Hepatitis B Infection among Parturient Women in Peri-Urban Ghana

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Abstract. Global evidence suggests that hepatitis B viral (HBV) infection is endemic in Africa and perinatal transmission remains one of the most important modes of HBV transmission in this area. This cross-sectional survey examined the seroprevalence and knowledge of hepatitis B among pregnant women attending antenatal clinic (ANC) in a mission hospital in Ghana. Systematic sampling technique was used to recruit 196 pregnant women. The level of statistical significance was set at 0.05 alpha level. The hepatitis B prevalence estimate (hepatitis B surface antigen) was 10.2% ($N = 20$) and all of the participants were aware of HBV infection. Majority cited media (radio) as their main source of information. Approximately 86% of the participants ($N = 168$) associated HBV infection with a curse and 88.8% ($N = 174$) indicated witches and wizards as possible causes of the infection. Those with higher level of school education had high hepatitis B knowledge score ($P < 0.01$). Implementation of a health education program on the route of hepatitis B transmission is required in the study setting. Also, inclusion of hepatitis B education as part of ANC activities will enable HBV-positive pregnant women to appreciate the need for hepatitis B vaccination of their newborns at birth.

INTRODUCTION

Hepatitis B infection is a public health threat affecting about 257 million people worldwide.¹ According to the World Health Organization (WHO), sub-Saharan Africa (SSA) and Asia are disproportionately affected with a prevalence estimate of 5–10% among the adult population.² Complications associated with hepatitis B, such as cirrhosis and hepatocellular carcinoma, account for 780,000 global deaths annually.^{3,4}

Hepatitis B transmission can occur through different means;⁵ however, the most important mode of transmission particularly in SSA is perinatal transmission.^{3,6–8} Perinatal transmission is well documented to account for about 50% of the hepatitis B viral (HBV) infection in highly endemic countries.⁷ In addition, 21% of hepatitis B-related death are attributable to perinatal transmission globally,³ a situation that requires an immediate response.

Early exposure of HBV to children may present a deleterious effect on the individual later in life. Approximately 80–90% of infants infected with HBV at birth develop chronic hepatitis B infection.² However, appropriate screening of pregnant women during antenatal Care (ANC) and timely administration of hepatitis B birth-dose vaccination (within 12 hours after birth) to newborns of hepatitis B-positive mothers is effective in preventing mother-to-child transmission (MTCT) of the infection.^{2,9} Evidence suggests that 75–90% of HBV infections can be averted following neonatal immunization, with either hepatitis B vaccine alone or with hepatitis B immunoglobulin at birth.¹⁰ The vaccine has proven to be safe and effective since 1982.¹ Countries where a higher proportion (8–15%) of children before the introduction of the vaccine were developing chronic hepatitis B have observed a significant reduction of chronic infection of less than 1% among immunized children.¹ Clearly, effective implementation of

birth-dose vaccination may lead to the realization of the global target of eliminating viral hepatitis by 2030.¹¹

Hepatitis B infection is endemic to Ghana as per WHO classification (Hepatitis B surface antigen [HBsAg] $\geq 8\%$).^{3,8} This is confirmed by a recent meta-analysis that estimated hepatitis B prevalence in Ghana as 12.3%.¹² However, most prevalence studies were carried out in the urban communities,^{13–15} and a dearth of evidence exists in both peri-urban and rural Ghana. A recent study assessed physicians and midwives knowledge on MTCT of hepatitis B in Ghana,¹⁶ but little is known about the extent of knowledge of pregnant women on the disease considering their role in the prevention of MTCT. This study, therefore, sought to document the prevalence and extent of knowledge of hepatitis B among pregnant women attending ANC in a selected hospital in Ghana. The outcome of the study will inform the type of hepatitis B message to be designed for pregnant women during ANC.

MATERIALS AND METHODS

Study design. The study used a descriptive cross-sectional survey. This was appropriate because it provides snapshot information about the issue of interest.¹⁷

Study setting. Dormaa Ahenkro Municipality is located in the western part of the Brong Ahafo region. It shares borders with Jaman and Dormaa east district in the north, Sunyani municipality assembly in the east, Asunafo in the south and La Cote D'Ivoire in the west.¹⁸ The municipality has a total land area of 917 square kilometers representing 3.1% of the total land area of Brong Ahafo region.¹⁸ According to the 2010 population and housing report, about 112,111 individuals reside in Dormaa municipality. Also, the growth rate for the municipality is 3.3%. The population of women in their fertile age (15–49 years) in 2010 were 29,337 in the municipality.¹⁹ Dormaa Presbyterian Hospital where the study was conducted has a bed capacity of 172. The hospital serves as a referral facility for about 13 clinics and maternity homes in the municipality.¹⁹

Inclusion criteria. Participants were included in the study if they were pregnant and attending antenatal clinic at Dormaa

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Presbyterian Hospital and consented to participate in the study.

Exclusion criteria. Pregnant women who had a history of liver disease and were immunized against hepatitis B infection were excluded.

Sampling size and sampling method. Daniel (1999) formula for calculating sample size in prevalence studies was used to determine the required sample size for the study.²⁰ As per the calculation, a minimum of 146 participants were required; however, a larger sample size helps to detect an effect, hence, 220 participants were targeted for recruitment. Of the 220 expected, 196 accepted and participated in the study, representing an 89.1% response rate.

Furthermore, a systematic sampling technique was used to recruit participants for a period of 3 months. The systematic sampling technique was ensured by determining the standard interval between chosen samples. Data were collected until the required number of participants was recruited at the third month.

Recruitment of participants. Participants were recruited after ethical clearance was obtained from Noguchi Memorial Institute for Medical Research (approval number no. 007/15-16). In addition, permission was sought from the management of the data collection site. Participants who met the inclusion criteria were informed about the purpose of the study. Those who agreed to participate were given a consent (written) form to sign. The data were collected between May and August 2016.

Data collection tool and procedure. A structured questionnaire was used to collect participants' sociodemographic information and knowledge on hepatitis B infection. Questions such as "Have you heard of hepatitis B infection?" were asked to ascertain participants' level of awareness. Furthermore, no existing standard instrument was available to assess participants' knowledge on hepatitis B, and therefore, the researchers designed one based on the literature. The instrument had 15 questions on knowledge and participants were supposed to respond correctly to all for a total score of 15 points. A score between 0 and 5 was interpreted as poor, 6–10 as fair, and 11–15 as good.

To test the clarity of the constructs of the questionnaire, 10 pregnant women were used for pretesting. Items in the instrument that were ambiguous and difficult to understand were noted from the responses and corrected. Cronbach's alpha of the questionnaire was determined and found to be 0.76. The management of the data collection site was given prior notice 2 days to the date of data collection. Participants who could not read or write in English were given assistance to fill in the questionnaire by an interpreter (Mr. Frederick Ahordzor, the fourth author) who understands English and the two languages commonly spoken in the area; Twi and Bonno.

The research team met the participants at the obstetric department on the day of data collection to explain in detail the rationale for the study. The team ascertained if the participants were willing to take part in the study and those who agreed were given a consent form to sign. To ensure anonymity and confidentiality, any identifiers that could link the participants to the data such as name and house number were not included. The researchers visited the department twice weekly for a period of 3 months. The twice weekly visit was carried out because antenatal services were provided twice weekly for pregnant women.

Following the filling of the questionnaires, about 2.5 mL of venous blood was drawn from each participant using an aseptic technique, after they consented. The blood was dispensed into an ethylenediaminetetraacetic acid tube. The blood was then spun at 1,500–2,000 rpm for 5 minutes. The plasma part of the blood was used for the test. ABON HBsAg rapid test device manufactured by ABON Biopharm (Hangzhou) Co. Ltd (Hangzhou, China) was used for the screening. A commercially prepared control sample was used to determine the effectiveness of the HBsAg test strip. However, the manufacturer's instruction was followed accordingly. A confirmatory test was carried out for all participants who were reactive to the HBsAg. The confirmation test was carried out by checking those who tested hepatitis B-positive because enzyme-linked immunosorbent assay (ELISA) test was not available to the researchers.

Data analysis. The data was analyzed using Statistical Package for Social Sciences version 22.0 (IBM Corp, Armonk, NY). Each questionnaire was given an identifier for example, 001, 002, etc. to help prevent double entry and easy verification of any observed anomaly. A *P* value of 0.05 alpha level was considered statistically significant.

Ethical considerations. The study was ethically cleared by Noguchi Memorial Institute for Medical Research (approval number 007/15-16). Permission was sought from the management of the Dormaa Presbyterian Hospital before the study was carried out. Informed consent (written) of the participants was obtained after explaining the purpose of the study to them.

RESULTS

Sociodemographic characteristics. The study recruited 196 participants who were pregnant and attending antenatal clinic. Seventy-two (36.7%) of the participants were within the age category of 20–25 years, 51 (26.0%) within 26–30 years, 39 (19.9%) within 31–35 years, 26 (13.3%) within 36–40 years, three (1.5%) within 41–45 years, and three (1.5%) within 46–50 years. Two of the participants failed to respond to the age, which presents a shortfall of 1.1%. The marital status of the participants was examined. Of the 196 pregnant women, 38 (19.4%) were single, 109 (55.6%) were married, and 49 (25.0%) were cohabitating. With respect to educational level, 55 (28.0%) had no formal education, 77 (39.3%) had primary level education, 39 (19.9%) had secondary education, and 25 (12.8%) had tertiary level education. Examined parity revealed that 68 (34.9%) of the participants were nulliparous and 127 (65.1%) were multiparous. Summary of descriptive statistics is presented in Table 1.

Seroprevalence of HBsAg among pregnant women. All the 196 participants were screened for HBsAg and 20 of them tested positive, representing a prevalence of 10.2%. In addition, those between the ages of 46–50 years had the highest positive results followed by 41–45 years and those within 31–35 year bracket, with respect to their representation. Health workers had the highest HBsAg positivity followed by civil servants, traders, farmers, others, and unemployed pregnant women, respectively, as per their representation. This is shown in Table 2.

Participant's HBV awareness and source. All the participants indicated that they were aware of HBV transmission. In terms of sources of awareness, majority (84) indicated media, followed by antenatal clinics (33). In addition, 22 indicated

TABLE 1
Summary of demographic characteristics of participants

Variable	Frequency	Percentage (%)
Age (years)		
20–25	72	36.7
26–30	51	26.0
31–35	39	19.9
36–40	26	13.3
41–45	3	1.5
46–50	3	1.5
Marital status		
Single	38	19.4
Married	109	55.6
Cohabitation	49	25.0
Educational level		
No formal education	55	28.0
Primary	77	39.3
Secondary	39	19.9
Tertiary	25	12.8
Occupation		
Farming	60	30.6
Trading	33	16.8
Civil servant	14	7.1
Health worker	7	3.6
Unemployment	47	24.0
Others	35	17.9
Parity		
Nullipara	68	34.9
Multipara	127	65.1
Gestational age		
First trimester	36	18.4
Second trimester	83	42.3
Third trimester	77	39.3
Family setup		
Monogamous	183	93.8
Polygamous	12	6.2
Religion		
Christianity	178	90.8
Islam	18	9.2

health professionals, four indicated colleagues, and 53, however, failed to indicate the source of awareness. This is presented in Table 2.

Knowledge about hepatitis B infection. Most participants ($N = 136$, 69.4%) did not know that the liver is the main organ that hepatitis B virus attacks. In addition, 23% ($N = 45$) indicated that mosquitoes can transmit HBV infection. About 90% ($N = 177$) correctly answered the question “hepatitis B can be transmitted through unprotected sexual intercourse.”

TABLE 2
Summary of HBsAg prevalence in relation to some sociodemographic characteristics

HBsAg prevalence	Positive
Pregnant women	20 (10.2%)
Age (years)	
20–25	4
26–30	7
31–35	5
36–40	1
41–45	1
46–50	2
Occupation	
Farming	3
Trading	5
Civil servant	3
Health worker	7
Unemployment	1
Others	1

HBsAg = hepatitis B surface antigen. Negative (176, 89.8%).

The majority ($N = 157$, 80.1%) of the participants said hepatitis B infection can be transmitted through handshake and contact with an infected person's sweat. Also, 93.9% ($N = 184$) knew that hepatitis B can be transmitted through blood transfusion. A large majority of participants ($N = 187$, 95.4%) correctly answered the question whether a “Hepatitis B carrier pregnant woman can pass on her infection to her infant at birth.” Majority (168, 85.7%) of the participants said hepatitis B can be caused by a curse and witches/wizard ($N = 174$, 88.8%). Detailed response of participants on specific knowledge questions are presented in Table 3.

From Table 4, most participants (158, 80.6%) whose knowledge level was tested were found to have a fair knowledge about hepatitis B, 23 (11.7%) had poor knowledge, and 15 (7.7%) had good knowledge.

The result as represented in Table 5 showed a significant cross-relationship between the type of occupation and level of knowledge of hepatitis B among the participants studied $\chi^2_{(10)} = 95.12$, $P < 0.01$. The percentage of participants with good knowledge was 7.7% (15 participants). Among these, six people were health workers (3.1%), five were civil servants (2.6%), and two (1%) were participants who selected the option “other.” Farming and unemployed had only one person each (0.5%) and there were no traders.

The results as represented in Table 6 showed a significant cross-relationship between the level of education and level of knowledge of hepatitis B among the participants studied $\chi^2_{(8)} = 48.96$, $P < 0.01$. The percentage of participants with good knowledge was 7.7% (15 participants). Among these 10 people had tertiary education (5.1%), three had secondary education (1.5%), and two had primary education (1%).

DISCUSSION

The study examined the seroprevalence and knowledge of hepatitis B infection among pregnant women attending ANC at a mission hospital in peri-urban Ghana. Overall, 10.2% ($N = 20$) of the participants tested HBsAg positive. In comparison with related studies in other parts of the country, this prevalence estimate is similar to the 9.5% and 10.6% reported in the eastern region of Ghana and Agogo Ashanti Akim, respectively.^{13,14} Elsewhere, it is consistent with a 9.7% prevalence rate reported in Cameroon,²¹ higher than what was found in Ethiopia (4.3%),²² Nigeria (6.78%),²³ and Kenya (3.8%)²⁴ but lower than studies in Uganda (11.8%),²⁵ Benin (12.5),²⁶ and Nigeria (16.5%).²⁷ Nonetheless, the 10.2% prevalence found in this present study is greater than the WHO threshold (> 8%) for classification of highly endemic population.⁵ Factors such as geographical variation may be accounting for the different results in the various settings. Notwithstanding, effective intervention-targeting prevention of MTCT of hepatitis B particularly at birth in the study area is very crucial.

Furthermore, all the participants in this study were aware of HBV infection. This is in contrast to a 71.5% ($N = 400$) HBV awareness level reported in Nigeria,²⁸ 12.2% ($N = 287$) in Kenya,²⁴ and 41% in Ghana.¹⁵ The high hepatitis B awareness found in this study is not surprising because over the years hepatitis B information has been discussed in many parts of the country.¹⁶ The media ($N = 84$) was the most cited source of HBV information in this present study followed by ANC ($N = 33$). This is not peculiar to our work as a related study

TABLE 3
Summary of participants' responses on knowledge of hepatitis B

Knowledge of hepatitis B	Response		Chi square	
	Correct	Incorrect	df	χ^2
Hepatitis B virus affect the liver	60 (30.6%)	136 (69.4%)	1	29.47*
Hepatitis B infection can be transmitted by mosquitoes	151 (77%)	45 (23%)	1	57.33*
Hepatitis B can be transmitted through unprotected sexual intercourse	177 (90.3%)	19 (9.7%)	1	127.37*
Hepatitis B can be transmitted through food and drinks	85 (43.9%)	110 (56.1%)	1	3.21 ^{ns}
Hepatitis B can be transmitted through handshake and contact with person's sweat	39 (19.9%)	157 (80.1%)	1	71.04*
Hepatitis B be can be transmitted through blood transfusion	184 (93.9)	12 (6.1%)	1	150.94*
Hepatitis B carrier pregnant woman can pass on her infection to her infant at birth	187 (95.4%)	9 (4.6%)	1	161.65*
Hepatitis B is caused by a curse	27 (14.3%)	168 (85.7%)	1	101.95*
Hepatitis B can be passed onto someone by witches and wizards	22 (11.2%)	174 (88.8%)	1	117.88*
Hepatitis B infected person may present no symptoms	33 (16.8%)	163 (83.2%)	1	86.22*
Hepatitis B can be prevented through screening and vaccination	81 (41.3%)	115 (58.7%)	1	5.90†
Babies born to mothers with hepatitis B infection can receive vaccination at birth to prevent transmission of the virus from mother to the newborn	86 (43.9%)	110 (56.1%)	1	2.94 ^{ns}
Hepatitis B can be prevented by eating nutritious diet	84 (42.9%)	112 (57.1%)	1	4.00†
Hepatitis B can be prevented when slept under mosquito net	137 (69.9%)	59 (30.1%)	1	31.04*
Hepatitis B infection can cause liver cancer	165 (84.2%)	31 (15.8%)	1	91.61*

^{ns} $P > 0.05$; $N = 196$.

* $P < 0.01$.

† $P < 0.05$.

identified the same source of HBV information in the Kintampo district in Ghana.¹⁵ Generally, dissemination of health information is often carried out by the media in Ghana. However, communication of hepatitis B information is best delivered by health-care providers or a resource person who understands the epidemiology of the disease. Interestingly, a higher proportion of hepatitis B communicators on radio in Ghana are herbal medicine practitioners, who use the platform to discuss the severity of hepatitis B to attract clients to purchase their products.²⁹ It is imperative that public campaigns on hepatitis B are carried out by qualified health-care providers. This will help in reducing the widespread myth about the disease in the study area. Another worrisome situation is the fact that only few participants (33) received hepatitis B information at ANC clinics. Undoubtedly, this is a missed opportunity for health professionals to communicate hepatitis B information to pregnant women, particularly information on available interventions to prevent MTCT of the infection.

TABLE 4

Summary of participants level of knowledge of hepatitis B

Knowledge		Frequency	Percentage (%)
Level	Poor	23	11.7
	Fair	158	80.6
	Good	15	7.7

With respect to knowledge, only 7.7% ($N = 15$) of the participants had a good knowledge score. A study by Frambo et al.²¹ also found only 16% ($N = 176$) of pregnant women with a good knowledge of hepatitis B in Cameroon. There is the need to include hepatitis B education as part of the health topics discussed at the ANC by midwives. Such exercise will enable the hepatitis B-positive pregnant women to appreciate the significance of hepatitis B vaccination of their newborn at birth. Furthermore, about 69.4% ($N = 136$) of the participants failed to recognize that hepatitis B affects the liver in this present study. This observation is higher than the 15.9% ($N = 176$) reported in Cameroon¹⁶ and 24.8% in Nigeria.²³ Moreover, 23% ($N = 45$) of the participants indicated mosquitoes as a possible agent for hepatitis B transmission similar

TABLE 5

Summary of cross tabulation and chi square of occupation against knowledge of hepatitis B among study participants

		Level of knowledge			Total	df	χ^2
		Poor	Fair	Good			
Occupation	Farming	5	54	1	60	10	95.12*
	Trading	4	29	0	33	—	—
	Civil servant	0	9	5	14	—	—
	Health worker	0	1	6	7	—	—
	Unemployment	12	34	1	47	—	—
	Others	2	31	2	35	—	—

* $P < 0.01$.

TABLE 6

Summary of cross tabulation and chi square of education against knowledge of hepatitis B among study participants

		Level of knowledge			Total	df	χ^2
		Poor	Fair	Good			
Education	No formal education	9	46	0	55	8	48.96*
	Primary	9	66	2	77	–	–
	Secondary	5	31	3	39	–	–
	Tertiary	0	14	10	24	–	–
	Unidentified	0	1	0	1	–	–

* $P < 0.01$.

to what was found by Abdulai et al.¹⁵ in the Kintampo district in Ghana. A higher proportion of the participants ($N = 157$, 80.1%) mentioned handshake and sweat as possible modes of HBV infection. This finding is higher than a 2.8% ($N = 400$) reported by Gboeze et al.²⁸ It is a common belief that sweat is a source of hepatitis B transmission in Ghana.²⁹ However, according to Schillie et al.,³⁰ HBV cannot be transmitted through sweat. Considering the study area in particular and Ghana as a whole, social interaction forms a central part of the culture. For instance, expressions of sympathy to loved ones are demonstrated by handshakes during funeral ceremonies. Perpetuation of these myths is more likely to create fear and social stigma, which may lead to social exclusion of people with hepatitis B. The routes of hepatitis B infection need to be stressed when hepatitis B messages are being communicated to the general public.

In addition, there were some spiritual connotations assigned to the mode of transmission with most participants mentioning a curse ($N = 168$, 85.7%) and an act of witches or wizards ($N = 174$, 88.8%) as a cause. The perception and belief ascribed to the etiology of the infection has the tendency of influencing the health-seeking behavior of people infected with the disease. Lessons can be drawn from human immunodeficiency virus interventions that yielded increasing awareness on the natural cause of the disease in the past.

Furthermore, the result of cross tabulation and χ^2 of occupation against knowledge of HBV infection among study participants revealed a significant cross-relationship between type of occupation and level of knowledge of hepatitis B among the participants. Participants who were health-care providers had the highest knowledge score in this study. Perhaps, their exposure to hepatitis B information during their formal training might have contributed to their good knowledge.¹⁶ This is an encouraging piece of information because health-care workers are reported as the main source of hepatitis B information for their clients.³¹ The higher level of educational attainment leading to a higher hepatitis knowledge score is also reported elsewhere.²¹

The study has some limitations and one of them is the determination of the HBsAg without the hepatitis B e antigen (HBeAg). The HBsAg determined is a serological marker of the hepatitis B virus in which a positive result indicates an exposure. On the other hand, a positive HBeAg suggests infectivity and replication of the virus. Because this study sought to determine only the HBsAg, we cannot infer that the 10.2% of our study participants who tested HBsAg positive will eventually pass on the infection to their newborns. Also, the rapid test used could underestimate the prevalence compared with the use of ELISA and polymerase chain reaction tests that have high sensitivity.

CONCLUSION

The study highlighted the prevalence of hepatitis B in peri-urban Ghana. The outcome suggests high prevalence of hepatitis B among the pregnant women. In addition, myths surrounding hepatitis B were very high among the participants. We therefore recommend a hepatitis B awareness campaign on the causes and mode of transmission of hepatitis B in the study setting.

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