Prevalence and Risk Factors of Hepatitis B among Pregnant women attending antenatal clinics in Abuja Nigeria.

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ABSTRACT
Nigeria is one of the countries considered as a highly endemic country for hepatitis B, mainly due to perinatal transmission of hepatitis B virus (HBV). The prevalence of HBV surface antigen (HBsAg) carriage in pregnant women is a relevant marker for the risk of mother-to-child HBV transmission. This study was conducted to determine the prevalence of Hepatitis B virus infection among pregnant women visiting antenatal clinics in Abuja Nigeria. A total of 350 pregnant women were screened for hepatitis B virus surface and core antibodies. Out of the screened women, 34(9.7%) were positive for HBsAg while 10(2.9%) were positive for HBsAb. Pregnant women within the age group 25-29 years recorded prevalence of 3.7% HBsAg while 30-34 years had 1.4% HBcAb. Pregnant women with and without history of surgery had prevalence of 4.86% each for HBsAg and 1.43% HBcAb. Pregnant women that share sharp objects had prevalence of 3.43% for HBsAg and 1.14% for HBcAb compared to others. Pregnant women from polygamous homes had a prevalence of 1.7% for HBsAg and 0.29% for HBcAb while women from monogamous had 8% for HBsAg and 2.57% HBcAb. Prevalence of 8.57% for HBsAg and 2.86% for HBcAb was recorded for pregnant women that are non health workers while 1.14% HBsAg only was recorded for health workers. Pregnant women with history of blood transfusion had prevalence of 8% for HBsAg and 2.3% HBcAb while women without history of blood transfusion had prevalence of 1.71% for HBsAg and 0.57% for HBcAb. Statistical analysis (chisquare, t- test and correlation regression) showed no significant relationship between the rates of infection with hepatitis B virus and socio economic factors considered except in age group. HBsAg prevalence observed in pregnant women in Abuja, Nigeria reflects a high risk of HBV perinatal transmission and call for a widespread action for the newborns.

KEYWORDS: Hepatitis B Virus, Serological markers, Ante natal clinics, Abuja, Nigeria

INTRODUCTION

The liver which is a vital organ that processes nutrients, filters the blood, fights infections can be inflamed or damaged when its function is affected (Santos, Choquette and Bezerra, 2010). Hepatitis is a general term referring to inflammation of the liver, which may result from various causes (Ghabril, Chalasani and Björnsson, 2010). Hepatitis can be caused by both infectious (i.e. viral, bacterial, fungal, and parasitic organisms) and non infectious agents (e.g. alcohol, drugs, autoimmune diseases, and metabolic disorders) but viral hepatitis are the most common cause of hepatitis worldwide (Malaguarnera, Cataudella, Giordano, Nunnari, Chisarin and Malaguarnera, 2012). The most common causes of viral hepatitis are these hepatotropic viruses; Hepatitis A, Hepatitis B, Hepatitis C, Hepatitis D and Hepatitis E (Gallegos-Orozco, Rakela-Brödner, and Gross, 2010). Other viruses can also cause liver inflammation such as Herpes Simplex, Cytomegalovirus, Epstein-Barr virus or Yellow fever (Naides, 1998).

Hepatitis B virus is a hepadnavirus that has a circular genome of partially double-stranded DNA and replicates through an RNA intermediate form by reverse transcription, it was originally known as "serum hepatitis" (Bartenschlager, Junker-Niepmann, Schaller, 1990). The virus can remain viable for more than 7 days on environmental surfaces at room temperature. The average incubation period is 90 days from time of exposure to onset of symptoms, but may vary from 6 weeks to 6 months.. Hepatitis B virus is a major global health problem that can cause chronic liver disease and put people at high risk of death from cirrhosis of the liver and liver cancer. More than 240 million people have chronic (long-term) liver infections and more than 780,000 people die every year due to acute or chronic consequences of hepatitis B (Santos *et al.,* 2010).

Perinatal infection is a major route of infection in developing countries, about 10-20% of seropositive women transmit the virus to their neonates in the absence of immunoprophylaxis (Okonko, Okerentugba and

Innocient-Adiele, 2012). A newborn baby can get the virus from the mother during delivery when the baby comes in contact with the mother's body fluids in the birth canal (Lee, Lo, Tsai, Wu, Wu, Yang, and Ng, 1998). In women who are seropositive for both HBsAg and HBeAg vertical transmission is approximately 90% (Leung, 2009). In patients with acute hepatitis B, vertical transmission occurs in up to 10% of neonates when infection occurs in the first trimester and in 80 -90% of neonates when acute infection occurs in the third trimester (Xu, Yan, and Choi, 2002).

Diagnosis of hepatitis is made by biochemical assessment of liver function (Mast, Weinbaum and Fiore, 2006). Initial laboratory evaluation should include: total and direct bilirubin, Alanine transferase, Aspartate ,prothrombin time, total protein, albumin, serum globulin, complete blood count, and coagulation studies. Diagnosis is confirmed by demonstration in sera of specific antigens and/or antibodies (Aspinall, Hawkins, Fraser, Hutchinson and Goldberg, 2011).Tests specific for complete virus particles in liver and serum are available only in research laboratories (Zoulim, 2006).

Serological markers are key elements in diagnosing acute hepatitis B virus (HBV) infection and determining its possible evolution towards chronicity (Lee, 1997). Serologic testing for the diagnosis of hepatitis B virus (HBV) infection involves measurement of a panel of distinct HBV-specific antigens and antibodies reaction (Linnen, Wages and Zhang-Keck, 1996). The panel of responses can determine whether a patient is susceptible to infection, immune as a result of resolved infection, immune as a result of vaccination, acutely infected, or chronically infected. The primary markers are HBsAg, HBeAg, Anti-HBc, Anti-HBe, Anti-HBs. The limitation in the diagnosis is that once treatment of chronic HBV is initiated with approved anti-hepadnaviral agents, the measurement of HBV DNA in serum can only be done with molecular technology, which helps monitor treatment efficacy but also indicates breakthrough infection should drug resistance emerge (Chang and Lewin, 2007). Advances in the molecular diagnosis of drug resistance using highly sensitive methodologies such as DNA hybridization assays can further pinpoint the type of mutation responsible and, more importantly, detect upcoming viral resistance at an early stage when the variant represents only a minor fraction of the total viral population. Such new tools are especially relevant for patients at high risk for disease progression but are expensive (Cindy, Weinbaum, Ian, Eric, Mast, Susan,… Ward, 2008)

Statement of the Research Problem

Hepatitis B Virus can be transmitted from one generation to another during child birth and has been reported to be a major cause of death in time past. It affects the most sensitive organ of the body. To date, transmission and management of Hepatitis B is an issue of medical importance.

Justification of the Study

Studies (Seyed, Azar, Kourosh, Mohammad, Hamid and Mohammad, 2011) have been done on Hepatitis B Viral infection in different parts of the world but information regarding the prevalence of HBV infection in pregnant women using two serological markers (HBsAg and HBcoreAb) is very scanty particularly in Nigeria.

Studies (Pomper, Wu and Snyder, 2003) have revealed that steady increase in the transmission of the disease is attributed to improper screening of the blood; also the virus can be transmitted by blood donors and organ donors who are positive for antibody to HBV core antigen (anti-HBc) but negative for all other HBV markers. This occult infection is one of the reasons for high risk of HBV infection. There may be possibility of missing out one marker when the other is negative among pregnant women posing a risk to their babies. The findings from this study will improve the management protocol of pregnant women when screened, hence the need for this study.

Scope of the Study

This study involved 350 pregnant women visiting three hospitals in Abuja for ante-natal care. Blood samples were collected from the pregnant women and screened for Hepatitis B virus using two serological markers (HBsAg and HBcoreAb). Methodology employed for the study includes collection of Demographic information and the screening of the blood samples using rapid HBV panel kit.

Aim and Objectives of the Study

This study was aimed at determining the prevalence of Hepatitis B among pregnant women visiting three hospitals in Abuja for ante-natal care with the following Objectives:

1. To screen blood samples for hepatitis B virus surface and core antibodies among pregnant women visiting the three hospitals for ante-natal care.
2. To determine the risk factors (age, history of surgery etc) associated with Hepatitis B virus infection among pregnant women in the study area.
3. To determine the relationship between HBsAg and HBcAb among pregnant women under investigation.

MATERIALS AND METHODS

Description of the study area

Abuja is the largest and the capital city of Nigeria, it has a human population close of 780,000 people. The city of Abuja is on latitude **9.0667°N** and longitude **7.4833°E.** The Territory is north of the confluence of the Niger and Benue Rivers. Abuja is bordered by Kaduna state to the north, Nassarawa state to the east , Kogi state to the south and Niger state to the west. It has land area of 2,824 square miles (7,315 square km). The average annual temperature is 27.2 °C in Abuja and about 1267 mm of precipitation falls annually. The occupation of the first inhabitants of Abuja(the Gbagyi) is farming, following the influx of people to Abuja the major occupation of the inhabitants are public servants and civil servants.

Sample size determination

The sample size for this research work was determined by the formula below

$n = t^2 \times p(1-p)/m^2$ (Aminu *et al.*, 2009)

Where,

n =required sample size

t =confidence level at 95%

p =prevalence rate of the disease

m = margin of error at 5%

Ethical Consideration

Ethical clearance was obtained from the research ethical committee of the Federal Capital Territory before blood samples collection

Sample collection

A total of 350 samples were collected using venipuncture from the pregnant women visiting the three hospitals (University of Abuja Teaching Hospital, National hospital and Zankli hospital) from July to December, 2014. A structured questionnaire was administered in order to obtain demographic information of the pregnant women before the collection of the samples. The breakdown of the blood samples collected from each of the three hospitals is as follows: University of Abuja Teaching Hospital -150, National Hospital - 50 and Zankli Hospital – 150. Five milliliter (5ml) of blood was taken from each of the 350 pregnant women recruited for the study. The blood samples were taken into EDTA bottles and transported to the serology laboratory of Zankli hospital for analysis

Sample preparation and screening

Blood samples were centrifuged separately at 1500 rpm for 5 minutes, plasma from each sample was aspirated and transferred into a sterile cryovial. The samples were stored at -20° C prior to screening. The frozen plasma was allowed to thaw before the tests devices were removed from the pouches, placed on a clean surface in the laboratory. The test devices were labeled with samples code for easy identification, three drops of specimens were dispensed into the sample wells using the sterile droppers and allowed to stand for 15 minutes. Readings were taken and recorded.

Quality Control of the Assay

A procedural control is incorporated in the device and is labelled "control". Control bar that did not turn red by assay completion was seen as invalid and was retested.

Interpretation of the test results

The test was said to be positive when red bands appeared in both the control and test region of the test device. When a red band appeared in the control region of the strip without any red band in the test (patient) region, the test was said to be negative. When no red band appeared in the control region, and when a red band appeared only in the test of the strip, these two tests were said to be invalid and the test was repeated to rule out errors

Statistical Analysis

Chisquare, student t- test was used to determine the level of significance between the considered factors and rate of infection.

RESULTS AND DISCUSSION

Results

Out of the 350 blood samples collected from pregnant women visiting three hospitals in Federal Capital Territory, Abuja, Nigeria, 34(9.7%) were found positive for hepatitis B virus surface antigen while 10(2.9%) were positive for hepatitis B virus core antibody.

Pregnant women within the age group 25-29 years recorded high prevalence of 3.7% for surface antigen while pregnant women within the age group 30-34 years had prevalence of 1.4% for hepatitis B virus core antibody (Table 1)

Table 1 Prevalence of hepatitis B virus surface antigen and core antibody

	HB surface Antigen			HB core Antibody		
Age	Sample screened	+ve	Prevalence (%)	Sample screened	+ve	Prevalence (%)
20-24	44	1	0.3	44	0	0
25-29	115	13	3.7	115	4	1.1
30-34	78	9	2.6	78	5	1.4
35-39	63	8	2.3	63	1	0.3

(t- test= 3.81, p<0.05, coefficient of correlation (r)= 0.900, coefficient of regression b=0.4)

Pregnant women with history of blood transfusion had prevalence of 2.3% surface antigen, 0.6% core antibody while those without history of blood transfusion had prevalence of 7.4% surface antigen and 2.3% core antibody (Table 2).

Table 2 Prevalence of HBV surface antigen and core antibody according to history of blood transfusion

		HB surface Antigen			HB core Antibody		
	Blood transfusion	Sample screened	Positivity	Prevalence	Sample screened	Positivity	Prevalence
	Yes	85	8	2.3	85	2	0.6
	No	265	26	7.4	265	8	2.3
		350	34	9.7	350	10	2.9

(chisquare(X^2)= 3.81, p>0.05, coefficient of correlation (r)= 0.997, coefficient of regression b=0.33)

Pregnant women with history of surgery and those without history of surgery recorded 4.86% each for HBV surface antigen. Similarly, pregnant women with and without history of surgery also had 1.43% each for hepatitis B virus core antibody (Table 3)

Table 3 Prevalence of HBV surface antigen and core antibody according to History of Surgery

		HB surface Antigen			HB core Antibody		
	History of surgery	Sample screened	Positivity	Prevalence	Sample screened	Positivity	Prevalence
	Yes	125	17	4.86	125	5	1.43
	No	225	17	4.86	225	5	1.43
		350	34	9.7	350	10	2.9

chisquare (X^2)= 3.44, p>0.05, coefficient of correlation (r)= 1.000, coefficient of regression b=0)

Pregnant women that shared sharp objects had prevalence of 3.43% surface antigen, 1.14% core antibody while those without history of sharing sharps had prevalence of 6.29% surface antigen and 1.71% core antibody (Table 4).

Table 4 Prevalence of HBV surface antigen and core antibody according to lifestyle

	HB surface Antigen			HB core Antibody		
Sharing of sharp objects	Sample screened	Positivity	Prevalence	Sample screened	Positivity	Prevalen
Yes	102	12	3.43	102	4	1.14
No	248	22	6.29	248	6	1.71
	350	34	9.7	350	10	2.9

(chisquare (X^2)= 1.07, p>0.05, coefficient of correlation (r)= 0.996, coefficient of regression b=0.2)

Table 5 Prevalence of HBV surface antigen and core antibody according to family type

	HB surface Antigen			HB core Antibody		
Family type	Sample screened	Positivity	Prevalence	Sample screened	Positivity	Prevalence
Polygamy	19	6	1.71	19	1	0.29
Monogamy	331	28	8	331	9	2.7
	350	34	9.7	350	10	2.9

(chisquare(X^2)= 2.73, p>0.05, coefficient of correlation (r)= 0.995, coefficient of regression b=0.36)

Pregnant women from polygamous homes had prevalence of 1.71% surface antigen and 0.29% had core antibody while those from monogamous homes recorded prevalence of 8% surface antigen and 2.57% core antibody (Table 5).

Pregnant women who are non health workers had a prevalence of 8.57% surface antigen and 2.86% core antibody while prevalence of 1.14% surface antigen and 0% core antibody was recorded for those that are health workers (Table 6).

Table 6 Prevalence of HBV according to occupation of the pregnant women

	HB surface Antigen			HB core Antibody	
Occupation	Sample screened	Positivity	Prevalence	Positivity	Prevalence
Non health workers	318	30	8.57	10	2.86
Health workers	32	4	1.14	0	0.0
	350	34	9.7	10	2.9

(chisquare(X^2)= 1.28, p>0.05, coefficient of correlation (r)= 0.991, coefficient of regression b=0.38)

Table 7 Relationship between the factors and the rate of infection

Factors	Positive samples HBsurface	Positive samples core antibody	p-value
Age(years)			
20-24	1	-	3.81
25-29	13	4	
30-34	9	5	
35-39	8	1	
40-44	3	-	
History of blood transfusion			
Yes	8	2	3.81
No	26	8	

History of surgery			
Yes	17	5	3.44
No	17	5	
Sharing sharp objects			
Yes	12	4	1.07
No	22	6	
Family type			
Polygamous	6	1	2.73
Monogamous	28	9	
Occupation			
Non health workers	30	10	1.28
Health workers	4	-	

Discussion

Transmission of hepatitis B virus (HBV) from mother to infant during the perinatal period is one of the most efficient modes of HBV infection which often leads to severe long-term diseases. In this study, prevalence of HBV surface antigen and core antibody among pregnant women visiting three hospitals in Abuja was determined to be 9.7% and 2.9% respectively. The high prevalence of HBsAg and HBcAb recorded in this study is comparable with the study conducted by Forbi, Onyemauwa, Gyar, Oyeleye, Entonu and Agwale (2008); Mbaawuaga, Enenebeaku, Okopi, Damen, (2008); Kuta *et al.*, (2014).

Pregnant women within the age group 25-29 years recorded prevalence of 3.7% for surface antigen while pregnant women within the age group 30-34 years had high prevalence of 1.4% for hepatitis B virus core antibody (Table 1).These findings agree with the report by Vazquez-Martinez *et al*., (2003) and Olokoba *et al.,* (2011) who observed that the average age of women infected with the Hepatitis B virus was 26 years. The reason for the prevalence could be attributed to sexual activeness peculiar with women within the age group (25-29 years). Statistical analysis (Table 7) revealed that age of the pregnant women is a significant factor associated with the rate of infection.

Pregnant women with history of blood transfusion had prevalence of 2.3% surface antigen, 0.6% core antibody while those without history of blood transfusion had prevalence of 7.4% surface antigen and 2.3% core antibody (Table 2). Study by Ibrahim *et al.,* (2012) and Olokoba *et al.,* (2012) have reported similar incidences. Although the environment where the previous studies (Ibrahim *et al.,* 2012; Olokoba *et al.,* 2012) cannot be compared with the environment (Nigeria) where this study was conducted, the fact that similar procedures were used makes the outcome of this study comparable with the previous studies. Statistical analysis revealed that blood transfusion is not a factor in the infection rate with HBV (Table 7). Despite the revelation of the statistical analysis, the possibility of contracting HBV through blood transfusion is not in doubt.

Pregnant women with history of surgery and those without history of surgery recorded 4.86% each for HBV surface antigen. Similarly, pregnant women with and without history of surgery also had 1.43% each for hepatitis B virus core antibody (Table 3). Similar studies by Ibrahim et al. (2012) and Olokoba et al. (2012) have reported similar incidences among pregnant women with history of blood transfusion with a significant relationship between the rate of infection and the factor (history of surgery). The result of this study is at variance with the previous studies (Table 7).

Pregnant women that share sharp objects had prevalence of 3.43% surface antigen, 1.14% core antibody while those without history of sharing sharp objects had prevalence of 6.29% surface antigen and 1.71% core antibody (Table 4). Similar study has been reported by Machado *et al.* (2013) with higher prevalence. The low prevalence recorded among pregnant women involved in this study could be attributed to good hygienic practices and awareness on the common routes of transmitting HBV. Chisquare analysis revealed that the use of sharp objects is not a significant factor.

Pregnant women from polygamous homes had prevalence of 1.71% surface antigen and 0.29% core antibody while those from monogamous homes recorded prevalence of 8% surface antigen and 2.57% core antibody (Table 5). This study corroborate the previous study by Frambo *et al.*(2014) but at variance with the report by Anaedobe, Fowotade, Omoruyi, Bakare, (2015). Chisquare analysis indicated no significant relationship between the rate of infection and the factor(polygamous or monogamous) considered (Table 7).

Pregnant women who are non health workers had a prevalence of 8.57% surface antigen and 2.86% core antibody while prevalence of 1.14% surface antigen only was recorded for those that are health workers (Table 6). Akani et al. (2005) has reported higher prevalence (17%) among public health workers. The low prevalence observed in this study could be attributed to awareness and war against the proliferation of untrained or half-baked medical personnels particularly in the rural settings. Despite the prevalence recorded among pregnant women that are health workers and non health workers, chisquare analysis revealed that working or not working in the health sector was not a factor in the transmission of HBV (Table 7).

CONCLUSION AND RECOMMENDATIONS

Conclusion

From the results of this study, the prevalence of Hepatitis B among pregnant women is high and reflects a high risk of Hepatitis B Virus perinatal transmission. The factors obtained from the demographic data of the pregnant women investigated revealed that there was no significant relationship between the rate of infection and

the factors considered. Indiscriminate blood transfusion by untrained medical personnel cannot be ruled out as a major contributing factor in the spread of the Hepatitis B virus infection. The study also observed less awareness about the disease (Hepatitis B) particularly the less privileged in the society.

Recommendations

Based on the results, it is recommended that all pregnant women be routinely screened for HBV with other markers because the use of other HBV infection serological markers such as anti HBs, anti HBcore (HB coreAb) and anti HBe will help to clearly differentiate a true negative person from a person having an occult HBV infection as well as providing information about the status of a pregnant woman. Community and hospital based studies should be encouraged to ascertain the true picture of the situation in FCT and the country at large. A strong surveillance strategy should be in place by government and private organizations to track the spread of the disease among many Nigerians.

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