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Preliminary study of seroprevalence and risk factors for hepatitis B infection in pregnant women in Lubumbashi, Democratic Republic of the Congo

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Abstract

Background: Hepatitis B virus (HBV) infection, defined as positivity for hepatitis B surface antigen (HBsAg), remains a public health problem nationally and globally. The objective of this study was to determine the seroprevalence and risk factors for HBV infection in pregnant women in the city of Lubumbashi.
Methods: Cross-sectional study of the 269 pregnant women received at Shalina Polyclinic in Lubumbashi. HBV screening was performed by the PCR technique (using the COBAS TaqMan 48 controller). The chi-square test and the calculation of the odds-ratios with 95% Confidence Intervals were used with the significance level set at $p < 0.05$.
Results: The mean age of pregnant women was 30.0 ± 5.34 years (range, 17 to 44 years). The majority of them were unemployed (98.51%) and married (99.25%). All pregnant women were unaware of their HBV serologic status and had not been vaccinated against HBV. Eighteen (6.69% [95% CI: 4.01-10.37%]) participants had HBsAg positive and four (1.48% [95% CI: 0.41-3.76%]) were HIV-positive. The highest prevalenc
Results: The mean age of pregnant women was 30.0 ± 5.34 years (range, 17 to 44 years). The majority of them were unemployed (98.51%) and married (99.25%). All pregnant women were unaware of their HBV serologic status and had not been vaccinated against HBV. Eighteen (6.69% [95% CI: 4.01-10.37%]) participants had HBsAg positive and four (1.48% [95% CI: 0.41-3.76%]) were HIV-positive. The highest prevalence of hepatitis B was observed in the age group between 31-40 (10.53%), single (50%), women with paying occupation (25%) and diabetes mellitus (14.29%) and a history of surgery (14.29%) with no statistically significant difference ($p>0.05$). However, HBV was significantly higher in HIV-positive pregnant women, who presented a risk of nearly 9-fold higher (50% versus 6.04%; OR adjusted: 8.89 [1.04-76.09]) compared to HIV-negative pregnant women.
Conclusion: Our study shows that hepatitis B is a public health problem among pregnant women in the city of Lubumbashi. The history of HIV infection is independently associated with HBV infection in this context.

Keywords: hepatitis B disease; pregnant women; Lubumbashi, DRC; risk factors

Introduction

Infection with the hepatitis B virus (HBV) remains a public health problem nationally and globally. The World Health Organization (WHO) estimates that 257 million people live with hepatitis B virus infection (defined as positivity for HBsAg antigen (HBsAg) surface area of hepatitis B) [1].

In 2015, 887,000 people died of hepatitis B infection, including cirrhosis and liver cancer [1]. In Africa, the prevalence of hepatitis B infection ranges from 7% to 20% [2, 3]. In the Democratic Republic of Congo (DRC) in general, and in the city of Lubumbashi in particular, few epidemiologi

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cal studies are available on estimates of the prevalence of HBsAg. A recent study conducted in Lubumbashi on blood donors at a teaching hospital showed that HBV seroprevalence was 8.01% (6.02-10.56%) [4]. Mother-to-child transmission of hepatitis B virus (HBV) is responsible for more than a third of chronic viral hepatitis infections [5] and is the main mode of transmission in high-prevalence in Africa [6]. HBV infection occurring during the perinatal period presents a risk of progression to chronic liver disease in more than 90% of cases [7]. Despite the importance of mother-to-child trans- mission of HBV, the diagnostic test for HBV infection is not part of routine in Lubumbashi clinics. To our knowledge, data on the prevalence of HBV infection among pregnant women in the DRC, and particularly in the city of Lubumbashi, are very rare and risk factors are not known. The objective of this study was to determine the seroprevalence and risk factors for HBV infection in pregnant women at the Lubumbashi Shalina Polyclinic

Methods

This is a cross-sectional study conducted at the polyclinic Shalina Lubumbashi (DRC). From 1st January to 31th December 2016, sera were collected from 269 pregnant women (after obtaining their free and informed consent) who consulted the antenatal care service of the Polyclinic Shalina. These blood samples were taken as part of a pregnancy check to screen for HBV surface antigen (HBsAg) and HIV. Blood samples were collected in sterile EDTA tubes. In addition to blood sampling, epidemiological data on age, marital status, occupational occupation, medical history (diabetes mellitus) and past surgeries (appendectomy, caesarean section, myomectomy, etc.) were collected using a pre-established form. Participation in this study was therefore entirely voluntary.

HBV screening was performed by PCR (using the COBAS TaqMan 48 controller). HIV serology was determined by rapid HIV antibody testing according to the recommended WHO/UNAIDS algorithm II [8]. Determine™ HIV-1/2 (Abbott lab, Japan) was the first screening test used and when it returned positive, the sample was re-tested with Uni-Gold HIV (Trinity Biotech PLC, Wicklow, Ireland). HIV-positive pregnant women have been cared for according to the recommendations of the National HIV PMTCT Program [8]. To determine the risk factors for HBV infection, a multivariate analysis was performed. Significant variables ($p \leq 0.20$) in univariate analysis were introduced in the multivariate model. A value of $p<0.05$ was statistically significant. The odds ratio (RC) was presented with a 95% confidence interval (95% CI).

Results

A total of 269 pregnant women were recorded in this study. The average age was 30.0 ± 5.34 years (range: 17 to 44 years). The majority of these participants were unemployed (98.51%) and married (99.25%). All pregnant women were previously unaware of their serologic status with HBV and the notion of previous vaccination against HBV. A total of 18 (6.69% [95% CI: 4.01-10.37%]) pregnant women had HBsAg positive and 4 (1.48% [95% CI: 0.41-3.76%]) were HIV-positive. Of these, 2 (11.11%) had HBV-HIV coinfection.

Multivariate analysis in **Table 1** was conducted to determine independent risk factors for HBV infection. Neither age, occupation, marital status, history of diabetes, nor history of surgery were significantly associated with HBV infection. In contrast, HIV infection was significantly associated with HBV (adjusted OR = 8.89 [95% CI: 1.04-4.09.09]).

Table 1. Socio-demographic characteristics and background of 269 pregnant women screened				
Variable	Total (N=269)	HBsAg positive (n=18)	HBsAg negative (n=251)	p
Age				0,1526
≤20 years	11	1 (9,09%)	10 (90,91%)	
21-30 years	139	5 (3,60%)	134 (96,40%)	
31-40 years	114	12 (10,53%)	102 (89,47%)	
>40 years	5	0 (0,00%)	5 (100%)	
Marital status				0,2983
Single	2	1 (50,00%)	1 (50,00%)	
Married	267	17 (6,37%)	250 (93,63%)	
Professional Occupation				0,1398
Unemployed	265	17 (6,42%)	248 (93,58%)	
Employed	4	1 (25,00%)	3 (75,00%)	
Diabetes mellitus				0,4151
Present	7	1 (14,29%)	6 (85,71%)	
Absent	262	17 (6,49%)	245 (93,51%)	
HIV serostatus				0,0234
Positive	4	2 (50,00%)	2 (50,00%)	
Negative	265	16 (6,04%)	249 (93,96%)	
Surgical History				0,1469
Present	21	3 (14,29%)	18 (85,71%)	
Absent	248	15 (6,05%)	233 (93,95%)	

Table 2. Risk factors for HBV infection		
Variable	Crude OR, [95% CI]	Adjusted OR [95% CI]
Age >30 years	2,69 [0,97-7,40]	2,50 [0,88-7,09]
Employed	4,80 [0,17-47,60]	3,00 [0,23-39,34]
HIV serostatus positive	15,14 [1,49-153,37]	8,89 [1,04-76,09]
History of surgery	2,57 [0,55-9,20]	2,22 [0,53-9,17]

Discussion

The information gathered by this study on seroprevalence and factors associated with HBV infection in a hospital institution in the city of Lubumbashi(DRC) may help to improve knowledge about the epidemiology of HBV infection in pregnant women in the city and to inform local and national policies of HBV screening and infant vaccination policies.

We found that 6.69% of pregnant women were infected with HBV in our series. According to WHO, the prevalence of HBV in pregnant women

in this study is classified as intermediate (2-7%) [9]. The seroprevalence found in this study is compara ble to 6.5% that were recorded in Brazzaville (Republic of Congo) [10]. Conversely, it is lower than those reported in several sub-Saharan Africa countries: 9.3% in Kenya [11], 9.5% in Gabon [12], 10.2% in Cameroon [13], 10.7 % in Burkina Faso [14], 10.9% in Mauritania [15], 12.6% in Ghana [16], 13.8% in Senegal [17], 15.5% in Mali [18] and 25% in Zimbabwe [19]. This difference for some may be related to climate [20], but more likely to local epidemiology, including very early contamination in life [18].

The prevalence of HIV infection and HIV/HBV co-infection was 1.48% and 0.74%, respectively. This co-infection rate is comparable to the 0.74% found in Yaoundé (Cameroon) [20] and 0.88% reported in Burkina Faso [22]. But it is well below 1.3% in northwestern Ethiopia [23], 1.5% in northern Came roon [13] and 4.2% in Nigeria [24]. We found that HIV infection was strongly associated with HBV infection in our study population, HIV-infected women were over eight times more likely to be co-infected with HBV than those who were not HIV infected (ORa = 8.89 [95% CI: 1.04-76.09]). This finding is consistent with previous studies with women [13]. This could be explained by the fact that HBV and HIV share common modes of transmis sion. In addition, HIV-HBV co-infection has been reported to facilitate HBV replication and reactivity leading to higher levels of HBV DNA and reduced spontaneous clearance of the virus [25].

In our study, socio-demographic characteristics were evaluated to determine if they were associated with HBV acquisition risk (**Table 2**). This included age, marital status and occupation. We did not find a statistically significant association between any of these factors and the risk of HBV infection in our study subjects. This finding is consistent with reports from other studies [13, 21]. We also found that a history of surgery and diabetes was not associated with an increased risk of HBV infection, as reported in previous studies in pregnant women [13, 21].

Nevertheless, our study has limitations. First, we used rapid diagnostic tests that were less sensitive than ELISA or PCR [26], which may underestimate the prevalence of HIV infection. In addition, we investigated HBV infectivity only for HBsAg and did not search for HBe antigen, HBeAg, and HBV viral load, which are also important determinants of HBsAg transmission. Despite these shortcomings, this study provides relevant information in the context of very limited epidemiological data on HBV infection in Lubumbashi, particularly among pregnant women.

Conclusion

Our study shows that hepatitis B is a public health problem among pregnant women in the city of Lubumbashi. The history of HIV infection is independently associated with HBV infection in this context. Certain socio-demographic characteristics such as age, marital status and professional activities as well as certain pathological history such as diabetes and previous surgery could directly or indirectly constitute risk factors; this would need to be confirmed or not by other more in-depth studies. The fact that pregnant women test positive for HBsAg justifies an effective treatment and a systematic serological survey in the family circle.

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