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Prevalence of Serologic Markers and Risk Factors for Hepatitis B Virus among Pregnant Women in Brazzaville, Congo

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Abstract: ***Background: Viral hepatitis B is widespread globally and fetomaternal infection transmission is a major public health problem. Few studies are available on HBV vertical transmission infection in Brazzaville. The purpose of this study was to investigate the prevalence of HBV markers and risk factors in pregnant women. Methods: A cross-sectional study was carried out from January to September 2014 among pregnant women attending antenatal clinics in Brazzaville. Relevant demographics and infectious risk factors were obtained. HBV serological markers were evaluated for HBsAg, HBeAg, anti-HBe, anti-HBs, anti-HBc using an enzyme-linked immunosorbent assay. Results: Of a total of 437 women tested, 38 were positive for HBsAg (8.7%), 15 (3.4%) HBeAg, and 41 (9.4%) for AcHBe. The anti-HBs and anti-HBc were positive in 96 (22%) and 287 (65.7%) cases respectively. The main significant risk factors were: piercings (adjusted OR = 3.16, 95% CI: 1.48-6.73), risky sexual behavior (AOR = 45.32, 95% CI: 3.22 to 638.47), family history (AOR = 2.17, 95% CI: 1.07-4.12) and scarification (AOR = 3.84, 95% CI: 1.53-9.66). Conclusion: Our results show a high frequency of HBV infection markers in pregnant women in Brazzaville. Screening for HBV and systematic implementation of vaccination programs should be considered in pregnant women to prevent HBV vertical transmission.***

Keywords: Hepatitis B virus, markers, risk factors, pregnant women, Brazzaville

1. Introduction

Hepatitis B is a leading cause of chronic infection worldwide, with over 350 million people chronically infected and about 600.000 people die each year [1]. Global prevalence of Hepatitis B virus (HBV) infection is distributed in three areas in the world of high (≥8%), intermediate (2-7%) and low (<2%) [2]. In the Republic of Congo, the prevalence of HBsAg is high, with rates oscillating between 6.5% to 17% in the general population and depending on the departments [3-6].

Hepatitis B virus (HBV) has clinical and obstetrics significance due to the fact that HBV during pregnancy is not only associated with the high risk of maternal complications but also a high rate of vertical transmission causing fetal and neonatal hepatitis [7]. This perinatal transmission of HBV causes serious long-term sequelae among children [8]. Children born to seropositive mothers for the surface antigen of hepatitis B (HBsAg) and hepatitis B e antigen (HBeAg) have between 70 to 90% of perinatal risk of acquiring infection by HBV. However, 85-90% of them end up becoming chronic carriers of the disease; in contrast to risk of 10-40% in infants born to mothers who are HBsAg positive but negative for HBeAg [9, 10].

A chronic HBV carrier have an increased risk of life to die from hepatocellular carcinoma and liver cirrhosis (25% risk) and continues to remain the main reservoir of HBV transmission [11]. Some of them eventually become mothers themselves, perpetuating the cycle [12]. Many recent data are available on the epidemiology of HBV in pregnant women and evaluation of perinatal transmission in different countries in Africa [13, 14]. However, few data on HBV carrying markers are available from Congo those existing are old [5].

Since HBV leads to serious consequences, it is important that epidemiology should be reviewed continuously. This study was conducted in Brazzaville, Republic of Congo, to investigate the prevalence and risk factors for HBV markers in pregnant women in order to target preventive measures.

2. Methods

2.1. Study Design and Setting

This study was conducted in Brazzaville, the administrative capital city of the Republic of Congo. A cross-sectional study was carried out from January to September 2014 among pregnant women attending antenatal clinics. It concerned health center BISSITA, Jeanne Vialle, Marien Ngouabi and CHU of Brazzaville. The choice of these

different centers was made according to the geographical location.

2.2. Study Population

We included women with confirmed pregnancy that provided written informed consent to participate in the study. Pregnancy was confirmed by one of the following means: positive pregnancy test (urine or serum B-HCG); Ultrasound: invigorating; and the presence of fetal heart. After obtaining signed informed consent of participants in the study, relevant demographics and infectious risk factors were obtained through anonymous questionnaires completed by trained midwives.

HBV serological markers were evaluated for HBsAg, hepatitis B e antigen (HBeAg), antibody against hepatitis B e antigen (anti-HBe), hepatitis B surface antibody (anti-HBs) and hepatitis B core antibody (anti-HBc). We used a commercial enzyme-linked immunosorbent assay (ELISA) kit (Bio-Rad Laboratories, Marnes La Coquette, France) according to the manufacturer's instructions.

2.3 Statistical Analysis

The data were organized and analyzed using the Epi-Info program, version 7.0. In the bivariate analysis explanatory variables with p-value less than or equal to 0.2 were included in a logistic regression. Odds ratio (OR) and their 95% confidence intervals (CI) were calculated. The results were considered statistically significant at $p < 0.05$.

2.4 Ethical Considerations

Each participant signed a consent letter at the beginning of the investigation and had the opportunity to stop participating at any stage of the process. All results were returned to the subjects, and participants who were detected as HBs antigen carriers were referred to specialists for treatments. The study was approved by the local ethics committee on research in the health sciences in Congo.

3. Results

A total of 437 pregnant women were included. The mean age of women was 29.31±7.67 years (range 15-45 years), medium-term pregnancy was 21.49±13.31 weeks of amenorrhea and the average parity of 1.25 ± 1.35 (range 0-5 parities).

Out of the 437 women tested, 38 were positive for HBsAg (8.7%; 95% CI: 6.30-11.84), 15 for HBeAg (3.4%; 95% CI: 2.00-5.73), and 41 for AcHBe (9.4%; 95% CI: 6.86-12.61). Search for HBsAb and AcHBc were positive in 96 (22%; 95% CI: 18.23-26.21) and 287 (65.7%; 95% CI: 60.99-70.08) cases respectively (Table 1).

All results of univariate analysis of socio-demographic characteristics or risk factors for viral transmission are summarized in Table 2. Our finding showed that, the frequencies of all studied markers were high in younger women aged than lower 30 years, in multiparity and married; however no significant differences were found between these variables and HBV infection ($p>0.05$).

In add no correlation was found between HBV infections with abortion, tattoos, history of surgery and dental surgery. In univariate and multivariate analyzes wearing piercings (adjusted OR = 3.16, 95% CI: 1.48-6.73), risky sexual behavior (adjusted OR = 45.32, 95% CI: 3.22 to 638.47), family history (adjusted OR = 2.17.95% CI: 1.07-4.12) and scarification (adjusted OR = 3.84, 95% CI: 1.53-9.66) were significant risk factors ($p < 0.05$) (Table 3).

4. Discussion

Brazzaville, capital city presents a socio-cultural diversity of the country and the number of immigrants is very high. The prevalence of HBV markers was very important in the population of pregnant women in Brazzaville, 78.3% (342) women had at least one marker of HBV. This is similar to the study made by Itoua-Ngaporo et al. with HBV carrying 57.8% among pregnant women in Brazzaville [5]. This data confirms that the Congo is countries with high prevalence of HBV country and high risk of vertical transmission [2].

The prevalence of HBsAg was 8.7%, high prevalences were observed in similar studies, 8.0% in Mali [10], 9.6% in Republic of Congo [6], 16.6% in Niger [15] and lower prevalences were observed in Ethiopia [16] with 3.2% and 5.6% in Sudan [17].

Anti-HBc was detected in 208 (65.7%) pregnant women similar prevalences high were observed in Brazzaville with 57.8% [18] ; 81.6% in Cote d'Ivoire [19], 61% in Zimbabwe [20] and lower, 5% in Spain [21]; 33% South Africa [22]. Geographical differences, local epidemiology, cultural practices including contamination at a very early in life may explain the variation in HBV prevalence of these markers in pregnant women from different countries.

In our series, 3.4% of women positive for HBeAg, low prevalences were also detected in HBsAg positive pregnant women in some countries, in Ethiopia (<1%)[23], Nigeria (1.39%)[24] and by against the highest prevalences were found in other parts of South and Southeast Asia, where prevalence of HBeAg varies 15% - 88% is reported in young women [11, 25, 26]. This difference was largely due to the natural history of HBV infection in Southeast Asia where infected individuals carry HBeAg and high viral load in the age groups that include most of the gestational age women [7, 27]. The risk of transmission of HBV from mother to child depends on the importance of viral replication. It has been estimated at more than 90-100% if HBe antigen (HBeAg) is detected in maternal serum. The presence of HBeAg was also associated with a high risk of failure in neonatal prevention [9]. However, even in the absence of HBeAg, HBV transmission risk exists and interpretation of the absence of HBeAg must consider the possibility of viral replication in asymptomatic carriers and at viral gene mutation C, high viremia then being possible [28, 29].

In this study, the prevalence of markers was majority among women 30 years with 40% and the different age groups were less significant, similar results were found in Nigeria and

Yemen [30, 31]. Many studies confirm the high rate of infection at birth or during early childhood especially in high prevalence areas [9, 11].

During this work no link was observed in porting markers with parity, marital status, occupation, education, a history of abortions and blood transfusion. Some studies report a link between abortions as risk factors and multiparous women may be more at risk than nulliparous women [9, 32, 33]. In part, this may be due to the increasing adoption of universal precautions by medical staff because of pandemics HCV, HIV, in which all patients are treated as potentially infectious and therefore precautions are taken to minimize the risk of transmission because they share similar modes of transmission [12, 33] .Blood transfusion was not a significant risk factor for HBV, because HBV testing is performed in all blood donors and excluding those testing positive [16].

HBV is transmitted through blood and other body fluids, including semen and saliva. HBV is present in all body fluids, we found a link between the carriage of different markers in the family antecedent (OR=2.17.95%CI:1,07-4.12), percing (OR=3.16, 95%CI:1.48-6.73), scarification (OR=3.84, 95%CI:1.53-9.66), multiple partners (OR= 45.32, 95%CI:3,22-638,47). These data are similar to studies conducted in Ethiopia [9, 16, 34]. Sexual transmission has long been recognized as a major source of HBV transmission in all regions of the world [35-37]. This high prevalence of markers suggests that vertical transmission may be a very important means of transmission of HBV, the inclusion of newborn was ideal.

5. Conclusion

The prevalence of serological markers of hepatitis B was higher in our study, which confirms the high risk of perinatal transmission. Thus, strategies must be developed to prevent this, including routine screening of pregnant women and the implementation of vaccination programs for newborns. Future studies are desirable to assess the situation at national level.

6. Competing Interests

The authors declare that they have no competing interests.

7. Authors' Contributions

Study conception and design: BMA, DM, CI, ABD, JRI. Data acquisition: BMA, CI. Data analysis and interpretation: BMA, LMAB, GA, CI, ABD. Critical discussion and manuscript revision: BMA, LMAB, DM, CI, ABD, JRI, GA, MME. All the authors approved the final version of the manuscript.

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Table 1: Prevalence of hepatitis B markers detected in Pregnant women in Brazzaville, Congo 2014 (n=437).

Serological markers	n	%	95% CI
HBsAg	38	8.7	6.30-11.84
HBeAg	15	3.4	2.00-5.73
Anti-HBe	41	9.4	6.86-12.61
Anti-HBs	96	22	18.23-26.21
Anti-HBc	287	65.7	60.99-70.08

Table 2: Characteristics and their relation to the prevalence of HBV serological markers among pregnant women in Brazzaville, Congo 2014 (n=437).

Characteristics	HBV +ve	HBV -ve	OR (95% CI)	P-value
Age				
15-20	68(19.9)	29(30.5)	0.85(0.37-1.98)	0.712
21-30	160(46.8)	38(40.0)	0.48(0.21-1.06)	0.070
31-40	92(26.9)	17(17.9)	0.37(0.15-0.89)	0.028
40-45	22(6.4)	11(11.6)	1(Reference)	
Pregnancy stage				
1° trimester	113(33.0)	35(36.8)	0.52(0.27-1,02)	0.061
2° trimester	137(40.1)	45(47.4)	1.06(0.64-1.76)	0.821
3° trimester	92(26.9)	15(15.8)	1(Reference)	
Parité				
Primiparity	122(35.7))	37(38.9)	1.15(0.72-1.84)	0.641
Multiparity	220(64.3)	58(61.1)	1(Reference)	
Education				
University	59(17.3)	20(21.1)	1.36(0.51-3.58)	0.539
High	154(45.0)	35(36.8)	0.91(0.37-2.25)	0.837
Primary	101(29.5)	33(34.7)	1.31(0.52-3.27)	0.567
No school	28(8.2)	7(7.4)	1(Reference)	
Marital status				
Married	200(58.5)	53 (55.8)	0.89(0.57-1.42)	0.639
Unmarried	142(41.5)	42(44.2)	1(Reference)	
Occupation				
student	73(31.4))	25(26.3)	1.07(0.59-1.92)	0.833
professionnel	41(11.9)	16(16.8)	1.21(0.61-2.42)	0.581
military	17(4.9)	4(4.2)	0.73(0.23-2.32)	0.596
laborer	99(28.9)	14(14.7)	0.44(0.22-0.86)	0.017
unemployed	112(32.8)	36(37.9)	1(Reference)	

HBV, Hepatitis B virus; OR, odds ratio; −ve, negative; +ve, positive; CI, confidence interval

Table 3: Univariate and multivariate analyses for risk factors of HBV among pregnant women in Brazzaville, Congo 2014 (n=437)

Risks factors	HBV +ve	HBV -ve	COR (95% CI)	AOR (95%)	P-value
Abortion					
Yes	55(16.1)	15(15.8)	1.02(0.55-1.90)	1.16(0.59-2.27)	0.665
No	287(83.9)	80(84.2)	1(Reference)	1(Reference)	
Blood Transfusion					
Yes	18(5.3)	3(3.2)	1.70(0.49-5.91)	1.58(0.43-5.82)	0.485
No	324(94.7)	92(96.8)	1(Reference)	1(Reference)	
Tattooing					
Yes	14(4.1)	6(6.3)	0.63(0.24-1.69)	0.467(0.07-2.97)	0.421
No	328(95.9)	89(93.7)	1(Reference)	1(Reference)	
History of surgery					
Yes	23 (6.7)	8(8.4)	0.78(0.34-1.81)	1.31 (0.27-6.42)	0.739
No	319 (93.3)	87(91.6)	1(Reference)	1(Reference)	
Familial antecedent					
Yes	152 (44.4)	17(17.9)	3.67(2.08-6.47)	2.17(1.07-4.12)	0.032
No	190 (55.6)	78 (82.1)	1(Reference)	1(Reference)	
Percing					
Yes	119(34.8)	10(10.5)	4.54(2.27-9.06)	3.16(1.48-6.73)	0.003
No	223(65.2)	85(89.5)	1(Reference)	1(Reference)	
Risky sexual behavior					
Yes	87(24.4)	5(5.3)	6.14 (2.42-15.61)	45.32(3.22-638.47)	0.005
No	255(74.6)	90(94.7)	1(Reference)	1(Reference)	
Scarification					
Yes	88(25.7)	7(7 .4)	4.36 (1.94-9.76)	3.84(1.53-9.66)	0.004
No	254(74.3)	88(92.6)	1(Reference)	1(Reference)	
Dental surgery					
Yes	24(7.0)	7(7.4)	0.949(039-2.27)	1.67 (0.46-6.05)	0.432
No	318(93.0)	88(92.6)	1(Reference)	1(Reference)	

HBV, Hepatitis B Virus; A. OR, Adjusted odds ratio; C. OR, Crude odds ratio; −ve., Negative; +ve, positive.

Author Profile

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