Seroprevalence of hepatitis B surface antigen among pregnant women attending the Hospital for Women & Children in Koutiala, Mali

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Objective. To establish the rate of seroprevalence of the hepatitis B surface antigen in pregnant women in south-eastern Mali, and to decrease mother-to-child transmission.

Methods. In a descriptive cross-sectional comparison study, 3 659 pregnant women attending a non-governmental hospital in Koutiala, Mali, during 2008 and 2009 were screened for the hepatitis B surface antigen during antenatal clinic attendance or when admitted for delivery. A chart review compared the hepatitis B virus (HBV)-positive women to HBV-negative women used as controls to identify potential risk factors for HBsAg positivity. The variables compared were age, parity, type of genital excision, birthweight of baby and HIV status.

Results. A total of 293 (8.0%) pregnant women tested positive for HBsAg. Their average age was 27.6 years, average parity of 2.8 births, 90% had Type 2 genital excision, 21% had low-birthweight infants, and 14 (0.4%) women also tested positive for HIV. Infants born to HbsAg-positive women were immunised with the hepatitis B vaccine in the delivery room. Two hundred and eighty-four HBV-negative women were compared with the HBV-positive women. None of the differences of means or relationships was statistically insignificant.

Conclusion. In view of the high endemicity and lack of easily identifiable risk factors, free maternal HBV screening should be provided to all women in Mali, and the infants born to HBsAg-positive women should be immunised within 12 hours of birth.

S Afr Med J 2012;102:47-49.

The hepatitis B virus (HBV) is estimated to chronically infect 350 million people worldwide,[1] of whom 65 million live on the African continent. Sub-Saharan Africa has a high endemicity, and more than 50 million people are believed to be chronic carriers of the HBV.[2] HBV is resistant to breakdown, can survive outside the body, and is easily transmitted through contact with infected body fluids.[3] The prevalence of chronic hepatitis B infection varies greatly around the world and is closely associated with the main routes of HIV transmission.[4] Modes of transmission of hepatitis B vary, since the virus is present in blood, saliva, semen, vaginal secretions, menstrual blood, and in smaller quantities in perspiration, breast milk, tears and urine of the infected individual. Worldwide, HBV is predominately transmitted perinatally.[5,6] Age at infection and risk of chronicity are inversely correlated;[7,8] 90% of infants born to a mother who is HbeAg-positive (core-associated antigen) will become lifelong HBV carriers[6] whereas less than 5% of immunocompetent adults become carriers. Perinatally-acquired chronic hepatitis B infection is linked to cirrhosis, hepatic carcinoma, glomerulonephritis and end-stage renal disease in children.[7,9]

From women who are seropositive for both HBsAg (surface antigen) and HBeAg (core-associated antigen), vertical transmission approaches 90%.[10] Universal maternal screening and newborn immunisation can drastically reduce perinatal transmission rates,[6] by vaccination of infants within 12 hours of birth with hepatitis B vaccine as well as with anti-viral therapy in late pregnancy.[1,11] Use of only the hepatitis B vaccine to prevent vertical transmission has been supported in remote areas of the world.[12,13] Given the impracticality of screening all pregnant women and the unavailability of the hepatitis B immune globulin (HBIG) in many developing countries, the use of the hepatitis B vaccine alone is recommended and considered appropriate treatment to prevent many cases of HBV during the perinatal period – the period of highest risk of chronicity.[14]

In 2008, the staff at the Hospital for Women and Children in Koutiala, Sikasso Region, south-eastern Mali, began screening pregnant women for hepatitis B and to immunise newborn infants born to women who tested positive for HBsAg. The prevalence rate data of HBsAg in Malian pregnant women in this paper are part of a larger ongoing hepatitis B prevention programme targeting infants for immunisation against hepatitis B on the first day of life.

Hepatitis B global infection rates published at www.pkids.org indicate that Mali has a 15.5% prevalence of HBV. The research literature in the last 10 years revealed few studies on the prevalence of hepatitis B in Mali in any population. A study of 11 592 blood donors in Bamako, Mali's capital city, screened during 2001 and 2002, revealed a prevalence of HBsAg of 14.9%.[15] Another study of 25 543 blood donors in 2007 revealed a slightly lower prevalence of 13.9%.[16] A screening of 152 medical students in Bamako revealed an HBsAg of 56%.[17] Only one study of pregnant Malian women and HBV prevalence was found in the literature. Data for that study were gathered in the late 1990s from 829 pregnant women in Bamako and revealed that 15.5% had the serologic marker for the HBsAg.[18] A recent HBV prevalence rate among pregnant women living outside Mali's capital city is unavailable.

Methods

A descriptive comparative cross-sectional design guided this study. Ethical review and approval were received from the administration of the Koutiala Hospital for Women and Children and the Human

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Research Committee at Malone University, Canton, Ohio, USA. The importance of screening was explained to each woman at her first antenatal visit. HBV screening was explained to women who had not had antenatal visits at the hospital upon arrival at the maternity department for delivery. Consistent with Malian governmental guidelines, verbal consent was obtained before screening, and all results were kept confidential.

Women who came to antenatal clinic and consented to screening were directed to the hospital's laboratory. Women who tested HBsAg-positive during antenatal consultations were encouraged to return to the study-site hospital for delivery and immunisation of the newborn during its first hours of life. Women admitted to the hospital during labour without prior screening had their blood drawn in the delivery room after giving consent. SD BIO Standard Diagnostic India was used for the serum/plasma tests conducted in the laboratory, and Vikia Brasil Biomerieux was used for the serum/plasma/whole blood tests done in the delivery room.

Data collection and analysis

Data of women screened in 2008 and 2009 were included. A chart review of the women who were found to be HBsAg-positive was conducted and the following variables noted: age, parity, type of genital excision, birthweight of baby, and HIV status. Genital excision is noted as a potential risk factor for hepatitis B transmission.[19,20] (A description of the types of genital excision can be found at the World Health Organization website.) HIV positivity – a noted risk factor for HBV infection – was only available for the HBV-positive women, and therefore a comparative analysis of the HIV variable was not done.

A comparison group of HBsAg-negative controls was included in the study by virtue of a random sample of charts of women who gave birth at the same hospital during the same years. To randomise the comparison sample, every 12th woman in the birth registry was chosen; if the randomly selected woman happened to be one who was HBsAg-positive, the chart of the next woman on the list was retained. SPSS version 18.0 was used for analysis of frequencies, means, chi-squares, *t*-tests, and analysis of variance.

Results

From May 2008 to end December 2009, 3 659 pregnant women were screened for HBsAg; 293 (8.0%) tested positive; 14 (0.38%) HBsAg-positive women were co-infected with HIV. Table I illustrates frequencies of descriptive variables of the sample, comparing HBV-positive and HBV-negative women. The women who screened positive for HBsAg were not demographically different from the HBsAg-negative women who gave birth during the same timeframe, and were randomly sampled from the birth registry. There was no statistically significant association between HBsAg positivity and the type of excision the woman had experienced (chi-square 5.233, df 3, p=0.155). The women who tested positive for HBsAg were almost the same mean age as the HBsAg-negative women (27.6 and 25.9 respectively) and had only a slightly lower number of pregnancies (2.8 and 3.1 respectively). The differences of means and their statistical significance for age, parity, and birthweight of baby comparing HBV-positive with HBV-negative women are displayed in Table II. None of the differences of means was statistically significant.

Discussion

The seroprevalence level of HBsAg of 8.0% in this study of Malian pregnant women was lower than the 15.5% found among pregnant women in Bamako, Mali's capital.18 The HBsAg positivity rate among pregnant women in Cote d'Ivoire was 8.5%, similar to Malian women;[21] higher than pregnant women in Sierra Leone (6.2%);[22] and lower than pregnant women in Burkina Faso (17.3%)[23] and Nigeria (11%).[24] The Malian prevalence rate is also higher than that

Table I. Frequencies of descriptive variables comparing HBV-positive women (*N*=80*) with HBV-negative women (*N*=284)

	HBV-positive women	HBV-negative women
Variable	*N* (%)	*N* (%)
Age	Mean (SD) 27.59 (6.6)	Mean (SD) 25.90 (7.2)
13 - 23	128 (45.7)	126 (44.4)
24 - 34	120 (42.9)	116 (40.8)
35 - 46	32 (11.4)	42 (14.8)
Parity	Mean (SD) 2.81 (2.7)	Mean (SD) 3.08 (2.7)
Babies' birth weights (g)*†	Mean (SD) 2 851.71 (524.4)	Mean (SD) 2 898.53 (566.1)
501 - 1 000	3 (1.6)	3 (1.1)
1 001 - 1 500	2 (1.1)	5 (1.8)
1 501 - 2 000	3 (1.6)	13 (4.7)
2 001 - 2 500	31 (16.6)	26 (9.3)
2 501 - 3 000	74 (39.6)	102 (36.6)
3 001 - 3 500	60 (32.1)	101 (36.2)
3 501 - 4 000	14 (7.5)	28 (10.0)
>4 000	0 (0.0)	1 (0.4)
Excision type‡		
Not excised	5 (3.3)	9 (3.8)
Type 1	8 (5.3)	22 (9.3)
Type 2	137 (90.1)	206 (86.9)
Type 3	2 (1.3)	0 (0.0)

*During 2009, staff stopped recording babies weighing <500 g at birth in the same birth registry as births >500 g; therefore average birth weight was higher in 2009 than in 2008.

†Data of the women who tested positive for HBV during prenatal visits in 2009 but had not yet given birth at the time of data collection were not available to include in the analysis of birth weights.

‡N≠293 for HBV-positive women because of missing chart data.

Table II. Differences of means and statistical significance of select variables for HBV-positive v. HBV-negative women

Variable	HBV+ women	HBV- women	ANOVA F statistic	*p* value
Age	25.79 (6.60)	25.90 (7.18)	0.037	0.848
Parity	2.81 (2.66)	3.08 (2.70)	1.429	0.233
Babies' birth weights (g)	2 851.71 (524.35)	2 898.53 (566.08)	0.812	0.368

of pregnant women in several East African countries: Sudan (5.6%),[25] Uganda (4.9%) and Rwanda (2.4%).[26] Female excision did not emerge as a risk factor for hepatitis B infection in this sample, similar to findings in Tanzania[19] and Nigeria.[27]

Since maternal screening and newborn immunisation are known to reduce perinatal transmission rates,[6] immunisation of infants born to HBsAg-positive women at the Hospital for Women and Children in Koutiala began simultaneously with the HBV screening programme in 2008. Screening continues to be offered to all pregnant women, with the goal of preventing perinatal HBV transmission. The screening fee is included in the cost of antenatal care. All babies born to women who test positive for HBsAg are vaccinated within 12 hours of birth, and this immunisation is noted in the hospital record. A large sign in the hospital's labour room reminds obstetric staff to verify each woman's HBsAg status and to give the hepatitis vaccine to the newborn when indicated. (HBIG is not readily available so it is not used in this prevention strategy per research evidence of sufficient coverage with HB vaccine alone.[14,28]) The infants who are immunised in the delivery room are subsequently tracked in the well-baby clinic where completion of the immunisation series is promoted. These same infants return for free follow-up hepatitis B screening at 9 months of age. A register with contact information is kept to telephone mothers who fail to return.

In conclusion: the 8% hepatitis B prevalence rate found is this sample of pregnant Malian women indicates a high endemicity level of HBV and a clear danger of perinatal transmission. Free screening of pregnant women in Mali is strongly recommended to spare children from the hepatitis B virus and its chronic and fatal consequences.

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Accepted 28 June 2011.