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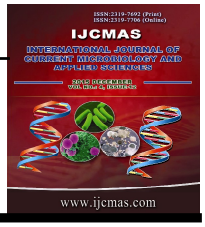

Original Research Article

Sero-Prevalence of Human Immunodeficiency Virus (HIV) and Hepatitis B Virus (HBV) Co-Infection among Pregnant Women Residing in Bamenda Health District, Cameroon

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Keywords

HIV, HBV, Cameroon, Pregnant women; Co-infection

A B S T R A C T

HIV and HBV are common public health problems recognized worldwide. The consequences of these problems have increased morbidity and mortality. As such, there is a need to determine their prevalence patterns among pregnant women. This study was conducted on 301 pregnant women from January to July 2015 in Bamenda Health District. Both quantitative and qualitative data were collected. HIV was diagnosed and confirmed using Determine test kits and Oraquick and HBsAg with Acon HBsAg test kit. The prevalence of HIV and HBV co-infection 5(1.7%) was significant (P<0.05) compared to HIV (6.6%) and HBV (6.0%). There was no significant association between HIV and HBV co-infection with age, residence, marital or educational status, except for grand multigravida women (P > 0.05). A significant difference was observed when good knowledge of HIV and HBV were compared (94.0% vs 11.3%) and also when good practices towards HIV and HBV (97.0% vs 15.3%) were compared. The relationships between level of education and knowledge of HBV and HIV/practices were significant. These findings confirm the evidence of high HBV and HIV co-infection rates and the need to monitor for hepatotoxicity those on antiretroviral treatment and timely HBV vaccination to all exposed infants.

Introduction

HIV and HBV, are major public health problems (Mohsen et al., 2009; Zenebe et al., 2014). HBV infection affects over 350 million people worldwide, reaching endemic proportions in sub Saharan Africa (Bankole et al., 2012). HBV causes life-threatening liver disease and liver-related deaths, a major public health problem, particularly in developing countries (Dibua et al., 2013; Esan et al., 2014).

Viral hepatitis during pregnancy is associated with high risk of maternal and infant complications leading to spontaneous abortion, premature delivery, intrauterine growth restrictions and low birth weight infants (Esan et al., 2014; Frambo et al., 2014). In Cameroon the prevalence of HBV ranges from 6-12% among pregnant women (Frambo *et al*. 2014; Noubiap et al., 2015).

There are about 40 million people worldwide infected with HIV, of which 68% reside in sub-Saharan Africa (Uneka et al., 2007). HIV epidemic affects females severely in the sub-region and women of reproductive age make up 57% of adults living with HIV (Uneka et al., 2007). HIV in pregnancy has adverse outcome to maternal and foetal and also to health workers at times of delivery (Bankole et al., 2011; Esan et al., 2014).

Many countries that are affected by high HIV are also affected by HBV burden leading to high frequent HIV and HBV co-infection since both of them have shared routes of transmission (Zenebe et al. 2014). HIV and HBV co-infection has therefore emerged as a significant cause of morbidity and mortality. It alters the natural history of HBV infection promoting HBV replication and progression of hepatic damage associated with antiretroviral therapy (Uneka et al., 2007; Geretti et al., 2010). In several studies, the risk of liver-related mortality has been found to be 2-3 times higher in HIV/HBV-coinfected patients than in HIV-mono infected patients (Bonacini et al., 2004; Weber et al., 2006). A number of seroprevalence studies conducted in HIV-positive populations have reported coinfection rates of 2 to 20% (Harania et al., 2008, Jindal et al., 2008; Geretti et al., 2010).

Epidemiological data on HBV and HIV, coinfection among pregnant women are very scarce in Cameroon. This study therefore aimed at examining the serological prevalence of HBV and HIV co-infection among pregnant women in Bamenda Health District. More specifically, it set out to assess the knowledge of and practices by inhabitants on these viruses. This study being the first of its kind after the adoption of the scale of option B + in the entire Cameroon will increase clinical information is required to treat and care for pregnant women who are placed on live long antiretroviral treatment irrespective of their clinical or immunological status. In addition, it will establish a paradigm that would serve as evidence-based model in the epidemiologic surveillance and management of HIV and HBV co-infection in specified community.

Methodology

Study Design

This study was designed to collect both quantitative and qualitative data on HBV and HIV coinfection among pregnant women. A questionnaire was designed to capture information on socio-demographic, obstetric, knowledge and practices of HBV and HIV. Knowledge was assessed by questions focusing on the causative agent, sign and symptoms, transmission, treatment and prevention. Each correct response was scored as 1 and 0 for a wrong response. The knowledge scores for an individual were calculated and summed up to give the total knowledge score of 16. A score between 0-7 was classified as poor, 8-12 as good and 13-16 as excellent. Practice was assessed by information on screening, relationship with infected persons**,** vaccination, preventive method used, and participated in health education. Practice was assessed on a scale 6, a score of 0-3 was considered as poor practice while a score of 4-6 was classify as good practice.

Ethical clearance was obtained for the regional delegation of public health in the Northwest region. All subjects were verbally notified of the importance of the study aim and the importance of participating in the study.

Study Site and Population

This cross-sectional study was carried out in the Bamenda Health District of the northwest region of Cameroon from January 2015 to July 2015 on pregnant women attending antenatal clinics in Mulang Integrated Health Centre and Azire Integrated Health Centre. These two clinics are found in the rural and urban areas respectively. Only women who gave a written consent and answered the questionnaire were enrolled.

Sampling

Five milliliter of venous blood was collected from each subject and the serum tested for HIV and HBsAg antibody. HIV was diagnosed using HIV 1&2 determine kit (Abott) and confirmed using Oraquick. HBsAg detection was done using HBsAg test kit (Acon).

Statistical Analysis

The demographic data of the subjects was collected and analyzed using the SPSS software 16.0 version. Only data from women who completed the questionnaire were analyzed. Chi- square contingency table was used for the analysis. Percentages and ratios were calculated and results presented as tables and figures. A 5% level of significance was used to test the association between the variables and infection rates.

Results and Discussion

Of the 421 women seen only 348 (82.7%) gave their consent and of these 301(86.5%) women completed the questionnaire and were included in the analysis. The age range was between 13 and 44 years with a mean (standard deviation) of 25.7 ± 5.17 years. A majority of the study subjects 217 (72.1%) were in the age group of 20-30years and resided in the urban area 269(89.4%). A total of 224(74.4%) of the study subjects were married, of which 217(72.1%) were monogamous marriage. The highest number of women 157(52.2%) attended tertiary school. The gravidity status of the women revealed that 193(64.1%) were pregnant for more than once with a multi gravidity range of 1-8 with of 2.4± 1.5 (Table 1).

Prevalence of HIV and HBV Infections in the Study Population

There was no significant difference ($P > 0.05$) between the prevalence of HIV and HBV (Fig 1). The Prevalence of HIV was significant only among the age group ($P= 0.01$) while residence, marital status, level of educational and gravidity were not significant. On the other hand the prevalence of HBV was significant among the different gravidity groups ($P= 0.01$) and not by age group residence, marital status and educational level (table 2). The prevalence of HIV and HBV coinfection was 1.7%. This prevalence was to highest among women 8.3%, women from rural area 1(3.1%), women in Concubine 12.5%, those with primary level of education 2(4.6%) and those who are Grand multigravida 1(3.8%) Table 3.

Assessing Knowledge and Practices of HIV and HBV

The mean ±SD knowledge score for HIV and HBV was respectively 14.52 ± 2.37 and 6.58 ± 4.72 and ranges from 9-16 and 2-13 while that of practice was 4.9 ± 0.37 and 1.63 ± 0.7 and ranges from 4-6 and 0-6 for HIV and HBV respectively. There was a significant difference seen when comparing knowledge and practices of HIV to HBV ($P<0.000$). There was a significant

difference (P<0.05) seen when comparing excellent knowledge on HIV to HBV (94.0% vs 11.3% respectively) and good practices toward HIV and HBV (97.0% vs 15.3% respectively) Fig 2. Although there was no significant difference seen between the level of education and knowledge and practices of HIV, Table 4 however there was a significant difference (P < 0.05) seen in knowledge and practices of HBV Table 5

Infections due to HBV and HIV are significant health problems around the globe especially in pregnant women due to perinatal transmission (Esan et al., 2014). The overall prevalence of HIV infection among pregnant women 6.6% obtained from this study is higher compare to the national prevalence of 4.8% seen among women of child bearing age (INS, 2012). However, it is lower than the 8.7% reported in Tanzania (Swai *et al.*, 2006) and 10.2% in Nigeria (Bankole et al., 2011). On the contrary the HIV prevalence rate is higher than the 1.8% in Kenya (Harania et al., 2008) and 0.4% in South Africa (Hoffmann *et al.*, 2008).

The prevalence of HBV among the pregnant women was 6.0%. Studies carried out in other localities in Cameroon, estimated the prevalence to be 7.7% in Yaounde (Fomulu et al., 2013) and 9.7% in Buea (Frambo et al., 2014).

This prevalence was higher compared to studies carried out in other parts of Africa, like Sudan 5.6% (Elsheik *et al.*, 2007) Ethopia 3.8% (Zenebe *et al.*, 2014) and lowered compared to 7.3% in Ethiopia (Tiruneh et al., 2008) and 9.5% in Nigeria, (Bassey et al., 2009). This wide geographical variation of HBV prevalence can be attributed to differences in cultural and behavioral practices as well as differences in the test methods employed to detect HBV infection (Olokoba *et al.*, 2011; Frambo et al., 2014).

The prevalence (17.4%) of HIV was highest in women of the age group 31-40years and this is higher compared to the prevalence (9.1%) seen in the 30-39 years national survey (INS, 2012). However the result was similar to studies (15.7%) in women below 20 years carried out by Dibua et al (2013). This can be attributed to the fact that these women are at the peak of their reproductive years and are exposed to multiple sexual activity which is the major risk factor of HIV (Olokoba *et al.*, 2011). Regarding HBV prevalence, it was highest in the below 20 age group (11.1%). This study contradicts that of Sania et al (2009) from Pakistan (2.6%) which reported that women <20 years had the lowest prevalence. This result may be associated with higher sexual activities and exposure to other risky behaviors like scarification and tattoos that is common with younger women.

Although the differences were not significant (p>0.05), the prevalence of HIV (6.7%) and HBV (6.3%) was higher in urban areas compared to rural areas. These results are also similar to results from the national survey carried out in 2011 with an HIV prevalence of 6.4% and 4.6% respectively (INS, 2012). On the contrary, studies by Sania et al (2009) and reports from Center for Disease Control and Prevention (CDC, 2005) state that the prevalence was higher in rural populations.

It is expected that the prevalence should be higher in rural areas due to increased rural population, illiteracy, poverty and less awareness (Asif et al., 2009). The low prevalence recorded in rural areas can be attributed to rural migration to urban areas for greener pasture the shift of health campaigns towards remote and rural areas in the past 3 years in Cameroon and the low sample population size.

In relation to marital status, both prevalence were highest among the women in a concubine relationship even though the difference was not significant (P<0.05). On the contrary a high prevalence of HIV infection was observed among the single ladies in Nigeria (Dibua et al., 2013). This can be attributed to the fact that women involved in this type of relation are mostly widows, divorced women or single women whose sexual partners are married men. This type of relationship is not usually stable and the person involved is exposed to multiple sexual partners which is a risky behaviour to all sexually transmitted infection. Further, more this group of individuals will hardly go in for voluntary HIV and HBV screening with their partners.

Although there was no significant difference in terms of education, both HIV and HBV prevalences were higher (10%) in women who did not have any formal education. This high prevalence of HIV contradicts other studies which state that HIV prevalence is lowest (2.8%) among women who have had no formal education (Jatau et al., 2009; INS, 2012). The highest prevalence seen among this group is probably because they are not knowledgeable about transmission routes for both HBV and HIV and might engage in risky behaviors. There was a significant correlation between HBV and HIV prevalence and gravidity. The frequency of HBV was highest (23.1%) among grand multigravida women. This study contradicts those of Sania et al (2009) which stated that it was highest (53.25%) in multigravida. This might be due to the fact that these women might have had several sexual intercourses compared to those with smaller gravidity.

The prevalence (1.7%) of HIV and HBV co-infection in Bamenda, is slightly higher compared to the 1.5% prevalence registered in North Region of Cameroon (Noubiap et al., 2015) and lower compared to the 1.0% registered in Cambodia (Van der Veen et al., 2014) and 1.3% from Ethiopia (Zenebe et al., 2014). On the contrary it was higher compared to the 8.5% registered in Côte d'Ivoire (Rouet et al., 2004), 4.3% in india (Vidya et al., 2014) and 6.5% in Nigeria (Okeke et al., 2012). This is because the prevalence rates of HBV and HIV co-infection varies worldwide depending on the geographic regions and risk groups (Jindal et al., 2008.).

The prevalence of HIV and HBV co-infection was highest among women <20 years of age, from rural areas, in concubine relationship, who have attained primary education, and those who are grand multigravida>4 Table 3. Dibua et al (2013) found out that co-infection was highest in the 31-40 years age group. However similarities were seen in other aspects.

Although the prevalence of HIV (6.6%) and HBV (6.0%) was almost similar there was a great difference in their knowledge. The good knowledge for HIV seen was similar to a study carried in Guangzhou (Nei and Shen, 2006), Botswana (Lindsey et al., 2012), india (Meena et al., 2013) but was contrary to studies from Ethopia (Wondemagegn et al., 2014). The similarities in prevalence may result from the fact that both HIV and HBV share a common route of transmission. Assessing knowledge of HIV and HBV we realize a significant difference. The more knowledgeable the women are on HIV is probably due to continuous HIV sensitization in the community. Results of the study showed very low knowledge and poor practice for HBV compared to HIV. Poor knowledge regarding HBV seen in this study is similar to what has been reported from around the globe (Van der Veen et al., 2010; ulHaq et al., *2013;* Yonatan and Kelemu 2013).

Table.1 Socio-Demographic Characteristics of Studied Women

Variable	N	%
Age(Years)		
<20	36	12.0
20-30	217	72.1
31-40	46	15.3
>40	2	0.7
Residence		
Urban	269	89.4
Rural	32	10.6
Marital Status		
Single	61	20.3
Married Monogamy (MM)	217	72.1
Married Polygamy (MP)	7	2.3
Concubine	16	5.3
Level of Education		
No formal education	10	3.3
Primary school	43	14.3
Secondary	91	30.2
Tertiary	157	52.2
Gravidity		
Primigravida: 1	108	35.9
Multigravida: 1- 4	167	55.5
Grand multigravida: >4	26	8.6

Table.2 Prevalence of HIV and HBV among the Study Population

Variable	N	HIV		HBV	
		Positive (%)	p	Positive (%)	p
Age(Years)					
<20	36	3(8.3)		4(11.1)	
20-30	217	9(4.1)	0.01	9 (4.1)	0.17
31-40	46	8(17.4)		5(10.9)	
>40	2	0(0.0)		0(0.0)	
Residence					
Urban	269	1 8(6 .7)		17 (6.3)	0.47
Rural	32	2(6.2)	0.96	1(3.1)	
Marital Status					
Single	61	1 (1.6)		2 (3.3)	
MM	217	17(7.8)	0.24	12(5.0)	0.41
MP	7	0(0.0)		1(14.3)	
Concubine	16	2(12.5)		3(18.8)	
Level of Educational					
No formal Education	10	1 (10.0)		1 (10)	
Primary school	43	3(7.0)	0.81	2(4.7)	0.77
Secondary	91	7(7.7)		4(4.4)	
Tertiary	157	8(5.7)		11(7.0)	
Gravidity					
Primigravida, 1	108	6(5.6)		6 (5.6)	
Multigravida1- 4	167	11(6.6)	0.51	6 (3.6)	0.00
Grand multigravida>4	26	3(11.5)		6(23.1)	

Table.3 Prevalence of HIV and HBV co Infection among Pregnant Women

Variable	N	HIV positive (%)	HBV positive(%)	HIV& HBV co infection(%)
Age(Years)				
<20	36	0(0.0)	1(3.0)	3(8.3)
20-30	217	8(3.8)	8(3.8)	1(0.4)
31-40	46	7(17.1)	4(10.5)	1(2.2)
>40	2	0(0.0)	2(100)	0(0.0)
Residence				
Urban	269	13 (5.2)	14(5.6)	4(1.5)
Rural	32	1(3.2)	0(0.0)	1(3.1)
Marital Status				
Single	61	0(0.0)	1(1.7)	1(1.6)
Married Monogamy Married	217	15(7.4)	11(5.5)	2(0.9)
Polygamy Concubine	7	0(0.0)	1(100)	0(0.0)
	16	0(0.0)	1(6.3)	2(12.5)
Educational Status				
No formal Education	10	1(11.1)	1(11.1)	0(0)
Primary school	43	1(2.4)	0(0)	2(4.6)
Secondary	91	7(8)	4(4.8)	0(0.0)
Tertiary	157	6(4.1)	8(5.4)	3 (1.9)
Gravidity				
Primigravida, 1	108	3(2.9)	3(2.9)	3(2.8)
Multigravida1- 4	167	10(6.2)	5(3.2)	1(0.6)
Grand multigravida>4	26	2(10)	5(21.7)	1(3.8)

Table.4 Assessing knowledge and Practice of HIV by Level of Education

Variable	knowledge				Practice			
	Excellent	Good	χ^2	p	Good	Poor	χ^2	p
No formal Education	10(100)	0(0.0)	1.5	0.7	10(100)	0(0.0)	10.76	0.84
Primary	39(90.7)	4(9.3)			43(100)	2(4.6)		
Secondary	86(94.5)	5(5.5)			91(100)	0(0.0)		
Tertiary	148(94.3)	9(5.7)			148(100)	9 (5.7)		

Table.5 Assessing knowledge and Practice of HBV by Level of Education

Variable	HIV					HBV			
	Excellent	Good	Poor	χ^2	p	Good	Poor	χ^2	p
No formal Education	0(0.0)	10(100)	0(0.0)	25.9	0.00	0(0.0)	10(100)	21.03	0.03
Primary	0(0.0)	20(46.5)	23(53.5)			5(11.6)	38(88.4)		
Secondary	8(8.8)	34(37.4)	49(53.8)			23(25.3)	68(74.7)		
Tertiary	26(16.6)	58(36.9)	73 (46.5)			18(11.5)	139 (88.5)		

Figure.1 Prevalence of HIV and HBV Infection

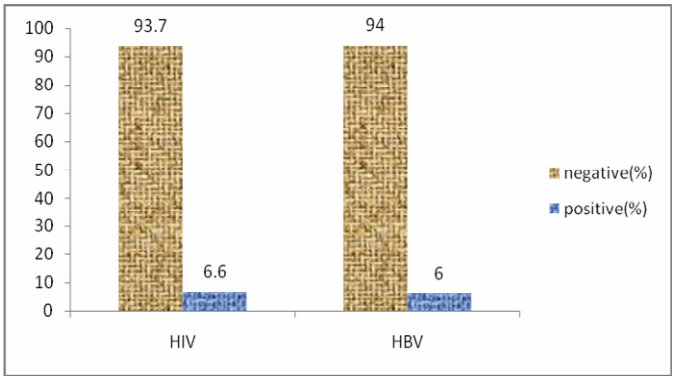
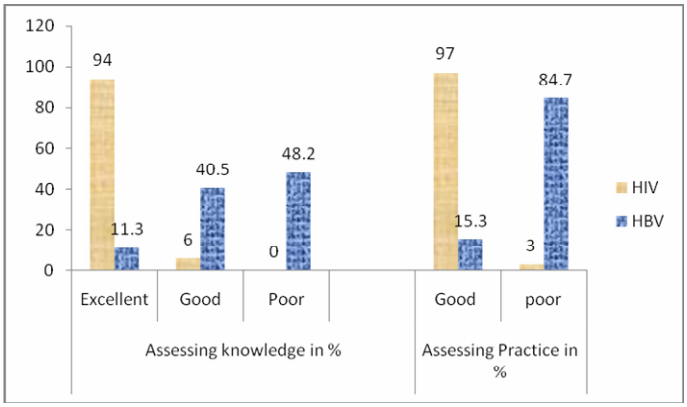


Figure.2 Assessing Knowledge and Practice in the General Population



However studies in Egypt (Shalaby et al., 2007) and Japan (Hisashi and Koji, 2013) reported an adequate and high knowledge of HBV respectively. Looking at practices, these women showed poor practices towards HBV. Similar results have been reported in Pakistan (ulHaq, et al., *2013)* and Iran (Kabir et al., 2010) and Ethiopia (Yonatan and Kelemu, 2013).

On the contrary, studies from Egypt showed good practices regarding hepatitis B (Shalaby et al., 2007). The significant differences in knowledge and practices account for the significant difference in the prevalence of HIV and HBV. It is evident that prevention against any disease is proportional to knowledge and practice. Therefore, understanding the knowledge and practice about HIV/HBV will help in formulating a strategy for prevention and treatment

This study showed that HIV and HBV infections are important public health issues in Cameroon that need to be addressed. Considering the high prevalence, all pregnant women need to be screened for both HIV and HBV infection during antenatal care so as to permit timely interventions aimed at preventing perinatal transmission. Thus, timely vaccination of all HBV-exposed infants is very necessary and should be made available and free in countries with high prevalence of HBV. Due to the poor knowledge seen in HBV patients, health education about HBV risk factors, the mode of transmissions and prevention

should be addressed in a similar way as it is with HIV in the entire country.

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