ASSESSING PREVALENCE AND RISK FACTORS OF HEPATITIS B SURFACE ANTIGEN AMONGST PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN THE NORTHWEST REGION OF CAMEROON

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ABSTRACT

Hepatitis B infection in pregnant women is on the rise with children having greater risk of acquiring HBV. This study seeks to assess the prevalence and risk factors among pregnant women in Cameroon. This study was conducted from May-July 2014. A questionnaire that constituted information on socio-demographic characteristics, obstetric characteristics and possible risk factors were administered to pregnant women who gave their consent. Blood samples were obtained and tested for the presence of hepatitis B surface antigen (HBsAg) using a rapid immunoassay kit. Data was analyzed using SPSS version 16.0. The percentages were calculated and compared between the sero-positive and sero-negative groups using and chi-square test. A total of 260 pregnant women were recruited. In all 20(7.7%) were positive for HBsAg. The prevalence of HBsAg was not statistically different between the different age groups but was significant (p = 0.012) among pregnant women from rural town 3(2.8%) to urban town 17(11.2%). Of the 246(94.6%) subjects accepted to vaccinate their baby against HBV only 30 (11.5%) were willing to pay for the hepatitis B immunoglobulin G vaccine despite the low cost. Only women who had attain tertiary education and with a high monthly income were willing to pay for the vaccine. Level of education, marital status, multiple sexual partners, scarification or tattooing, blood transfusion and history of surgery were found to be risk factors associated with transmission. This study indicates a high prevalence of HBsAg and requires that all pregnant woman must be screened and their children be administer free of charge hepatitis B immunoglobulin G vaccine.

Keywords: Hepatitis B surface antigen, prevalence, risk factors and pregnant women.

INTRODUCTION

Hepatitis B Virus (HBV) is a serious public health problem worldwide and is a major cause of morbidity and mortality, touching almost every class of person and age group with vertical transmission being the commonest route of transmission in many endemic areas (Chan, Lao, Suen, and Yeung, 2012; WHO et al., 2015). WHO estimates that more than 2 billion people have been infected with HBV and 350 million people across the world continue to carry chronic HBV infection, of which almost 1 million die annually from HBV related liver disease (Navabakhsh, Mehrabi, Estakhri, Mohamadnejad and Poustchi, 2011; ulHaq et al., 2013).

LITERATURE REVIEW

HBV is highly endemic in Cameroon and other sub-Saharan Africa countries (Pondei and Ibrahim, 2013; Esan et al., 2014) and existing data in Cameroon report that the seroprevalence of HBV ranges from 6-16% (Mbanya, Takam, and Ndumbe, 2003; Fouelifack et al., 2012).

Transmission of HBV is through unprotected sexual contact, use of unsterile sharp objects and blood products and by vertical transmission (Wurie, Wurie and Gevao, 2005; Bankole *et al.*, 2012). In addition factors such as poverty, literacy, low social standard, age and parity have shown to influence the rate of transmission (Akbar, Basuki, Garabrant, Sulaiman and Noer, 1997; Wurie *et al.*, 2007; Esan *et al.*, 2014).

HBV infection in pregnant women is on the rise and it is a call for concern as the commonest means of transmission worldwide is either prepartum or perinatally, with children having greater than 90% risk of acquiring HBV infection (Rasha, Ahmed, Elsheikh, Karsany and Adam, 2007; Oluyinka *et al.*, 2014). However if early diagnosed, and strict medical follow up implemented, children are prevented from being infected. HBV in pregnancy is associated with high risk of maternal complications such as induce premature labour, intraventricular, intrapartum and postpartum haemorrhages (Elinav *et al.*, 2006; Vipul *et al.*, 2012). It also has poor outcomes like still births and neonatal deaths, jaundice, anorexia, malaise, acute and chronic liver disease, impaired mental and physical health (Gambarin-Gelwan, 2007; Olubunmi and Gimbia, 2010). As such screening of pregnant women for HBV is necessary to reduce prevalence by identifying neonates at risk of transmission.

Studies have shown that effective management of HBV (Hepatitis B Virus) infection can only be attained through reliable data on the prevalence of infections in the general population (Ankouane *et al.*, 2013). While much data exist about the epidemiology of HBV during pregnancy in other countries, very little published data are available in some parts of Cameroon. Considering that infected pregnant women stand a high chance of transmitting the HBV infection to their newborn babies, this study was carried out to determine the prevalence and possible risk factors for hepatitis B surface antigen (HBsAg) amongst pregnant women in the Northwest region of Cameroon. The results from this study will generate relevant information to public health policy makers to monitor the trend of the disease so as to provide solution that will curb the transmission rate and thus improve on the health standards of the community.

METHODOLOGY Study area

This study was conducted in St. Mary Soledad hospital and National Social Insurance Clinic located in Bamenda III division of the Northwest region of Cameroon. These facilities are located in strategic positions that receive clients from both rural and urban areas.

Study design

This study was a cross-sectional study conducted from May 2014 to July 2014. During each visit the purpose of the study was duly explained to all women who visited the antenatal clinic to seek their consent. The pregnant women were given questionnaires to fill either by themselves or with the help of the service providers. This questionnaire constituted information of their socio-demographic characteristics (age, education, occupation, etc.), obstetric characteristics (gestational age and parity) and possible risk factors (e.g. sexual partner, history of surgery or blood transfusion, etc). After filling the questionnaires, the pregnant women were given health talk on HBV infections and were advised on the need to know their status.

Ethical Consideration

The study was approved by the Regional Delegation of Public Health. Verbal informed consent was obtained from all participating subjects prior to filling the questionnaire and sample collection.

Inclusion criterion: Any pregnant woman who gave consent to participate in the study.

Exclusion criteria: Pregnant woman who did not accept to be part of the study and those who were immunized against hepatitis B infection (confirmed verbally).

Study Population:The sample size was determined online using the total population, 95% interval and 5% confidence interval this gave a total of 185 subjects. A total of a 272 pregnant women who gave their consent were enrolled for the study.

Samples collection

Blood sample was obtained by venipuncture and serum separated. The samples were tested for the presence of HBsAg using a rapid lateral chromatographic immunoassay kit (Acon Biotech, China) following the manufacturer's procedure. Samples that could not be analyzed on that same day were stored at -20° C.

Statistical analysis

The data were entered in computer and double checked before analysis by SPSS version 16 for windows. The percentages were calculated and compared between the sero-positive and sero-negative groups using and chi-square test. Significance was determined at P < 0.05.

RESULTS

General characteristics of the women

Out of the 272 pregnant women who gave their inform consent, 260 (95.6%) women who were able to pay the complete or half of the amount charged for the test and those who completely filled the questionnaire were considered for the analysis. The socio-demographic characteristics of these women are shown on Table 1. The age range was between 17-44 years with mean \pm SD of 29.42 \pm 7.12 years. These women were enrolled at mean (SD) 19.70 (4.67) weeks of gestational age (range, 12-28 weeks) and parity of 2.6(1.63) that ranges from 0-7.

Characteristics(n=260)	Stratification	Frequency	%
Age group in years	A(<25)	86	33.1
	B(25-34)	87	33.5
	C(35-40)	64	24.6
	D(>40)	23	8.8
Level of Education	no formal	26	10.0
	primary	118	45.4
	secondary	92	35.4
	Tertiary	24	9.2
Marital status	cohabitation	20	7.7
	Divorce	33	12.7
	Married	123	47.3
	single	84	32.3
Occupation	civil servant	58	22.3
	Jobless	118	45.4
	Self employed	60	23.1
	student	17	6.5
Income	< 50000frs	157	60.4
	50000-100000	81	31.2
	100001-115	12	4.6
	>150000frs	10	3.8
Parity group	Primipara 1	40	15.4
	Multipara2-4	194	74.6
	Grand	26	10.0
	multipara>4		
Area of residence	Rural	108	41.5
	Urban	152	58.9
Sexual Partner	Single	129	49.6
	Multiple	131	50.4

Table 1.General characteristics of the study population

Prevalence of HBV

Of the 260 pregnant women, 20(7.7%) were sero positive for HBsAg. The prevalence of HBsAg was highest among the age group (25-34years) but the difference was not significant ($\chi^2 = 3.75$; p=0.29) Figure 1. The prevalence of HBV was significantly higher ($\chi^2 = 20.2$; p=0.00) in women from Urban area 17(9.7%) than in rural area 3(3.5%) Figure 2.



Figure 1: Age distribution and prevalence of HBV among pregnant women



Figure 2:Seroprevalence of HBsAg by area of residence

Looking at the level of education and marital status, there was a significant difference (p< 0.05) when comparing the prevalence of HBsAg among the positive and negative pregnant women. The prevalence of HBsAg was highest in women who had no formal education 6(23.1%) and lowest in women who had tertiary education 1(4.2%). On the other hand the difference was not significant (p>0.05) when looking at the different occupations and parity number however it was highest with non-civil servant 7(11.7\%) and multiparous 19(9.8\%) in women Table 2.

Characteristics	Level	Non-reactive	Reactive	χ2	df	P value
		n(%)	n(%)			
Level of Education	No formal	20(76.9)	6(23.1)	10.537	3	0.015
(N=260)	Primary	109(92.4)	9(7.6)			
	Secondary	88(95.7)	4(4.3)			
	Tertiary	23(95.8)	1(4.2)			
Marital status	Cohabitation	15(75.0)	5(25.0)	26.870	3	0.000
(N=260)	Divorce	31(93.9)	2 (6.1)			
	Married	115(94.3)	7(5.7)			
	Single	79(92.9)	6(7.1)			
occupation (N=260)	Civil servant	55(94.8)	3(5.2)	2.516	4	.642
	Jobless	109(92.4)	9(7.6)			
	Non civil servant	53(88.3)	7(11.7)			
	Student	16(94.1)	1(5.9)			
parity group	Primipara 1	39(97.5)	1(2.5)	4.892	2	0.87
(N=260)	Multipara2-4	175(90.2)	19(9.8)			
	Grand multipara>4	26(100.0)	0(0)			

 Table 2.Relationship between level of education, marital status, occupation, parity and HBV infection

When looking at risk factors like sexual partner, scarification marks, or tattooing, sterilized object, surgery and blood transfusion there was a significant difference (p < 0.05) when comparing the prevalence of HBsAg in pregnant women with multiple sexual partner, scarification marks or tattooing, history of surgery, and blood transfusion. This

difference was not significant among those who used sterilized and non-sterilized sharp objects (p>0.05) Table 3.

Characteristics (n=206)	Level	Non-reactive	Reactive	χ2	df	P value
		n(%)	n(%)			
sexual partner	Multipl	116(88.5)	15(11.5)	5.25	1	0.022
	e	124(96.1)	5(3.9)			
	Single					
scarification or tattooing	Yes	155 (89.6)	18(10.4)	5.34	1	0.021
	No	33 (97.7)	2 (2.3)			
sterilized object (needle, knife,	Yes	207(92.0)	18(8.0)	0.22	1	0.643
blade)	No	33(94.3)	2 (5.7)			
blood transfusion	Yes	63(80.8)	20(19.2)	0.89	1	0.000
	No	177(97.3)	5 (2.7)			
History of Surgery	Yes	43(82.7)	9(17.3)	8.46	1	0.004
	No	197(94.7)	11 (5.3)			

Table 3. Relationship between sexual partner, scarification marks or tattooing,sterilized object surgery, blood transfusion and HBV infection

Of the 260 subjects, 246(94.6%) accepted to vaccinate their baby against HBV. Unfortunately only 30 (11.5%) were willing to pay for the **hepatitis B immunoglobulin G** vaccine. Looking at the level of education and socio economic standard, it was seen that women who had attain tertiary education and with a high monthly income were willing to pay for the vaccine compared to those with low level of education Figure 3. This difference was significant (64.589; P= 0.000) Table 4.



Figure 3: Relationship between level of education and administration of vaccine

Table 4. Assessing knowledge on vaccination				
Characteristic	Response	Frequency	Percentage	
Willing to vaccinate the	Yes	246	94.6	
baby	no	14	5.4	
Willing to pay the sum of	yes	30	11.5	
8000frs for the vaccine	no	230	88.5	

DISCUSSION

Screening asymptomatic people is an important instrument in disease detection, prompt diagnosis and appropriate intervention particularly at an early stage of disease. This is the first published study documenting sero-prevalence of HBV among pregnant women in the Bamenda III division of the North West region of Cameroon. The prevalence of 7.7% is in agreement with the fact that Cameroon like other sub-Saharan African countries is an endemic area (Fouelifack et al., 2012). This study in pregnant women have shown a similar trend of 7.9% in Yaoundé and 9.7% in Buea as reported by Kfutwah et al., (2012), and Frambo, Atashili, Fon and Ndumbe (2014), respectively. However, other studies constituting both male and female in the country showed a very high prevalence of 12.14% in Yaoundé (Fouelifack et al., 2012) and 20.4% in the North (Ducancelle et al., 2013). This shows that prevalence of HBV varies in different region and in different groups of the same population. This might be due to variability in ethnicity, socioeconomic conditions and high rate of emigration due to urbanization (Esan et al., 2014). Similarly our high HBsAg prevalence remains coherent with published data from other African countries like 17% and 13.8% in Senegal (Touré-Fall et al., 2009; Ndongo, et al., 2011), 18.2% in Ivory Coast (Dao, et al., 2009), 24.9% in Mali (Dény and Zoulim, 2010), and 12.6% in Gabon (Makuwa et al., 2008). These differences in different countries maybe because of the different geographical regions, genetic factors and socioeconomic status associated with peculiarities in the modes of transmission, cultural practices (Esan et al., 2014; Akbar et al., 1997).

Although the difference among the age groups was not significant HBV prevalence was high among women in the age group 25-34years (11.8%). This was similar in studies carried out other regions of Cameroon by Firmin *et al.*, (2013) and Ducancelle *et al.*, (2013)and other countries like Sudan (Rasha *et al.*, 2007) and Nigeria (Habiba and Memon, 2007; Eke *et al.*, 2011). This age group correlates with the peak age of highest sexual activity thus suggesting the role of sexual intercourse in the transmission of HVB. However it was contrary to studies by (Habiba and Memon, 2007; Jatau *et al.*, 2009; Eke *et al.*, 2011) who stated that the prevalence is high among women in the age group 21-25 years and in 31-35age group (Elinav *et al.*, 2006). With this discrepancy in age it is good to repeat same studies in different location with a larger and equally age distribution population to actually conclude that age is a risk factor for hepatitis B infection as reported in other studies.

The results of this study indicate high prevalence of HBV infection in urban area (6.5%) than rural area (2.8%). This may be due to the higher rates of risky life-style practices in most urban towns and the increase migration from rural to urban for purpose of education or employment. This result however contradicts studies carried out in Cameroon by (Ndumbe *et al*., 1994) and in Kenya (Okoth *et al* 2009) and Pakistan (Ahmad et al, 2006).

Earlier studies have found an association between the prevalence of HBV infection and level of education (Oluyinka *et al.*, 2014). The more educated the pregnant population, the lower the prevalence rates. Our data revealed that women who have attained tertiary education had 4.2% while those who never went to school had 23.1%. Thus a direct relationship was seen between educational status and prevalence of HBV. This is similar to what was reported by studies in other area (Eke, Eke, Okafor, Ezebialu and Ogbuagu , 2011; Pennap *et al.*, 2011). This is attributed to public enlightenment and awareness. Thus there is need to educate the population on high risk factors associated to HBV and other diseases.

In our study most of the women who were found to be multiparous had a higher prevalence of HBsAg (9.8%). This result was similar to those of Gary et al., (2003) however it was contrary to studies by Pennap *et al.*, (2011) that stated that it was higher in primipara women. This high prevalence among this group might be as a result of repeated risky exposure of sexual activity and probably contamination from instrument during delivery.

Women with multiple sexual partners, presence of body inscriptions (scarification marks or tattoos), previous histories surgeries and blood transfusion, were found to be significantly associated with HBV infection (p= > 0.05) from this study. The majority of these women 131(50.4%) had multiple sexual partner in the past 3 years. The prevalence of HBV was found to be significantly higher inwomen with multiple partner (P=0.02). This was similar to studies carried out by Alegbeleye *et al.*, (2013) and Rabiu *et al.*, (2010). In addition all these subjects have had unprotected sexual intercourse and sexual intercourse is one of the route of HBV transmission. Unfortunately only 11(4.2%) of these women knew the HBV status of their partner. This increases the risk of HBV infection if such partners are infected [38]. Furthermore poor literacy, low socioeconomic status and cultural reasons could be responsible for the high number of multiple partners. In this study 157 (60.4%) women had a monthly income of <50,000 CFA Frs.

Comparing these results to other studies, scarification and tattoos have shown also to be risk factor to hepatitis infection. It was similar to studies from Nigeria (Pennap *et al.*, 2010; Taesser, *et al.*, 2010; Ugbebor *et al.*, 2011), but it was different from a result obtained in another town in Nigeria (Eke *et al.*, 2011). In Cameroon scarification marks are inflicted on the body for a variety of reasons which include birth mark, protection (from witch and wizards) and traditional healing. During this period the sharp instruments are usually sterilized but a common source of the substance are frequently used on multiple people at the same time. With the dawn of intense HIV sensitization, reusable sharp object like needles and blades are no more a common practice and was found not to be a risk factor for HBV transmission.

Blood transfusion was found as a risk factors associated with HBsAg positivity in our study (p=0.000). Similar supporting evidence was also reported by a study carried in Mexico (Cisneros-Castolo, Hernández-Ruiz, Ibarra-Robles, Fernandez-Garate and Escobedo, 2001). The limitation we had in this aspect of the study is that most women could not remember their pass history of blood transfusion especially when they were young. As such since participants could not possibly remember what happened to them at birth and child hood, information on blood transfusion, scarification and tattoos were not really reliable.

As concern history any surgical procedure, the prevalence of HBsAg was significantly higher in those who had previous surgery. This was in contrary to studies by Gary *et al.*, (2003) and similar to those of Alswaidi and Brien (2010), this probably is because surgical procedures do required the use of instruments and/ or blood transfusion that are increased risk factors.

Immunization with hepatitis B immunoglobulin G vaccine, administered at birth, reduces the risk of transmission to less than 10% among infants of mothers who are positive to HBsAg (Eke *et al.*, 2011). Despite the availability of vaccination against HBV infection, prevalence rates are still high in Cameroon. This is most likely that the cost of the vaccine is consider expensive (8000rs CFA frs). Out of the 246(94.6%) who accepted to vaccinate their baby, only 30 (11.5%) was willing to pay for the vaccine. Thus level of education and the socio economic factors pay a great role in the prevention of HBV

transmission. This is supported by the fact that the highest number of women (33.3%) who were willing to pay for the vaccine were women who had undergo tertiary education.

CONCLUSIONS

A 7.7% prevalence of HBsAg was seen in the study thus HBV infection remains a public health problem in Cameroon. The current study showed that lower education, multiple sexual partners, previous history of surgery, scarification marks or tattooing and blood transfusion poor literacy rate and low socio-economic are the major risk factors for hepatitis B transmission in pregnant women in Cameroon irrespective of the region and play an important role in HBV infection. As such highest risk for HBV infection is associated with lifestyles, occupations, or environments in which contact with blood from infected persons is frequent. Thus the introduction of HBV testing in all pregnant women combined with immunoglobulin prophylaxis and/or hepatitis B vaccination immediately after delivery in all children born to HBsAg positive mothers is a useful strategy to reduce the prevalence of HBV infection.

RECOMMENDATION

Due to the high prevalence of HBsAg (7.7%)there is need to institute public health measures, including sensitization of risk factors, routine screening of all pregnant mothers as well as high risk groups and women of child - bearing age in Cameroon for HBV infections. In addition protective immunization with hepatitis B immunoglobulin G vaccine should be made free as other vaccines like measles, polio and yellow fever for babies born to HBsAg-positive mothers and all who test negative against the HBV. Further studies using a larger sample size will be needed to assess the risk of mot her-to -child transmission.

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