

Seroprevalence of Viral Hepatitis B and C and Knowledge of the Hepatitis B Virus among Pregnant Women Attending Prenatal Care in the Democratic Republic of Congo

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Abstract. Viral hepatitis B (HBV) and C (HCV) can significantly influence maternal and child health. Although HIV infection, malaria, and syphilis in pregnant women are likely to be systematically screened for and managed according to national guidelines in the Democratic Republic of Congo, there is no plan for HBV and HCV. Furthermore, there is no documentation regarding pregnant women's knowledge about HBV and HCV. This situation has motivated the researchers to undertake the current study, which was designed to estimate the seroprevalence of HBV and HCV. We have also assessed knowledge of the HBV infection among pregnant women who consulted for antenatal care for the first time at Vanga Evangelical Hospital in Vanga. A cross-sectional study was conducted with 457 pregnant women who attended antenatal care. Sociodemographic, obstetric, and previous medico-surgical data, as well as information related to women's HBV knowledge, were collected using a questionnaire. Rapid tests were used to detect HBV surface antigen and HCV antibodies. Most pregnant women were aged 20–24 years. Only 6.8% of respondents had knowledge of HBV, and the main source of this knowledge was health facilities (4.6%). Only 0.7% reported having been tested, whereas 98.5% said that they had not been offered a test. Overall, 18 (3.9%) participants were HBV positive and 22 (4.8%) were positive for HCV. There is limited knowledge about HBV and HCV among pregnant women in rural Vanga. All pregnant women should be screened during antenatal care, and a well-implemented program of management is needed.

INTRODUCTION

Pregnancy represents a specific life event that is characterized by regular or even continual contact with the health-care system. It also places a woman in a vulnerable state because she is likely to develop several diseases during pregnancy, including infectious diseases.

Although some of these infectious diseases, including HIV infection, malaria, and syphilis, should be systematically screened and managed in the Democratic Republic of Congo (DRC), this is currently not always the case. Essentially, not all pregnant women are screened because of the lack of the necessary material. Moreover, there is no plan to screen for other infectious diseases, such as viral hepatitis B (HBV) and C (HCV), which can negatively affect maternal and child health.

According to the most recent Global Burden of Disease estimates, viral hepatitis is responsible for approximately 1.34 million deaths annually,¹ which is similar to the annual number of deaths from HIV/AIDS (1.3 million), malaria (0.9 million), and tuberculosis (1.3 million). Worldwide, there is an estimated incidence rate of 257 million positive HBV surface antigen (HBsAg) patients,² and the burden of chronic HBV is increasing, despite that this viral disease being entirely preventable through vaccination.³ According to a 2017 WHO report on hepatitis,² the number of positive HBsAg individuals was highest in the Western Pacific region (115 million, prevalence estimated at 6.2%) and Africa (60 million, prevalence estimated at 6.1%), which together represents 68% of the global burden.

Although some studies that confirm the burden of viral hepatitis in the pregnant women population in several African countries are available, only very limited data are available that

focus on the DRC. So far, only three studies on HBV have been identified: two conducted in urban regions^{4,5} and one combining rural and urban regions.⁶ The studies conducted in urban regions were performed among pregnant women living with HIV in Kinshasa or Lubumbashi, and the latter study was conducted in Kindu in the province of Maniema. Lubumbashi and Kindu are located in the eastern part of the DRC, whereas Kinshasa is in the western part of the country.

We have retrieved three studies related to HCV. Two of these studies were conducted in Kinshasa. The first study was published in 2001 but used data that were collected in 1990.⁷ The second study was published in 2000 using data collected in 1996.⁸ More recent data are emerging from Kindu in the eastern part of the DRC.⁶

Although there is a specific program for preventing mother-to-child transmission (PMCT) of the HIV infection,⁹ and malaria has a well-codified management protocol during pregnancy¹⁰ in the DRC, we are not aware of any program that has been implemented to address HBV and HCV infections in pregnant women.

The current study sought to estimate the seroprevalence of HBsAg and HCV and assess knowledge of HBV infection among pregnant women who consulted for antenatal care for the first time at Vanga Evangelical Hospital in Vanga, DRC. The information obtained will enable us to discuss interventions that likely improve women's knowledge and practices.

METHODS

Study area. The present study was carried out at Vanga Evangelical Hospital. The hospital comprises a total of 479 beds and serves a health zone with a population of more than 300,000 people, as well as patients from neighboring health zones.¹¹

The hospital is located in Kwilu Province, in the Vanga health zone. This is 530 km east of Kinshasa, 35 km from Bulungu hospital, and 60 km from Djuma hospital. The hospital offers

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TABLE 1
Questionnaire

Sociodemographic information	
Age (years)	
Tribe/ethnicity	1) Mbala 2) Yansi 3) Songo 4) Hungana 5) Humbu 6) Other
Education	0) No formal education 1) Attended primary school, but no certificate 2) Six years of primary school 3) Attended secondary school, but no diploma 4) State diploma after 6 years of secondary school 5) University
Marital status	1) Single 2) Married 3) Divorced 4) Widowed
Type of marriage	1) Monogamous 2) Polygamous
Obstetrical information	
Gravida	1) Primigravida 2) Multigravida
Past abortion	Yes No
Pregnancy age (trimester)	First trimester Second trimester Third trimester
Past history of surgery	Yes/no
Blood transfusion	Yes/no
Knowledge	
Ever heard of hepatitis B	Yes/no
If yes, what is the source of your information	1) Previous ANC 2) Radio 3) Church 4) Health center/worker 5) Newspaper 6) Friend 7) School
How does one catch HBV?	1) Sexual route 2) Mother-to-child transmission 3) Blood substance: injections 4) Spiritual or witchcraft 5) Do not know
When can our child become infected?	1) During pregnancy 2) During childbirth 3) During breastfeeding
Is there any way to prevent it?	1) Yes 2) No 3) Do not know
Have you ever undergone HBV serology?	Yes/no
If no, why?	1) I am afraid of knowing a positive result 2) I am not at risk and I cannot have hepatitis 3) I have never been offered testing before 4) The result may be known by others 5) My husband refuses this test 6) No answer
If yes, what was the result? Which one?	1) Positive 2) Negative
Hepatitis B serology result?	1) Negative 2) Positive

HBV = hepatitis B.

antenatal care for pregnant women every Thursday, including consultations with midwives and nurses.

Participants. During the period from March to June 2019, all pregnant women attending their first antenatal visit for an ongoing pregnancy were invited to participate in the study. All of these women agreed to participate in the study.

Because pregnant women attending the hospital for their first antenatal care are systematically screened for malaria in Vanga hospital, we simply added HBV and HCV serological tests to this screening.

Study procedures and data collection. A total of 5 mL of blood were collected from each study participant. Each participant was informed about the serological tests for HBV and HCV, in addition to the tests for malaria and HIV. All participants were also given a questionnaire regarding HBV knowledge (Table 1). Written, informed consent was obtained from each pregnant woman before the collection of blood samples.

After obtaining a total of 5 mL of blood from each study participant, the serum was separated and immediately used for serological HBsAg and HCV testing. Sociodemographic, obstetric, and previous medico-surgical information was also collected from the antenatal care chart.

Before embarking on this study, a pretest relative to the questionnaire about knowledge of HBV and HCV was conducted, which demonstrated a quasi-complete absence of HCV knowledge. It has also been noted that the practice of tattooing was nonexistent. For these reasons, we decided to only assess the knowledge of HBV, and we did not consider tattoos as a risk factor (Table 1).

Laboratory analysis. Hepatitis B seroprevalence. HBsAg detection was performed using a rapid screening test from the Encode brand, which is manufactured by Zhuhai Encode Medical Engineering, China. The test was used in accordance with the manufacturer's instructions.

Participants were considered to exhibit a positive serology status if the HBsAg test was positive, according to the test guidelines. Conversely, those with negative HBsAg tests, according to the test guidelines, were considered negative.

Hepatitis C seroprevalence. We used a rapid test from the Encode brand to detect HCV antibodies in participants' serum. This test kit is manufactured by Zhuhai Encode Medical Engineering, China, and it was applied in accordance with the manufacturer's instructions. Participants were considered HCV serology positive if the antibodies to HCV were positive. Otherwise, they were considered HCV negative.

Data handling and management. After data collection, the data were entered using EpiData software (EpiData Association, Odense, Denmark). At the study end, data were transferred to SPSS version 20 for analysis. We used descriptive analysis to express the proportion of each variable.

Ethics. Ethical approval for the study was obtained from the *Comité National d'Éthique de la Santé* (in the DRC). Investigations were performed in compliance with normal medical protocols.

RESULTS

Overall, 457 pregnant women were recruited (Table 2), and 26.0% of the participants were aged 20–24 years, and 42% had attended but had not finished secondary school. The majority of participants (92%) were married, 79% were multigravida, and 77% reported having at least one abortion; 13%

reported a past surgery, and 7% had received a blood transfusion (Table 2). The following seroprevalences were found: 18 participants were HBsAg positive (3.9%) and 22 were positive for HCV (4.8%).

With regard to knowledge of HBV, 93.2% of the respondents said that they had never heard of HBV. For those who reported having heard about HBV, the main source of information was health facilities. Less than 1% reported the possibility of mother-to-child transmission as a possible route of transmission. Overall, 99.3% stated that they had never been tested; the main reason for that was that this possibility was not being offered to them.

DISCUSSION

The situation regarding HBV and HCV in rural western areas of the DRC is still unknown, and to the best of our knowledge, this study is the first to investigate the HBV and HCV seroprevalences in this region. It is also the first that is performed at Vanga hospital.

We found a 3.9% HBV seroprevalence in our pregnant women population. This seroprevalence is lower than that found among the same population in either Lubumbashi (6.7%)⁵ or Kindu (5.9%),⁶ both of which are in the eastern DRC. This seroprevalence is also lower than that found among pregnant and postpartum women living with HIV and among those undergoing antiretroviral therapy in Kinshasa (4.7%), which is in the western DRC.⁴ This figure is also lower than the results pertaining to a systematic review of 28 studies (18

studies from blood donors) that included data from 154,926 subjects.¹² However, the seroprevalence data are similar (3.3%) to the results found in national, representative dried blood spot samples that were collected during the 2013–2014 Demographic and Health Survey, which sought to determine the HBV prevalence among adults and children living in the DRC.¹³

Compared with other countries, the seroprevalence rate we found is also lower than that found in Uganda (where 11.8% pregnant women tested positive for HBsAg),¹⁴ in Congo-Brazzaville (8.7%),¹⁵ in South Sudan (11%),¹⁶ in Sudan (8.5%),¹⁷ and in Cameroon (9.4%).¹⁸ However, this seroprevalence rate turns out to be superior to that found in Pointe-Noire, Congo-Brazzaville (2.6%).¹⁹ The seroprevalence rate pertaining to the Vanga region is likely accounted for by the fact that this is a rural region, where blood transfusions can only be performed in health facilities that have the possibility of applying this test. However, unsterilized equipment is still used in remote health facilities, which is considered to be a route of infection that is able to spread the disease.

With regard to the HCV seroprevalence among pregnant women, the studies conducted in Kinshasa, in the western DRC, were performed more than 15 years ago. One such study demonstrated a 4.3% seroprevalence rate,⁷ and another reported a 1% prevalence.⁸ Kabinda et al.⁶ recently reported a 4.1% seroprevalence rate in the eastern DRC. The results of these studies are in line with our own findings (4.8%), except for the study conducted by Liu et al.⁸

A systematic review and meta-analysis of HCV²⁰ reported a 2.9% seroprevalence with respect to the pooled seroprevalence, consisting of 3.3% among pregnant women and 2.7% among blood donors. A comparison of our results with a systematic review and meta-analysis that concerned pregnant women in Africa, which involved 58 studies from 30 countries, reveals a lower prevalence of 3.4%.²¹ Our results suggest the possibility of persistent ongoing infection in our region of the DRC, which is probably due to the use of unsafe injections and unsterile equipment in remote health facilities. This hypothesis can be supported by the 13.7% seroprevalence rate among members of the uniformed services in Kinshasa,²² which can probably be explained by the use of unsafe medical practices during missions. A study by Laurent et al.⁷ have also demonstrated a non-difference in the HCV seroprevalence rates between pregnant women and commercial sex workers (CAW) (4.3% versus 6.6%). A difference can be observed when comparing this figure to the HIV seroprevalence (2.8% versus 34.1%). This suggests that HCV is less likely to be transmitted through sexual routes than through other transmission routes, including the use of unsterilized materials in health facilities.

In our population, HBV knowledge proved to be very limited. Only 6.8% of pregnant women reported that they had heard of HBV, and most participants did not have any information about HBV. In addition, these women did know nothing about possible HBV transmission routes, including mother to child, nor did they know that the disease could, in fact, be prevented. Only three pregnant women reported having been tested, and 98.5% said that they had not previously been offered a test. The same results were found in Cameroon,²³ Nigeria,²⁴ and Ghana.²⁵ Conversely, in Uganda, about two-thirds of pregnant women reported having heard about HBV.²⁶ This result directly relates to the population apart from health facilities. During antenatal care, health education

TABLE 2
Participant characteristics

Variable	Number	Percentage
Age (years)		
Less than 20	64	14.0
20–24	119	26.0
25–29	85	18.6
30–34	98	21.4
35–39	65	14.2
> 39	26	5.7
Education		
No formal education	51	11.2
Attended primary school, but no certificate	75	16.4
Six years of primary school with certificate	4	0.9
Attended secondary school, but no diploma	190	41
Six years of secondary school	127	27.8
University/college	10	2.2
Marital status		
Unmarried	35	7.7
Married	421	92.1
Widowed	1	0.2
Gravida		
Primigravida	95	20.9
Multigravida	362	79.1
Abortion		
Yes	353	77.2
No	104	22.8
Past history of surgery		
Yes	61	13.3
No	396	86.7
Blood transfusion		
Yes	34	7.4
No	423	92.6

TABLE 3
Knowledge of participants on hepatitis B

	Frequency	Percentage
Knowledge		
Yes	31	6.8
No	426	93.2
Source of information		
Previous antenatal care	0	–
Radio	3	0.7
Church	0	–
Health facilities	21	4.6
Newspaper	1	0.2
Friend	7	1.5
School	5	1.1
Knowledge of route of infection		
Sexual intercourse	6	1.3
Mother-to-child transmission	2	0.4
Blood substance: injections	4	0.9
Spiritual or witchcraft	0	–
Reported period of MTCT		
During pregnancy	2	0.4
During labor/delivery	1	0.2
During breastfeeding	1	0.2
Knowledge of existence of PMTCT	1	0.2
Knowledge of prevention means		
ARV to mother	1	0.2
Vaccine to child	1	0.2
Avoid breastfeeding	2	0.4
Test in the past		
Yes	3	0.7
No	454	99.3
Why not tested in the past?		
I am not at risk	7	1.5
I have not been offered a test	450	98.5
The result may be known	0	–
My husband refuses	0	–

topics include HIV infection, malaria, and nutrition for pregnant women, whereas HBV and HCV are not included. This could explain the fact that midwives or nurses who are committed to antenatal care may exhibit limited knowledge of HBV and HCV. In addition, women in rural regions are likely to be less educated, and their access to health information is more limited.

Interventions to improve women's knowledge about HBV and HCV and about PMCT should be implemented as soon as possible based on well-known guidelines. Such interventions already exist in other parts of Africa. Thus, existing materials could be easily adapted and applied to rural areas of the DRC. Interventions are likely to be cost-effective, given that 90% of infants who are exposed to HBV progress to a chronic infection,²⁷ although such progression is preventable.

To the best of our knowledge, specific guidelines addressing mother-to-child HCV transmission do not exist to date. However, identifying infected pregnant women and implementing existing treatments are to be considered a distinctive opportunity to reduce HCV-related morbidity and mortality rates.

CONCLUSION

Hepatitis B and HCV infections exist among pregnant women in the rural Vanga region, and these women exhibit very limited knowledge of these infections (Table 3). All pregnant women should be screened during antenatal care, and a well-implemented program of management is urgently needed.

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