS, Bengono R, Foumane P, Ekono G.M

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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