

Hepatitis B Virus Seroprevalence and Potential Perinatal Transmission Among Pregnant Women in Abakaliki, Nigeria.

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Abstract

Background: Hepatitis B Virus Hepatitis B Virus (HBV) infection is a global public health problem. It is highly endemic in Nigeria and it is estimated that about 9-12% of the total population of Nigeria are chronic carriers of hepatitis B surface antigen. Epidemiological data on (HBV)infection among pregnant women in Nigeria are very scarce, especially in rural areas. The purpose of this study was to determine the prevalence and potential perinatal transmission among rural pregnant women in Abakaliki Nigeria.

Methods: A cross-sectional study was conducted among pregnant women accessing antenatal care at the Federal Teaching Hospital, Abakaliki. We consecutively recruited 300 pregnant women attending antenatal consultations. A pretested questionnaire was used to collect socio-demographic data and factors associated with HBV infection. The presence of hepatitis B surface antigen (HBsAg), hepatitis B e antigen (HBeAg), and human immunodeficiency virus (HIV) were determined using commercial test strips. A chi-square test was used for the analysis.

Results: The mean age was 31.8 (SD6.2) years. All women were married and (23.4%) were farmers while (47.0%) had secondary education. Sixteen women (5.3%) were HBsAg-positive, of whom (6.3%) were positive for HBsAg. The prevalence of HIV infection was (0.3%). Overall, (6.3%) women were co-infected with HIV and HBV. Independent correlates of HBV infection included a history of Jaundice ($p=0.046$) history of sexually transmitted infections ($p=0.005$) and concurrent infection by HIV ($p<0.0001$).

Conclusion: The prevalence of HBV infection among pregnant women in Abakaliki was intermediate. The relatively high rate of women positive to both HBsAg and HBeAg suggests that perinatal transmission of HBV might be the prevailing mode of HBV transmission in this area.

Keywords: Hepatitis B virus HBsAg, HBeAg Pregnancy Nigeria

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Quick Response Code:



Introduction

Background

Hepatitis B Virus infection is a global public health problem. More than one-third of the world population has been reported to have serological evidence of past or present hepatitis B virus (HBV) infection^{1,2,3}. It is estimated that 350 million people globally are chronic carriers of hepatitis B virus of whom 170 million reside in Africa^{2,3}. Areas of particularly high endemicity are in Sub-Saharan Africa and Asia⁴⁻⁸. It is highly endemic in Nigeria and about 9-12% of the total population of Nigeria are chronic carriers of hepatitis B surface antigen^{4,6,9}. Hepatitis B Virus (HBV) infection is an important cause of liver disease in pregnancy. The seroprevalence of hepatitis B surface antigen (HBsAg) in pregnant women ranges from 0.67% in Spain¹⁰ to 37% in Papua New Guinea¹¹. In Port Harcourt, Nigeria, the seroprevalence of hepatitis B surface marker in pregnant women is 4.3%⁴ whereas, in Ghana and Kenya, the hepatitis B surface antigen (HBsAg) seroprevalence in pregnant women is 6.4%¹² and 9.3%² respectively.

Mother-to-child transmission (MTCT) of HBV is responsible for more than one-third of chronic HBV infections globally¹³. Indeed, perinatal transmission seems to be predominant in high-prevalence areas such as sub-Saharan African countries¹⁴. Children born to mothers positive for hepatitis B surface antigen (HBsAg) and hepatitis B e antigen (HBeAg) have a 70-90% likelihood of perinatal acquisition of HBV infection, and up to 90% of perinatal infections evolve towards chronicity compared to nearly 5% of adult infections¹⁵. Prevention of perinatal transmission of HBV is therefore crucial to tackling the burden of the disease in high-endemic sub-Saharan African areas. Effective strategies for reducing the incidence of chronic infections include maternal screening combined with post-exposure prophylaxis consisting of HBV vaccination immediately after delivery in all children born to HBsAg-positive mothers, ideally with immunoglobulin prophylaxis¹⁶. This study aimed to determine the prevalence and factors associated with HBV infection and the infectivity of rural pregnant women in the Far North region of Cameroon.

Methods, Questionnaire administration, Laboratory testing, Statistical analysis, and finally Ethical considerations.

Study design

This was a cross-sectional study conducted among pregnant women accessing antenatal care or delivery services at the Federal Teaching Hospital, Abakaliki.

Study setting and population.

The hospital is located in the Abakaliki Metropolis, the capital of Ebonyi State of Nigeria. The inhabitants are mainly the Igbos. The majority of the population dwells in rural areas with farming as their major occupation¹⁷. The study population comprised all pregnant women who attended antenatal care at the Federal Teaching Hospital during the study period.

Sampling technique and sample size

The prevalence rate of Hepatitis B surface antigen (HBsAg) in pregnant women in Enugu is 4.5%¹. This prevalence rate of 4.5% has been chosen to calculate the minimum sample size of this study. This is because Enugu and Abakaliki fall under the same South-East Geopolitical zone of Nigeria with similar socio-cultural and demographic characteristics and no such studies have been done in Ebonyi state. The minimum sample size for this study therefore will be calculated using the following equation¹⁸.

$$n = Z^2PQ/d^2$$

n = The minimum sample size

z = The standard normal deviate = 1.96

p = The proportion in the target population estimated to have a particular characteristic with a prevalence rate of 4.5%¹ (0.045) in this instance

q = 1.0 – p = which is 1.0 – 0.045 = 0.955

d = Degree of accuracy desired which is 2.5% (0.025) in this case.

Consequently, by applying the formula as follows:

$$n = \frac{(1.96)^2 \times 0.045 \times 0.955}{(0.025)^2} = \frac{3.8416 \times 0.045 \times 0.955}{0.000625} = \frac{0.1650928}{0.000625} = 264.15$$

The minimum sample size was 264, allowing for a 20% attrition rate, the sample size for this study was 300.

Data collection and laboratory investigation.

A structured pretested questionnaire was used to collect socio-demographic information and data on risk factors for HBV infection among participants. Upon completion of the questionnaire, 5 ml of venous blood was aseptically collected by venipuncture into an Ethylene Di-amine Tetra-acetic Acid (EDTA) tube. The plasma obtained from each sample was tested for the presence of HBsAg using a commercial test strip, the Clinotech Diagnostics HBsAg detection test according to the manufacturer's instructions. All samples tested positive were retested for confirmation using the same kit. There were no discordant results. Samples confirmed positive for HBsAg were further tested for HBeAg using a commercial test strip, the Clinotech Diagnostics HBeAg detection test. We also tested all blood samples for HIV according to the national screening algorithm. Accordingly, samples were first screened with an anti-HIV antibody rapid test, the Determine HIV-1/2 (Abbott Laboratories, IL, USA).

Data analysis

Data were entered and analyzed using Epi info for Windows, version 7. (Atlanta, GA 30329-4027 USA). Results are presented as counts (proportions) and mean with standard deviations (SD). The influence of various factors on the occurrence of HBV infection was calculated by both univariate and bivariate analyses. A *p*-value < 0.05 was set as statistically significant.

Ethical consideration

Formal approval was obtained from the Research and Ethics Committee of the Federal Teaching Hospital, Abakaliki with reference no FMC/AI/AD/05/227. The participation of any pregnant woman in this study was voluntary and only after written informed consent had been obtained. Those recruited were free to withdraw from the study at any point in this study without any influence on their continued management in the hospital. An arrangement was made for those who had positive HBeAg to obtain treatment at the Federal Teaching Hospital Abakaliki at no cost to them.

Results

A total of 300 pregnant women receiving antenatal care at Federal Teaching Hospital Abakaliki were serially recruited into this study.

The age ranged from 20 to 48 years with a mean age of 31.9 ± 6.3 years. The majority of the women were in the age group 21-30 years 149 (49.7%). Most of our respondents 141 (47%) had secondary school education and 83 (27.7%) women were Farmers. (Table 1)

Table 1 Demographics of pregnant women attending antenatal care in the Federal Teaching Hospital Abakaliki, Ebonyi state. Nigeria.2014

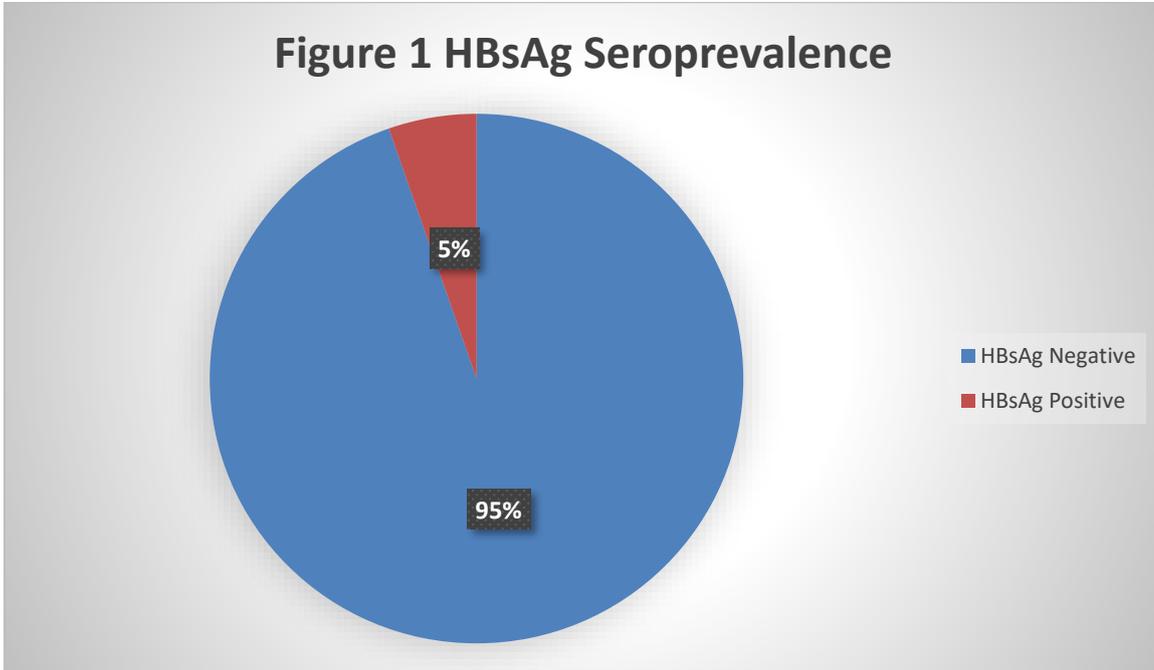
Variables	Number (N=300)	Percentage (%)
Age		
≤ 20	5	1.7
21-30	149	49.7
31-40	115	38.3
41-50	31	10.3
Educational level		
None	35	11.7
Primary	51	17
Secondary	141	47
Tertiary	73	24.3
Marital Status		
Married	300	100
Occupation		
Farmer	83	27.7
Civil servants	72	24
Students	69	23
Traders	62	20.6
Unemployed	14	4.7

Risk factors for HBV infection are presented in Table 2 The main factors reported were: previous history of sexually transmitted infection (68.0%), previous history of jaundice (35.3%), and family history of known HBV infection (6.5%).

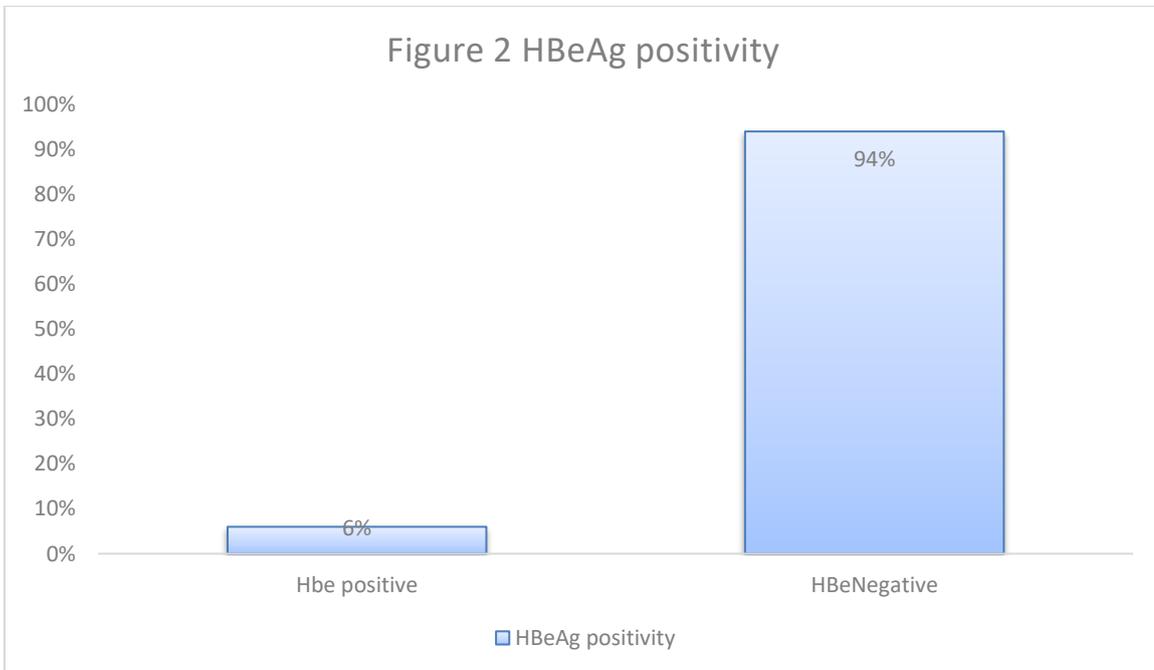
Table: Risk factors of HBV infection and markers of HBV infectivity among pregnant women attending antenatal care in Federal Teaching Hospital Abakaliki, Ebonyi State. Nigeria.2014

Characteristics	NO	Percentage (%)	Yes	Percentage (%)
Risk factors				
Previous history of Jaundice;	194	64.7	106	35.3
History of tattoo;	297	99	3	1
History of Sexually transmitted infection;	96	32	204	68
Family history of hepatitis	252	84	48	16
Past history of abortion	280	93.3	20	6.7

Number of pregnancies < 4	83	27.7	217	72.3
HIV serology test	299 (Negative).	99.67	1 (Positive)	0.33



The prevalence of HBV infection was 5%.



Factors independently associated with HBV infection included previous history of Jaundice ($p = 0.046$) History of sexually transmitted infections ($p = 0.005$) and co-infection with HIV ($p < 0.001$). The other factors assessed did not influence the occurrence of HBV infection among our participants (Table 3).

Table 3. Correlates of HBV infection among pregnant women attending antenatal in the Federal Teaching Hospital Abakaliki, Ebonyi State, Nigeria. 2014

Variables	Hepatitis B Negative	Hepatitis B Positive	P-value
Age			
≤31	144 (50.7%)	10 (62.5%)	0.508
≥32	140 (49.3%)	6 (37.5%)	
Educational Level			
Below Secondary	77(72.89%)	6(37.5%)	0.537
Secondary & above	207(27.77%)	10(62.5%)	
Parity			
≤4	236(83.10%)	13(81.25%)	0.880
≥5	48(16.90%)	3(18.75%)	
History of tattoo			
Yes	2(0.7%)	1(6.25%)	0.380
No	282(99.3%)	15(93.75%)	
HIV status			
positive	0(0.00)	1(6.25%)	0.046
Negative	284(100%)	15(93.75%)	
History of jaundice			
Yes	106(37.32%)	0(0.00%)	0.005
No	178(62.68%)	16(100%)	
History of hepatitis			
Yes	48(16.90%)	0(.0.00%)	0.148
No	236(83.10%)	16(100.0%)	
History of STI			
Yes	200(70.42%)	4(25.0%)	0.001
No	84(29.58%)	12(75.0%)	
History of miscarriage			
Yes	35	1	0.768
No	265	15	

Discussion

We investigated the seroprevalence and factors associated with HBV infection in Abakaliki Nigeria. The information gathered by this work may contribute to improving knowledge of HBV infection epidemiology in pregnant women in that region and inform local and national antenatal HBV screening and infant immunization policies.

In this study seroprevalence of HBV infection among pregnant women attending the antenatal clinic at the Federal Teaching Hospital, Abakaliki Nigeria was 5%. The prevalence reported in our study is consistent with data reported among pregnant women in Nigeria: 4.5% in Enugu¹, 4.3% reported in Port Harcourt⁴, 2.19% reported in Benin City,¹⁹ and 5.7% reported in Ilorin²⁰. However, the prevalence rate was lower, 11.6% in Maiduguri²¹, 8.3% in Zaria²² and 11% in Makurdi²³ in Nigeria. The various data reported among pregnant women in sub-Saharan African countries: 6.5% in Congo²⁴, 9.3% in Kenya²⁵, 9.5% in Gabon²⁶, 10.7% in Burkina Faso²⁷, 10.9% in Mauritania²⁸, 12.6% in Ghana²⁹, 13.8% in Senegal³⁰, and 25% in Zimbabwe³¹. The seroprevalence of HBV in Nigeria is higher in northern Nigeria than in the southern part of the country where this study was done. Reasons deduced for this difference include poor awareness of the infection and misconception about the safety of immunization which is a common finding in Northern Nigeria. Also, the common practice of Polygamy and widespread practice of native scarification in Northern Nigeria could contribute to the high prevalence in Northern Nigeria^{1,4,8}. The practice of scarification and tattooing has been reported to play a role in hepatitis B Virus infection.¹⁹

The age group of 21-30 years had the highest prevalence of 49.7% in this study. This agrees with the findings in Port Harcourt⁴ but is in contrast to the observations in the Middle East and Indonesia where most of the subjects were between 30 and 40 years of age¹⁹. The preponderance of HBsAg-positive pregnant women in this age bracket could be due to the fact that women within this age bracket constitute the majority of our obstetric population.

Mother-to-child transmission (MTCT) of HBV is reported to be responsible for more than one-third of chronic HBV infections globally¹³, and prenatal infection is assumed to be a major mode of transmission in high-prevalence areas like most sub-Saharan African countries¹⁴. HBeAg positivity is associated with a high risk of perinatal transmission of HBV as children born to mothers positive to both HBsAg and HBeAg have a 70-90% chance of perinatal acquisition of HBV infection¹⁵. The HBsAg seroprevalence rate in this study was 6.3%. This finding is higher than 3.3% in Makurdi²³ and 1.36% in Maiduguri⁸. The prevalence rate from this study is also significantly higher than 0.8%²¹ reported in Zimbabwe. In studies done at Port Harcourt and Enugu, HBsAg seropositive subjects were not tested for HBeAg. HBeAg and viral DNA level determine the level of mother-to-child transmission of HBV.³³ Hence for those reactive to HBeAg, the possibility of mother-to-child transmission is high. The overall prevalence of HBeAg in our sample was 0.33%. This suggests that the probability of HBV MTCT was high in our study population.

The prevalence of HIV/HBV co-infection was 6.3%. This co-infection rate was higher than the 4.2% rate reported in a study in Nigeria³⁴. We found that HIV infection was highly associated with HBV infection in our study population, this can be explained by the fact that HBV and HIV share common modes of transmission. Moreover, it has been reported that HIV/HBV co-infection facilitates HBV replication and reactivation leading to higher HBV-DNA levels and a reduced spontaneous clearance of the virus³⁵.

This study was limited by certain factors. First, we used rapid diagnostic tests which are less sensitive than ELISA or PCR tests, leading to possible underestimation of the prevalence of assessed markers. Furthermore, we investigated HBV infectivity based only on HBeAg, and we did not look for HBV viral

load which is an important determinant of HBV transmission. Despite these shortcomings, this study provides relevant information in the context of very limited epidemiological data on HBV infection in Nigeria, especially among pregnant women.

Conclusion and Recommendation

The seroprevalence of HBsAg among pregnant women in our setting is intermediate. History of jaundice, History of sexually transmitted infection, and HIV infection are independently associated with the occurrence of HBV infection in this setting. In view of this, routine testing of all pregnant women for HBsAg is necessary. Routine vaccination of all infants, irrespective of maternal HBV carrier status, as it is currently practiced, is also an effective approach to HBV prevention and control in Abakaliki, Nigeria and this practice should be continued and enforced.

References

1. Obi S. N; Onah H. E; Ezugwu F. O. Risk factor for hepatitis B infection during pregnancy in a Nigerian obstetric population. *Journal of obstetrics and Gynecology*; 2006; **26**(8): 770-772.
2. Okoth M, Gathes Z, Marila F, Mogo F, Esamai F, Alavi Z, Otieno Y, Lambatt H, Wanjaki N. Seroprevalence of hepatitis B markers in pregnant women in Kenya. *East Afr med Journal*. 2006; **38**(9): 485-39.
3. Kane M. Global Programme for the control of hepatitis B infection. *Vaccine*: 1995; **13** (supp); 544-549.
4. Akani CI, Ojule AC, Oporum HC, Ejilemele AA. Seroprevalence of hepatitis B surface antigen (HBsAg) in pregnant women in port Harcourt Nigeria. *The Nigerian postgraduate Medical Journal*. 2005; **12**(4): 266-267
5. Abia-bassey LN. Seropositivity of B virus among Health care workers, In Calabar Nigeria. *Mary Slessor Journal of Medicine* 2006 **6**(2): 36-39.
6. Ejele O, Nwauche CA, Erabor O. The Prevalence of hepatitis B surface antigenaemia in HIV positive patients in the Niger Delta, Nigeria. *Nigerian Journal of medicine*: 2004; **13**(2): 175-9:
7. Anya SE, Oshi DC, Ezeoke ACY. Jaundice in pregnant Nigerians. *International Journal of Gynecology and Obstetrics* 1999; **65**(1): 59-60
8. Harry TO, Bajani M.D, Moses A. Hepatitis B. Virus infection among blood donors and pregnant women in Maiduguri, Nigeria. *East Africa Medical Journal*. 1994;**7**(8):596-7.
9. Amazigyo UO, Chime AB. Hepatitis B virus infection in an urban population of Eastern Nigeria: prevalence of serological markers. *East Afr Med. J*. 1990; **67**(8): 539-44.
10. Vildozola H, Baxil V, Canibilla E, Torres Y, Hora ME, Ramos E: prevalence of hepatitis B infection and risk factors in two groups of pregnant adolescents related to the number of sexual partners. *Rev; Gastroenteral Peru* 2006; **26**(3): 242- 58
11. Saders RC, Lewis D, Dyke T, Alpers MP. Markers of hepatitis B. infection in Tari District, southern Highland's province, *Papau New Guinea P. N Highland's Journal*. 1992; **35**(3):197-207.
12. Acquaye J. K; Mingle Y. A. hepatitis B Virus markers in Ghanaian pregnant women. *West Afr Journal Med* 1994; **13**(3): 134 -7
13. Nelson NP, Jamieson DJ, Murphy TV. *Prevention of perinatal hepatitis B virus transmission. J Pediatric Infect Dis Soc*. 2014; **3** Suppl 1: S7-12.
14. Anna SF, Lok MD. *Chronic hepatitis B. N Engl J Med*. 2002; **346**:1682-3.
15. McMahon BJ, Alward WL, Hall DB, Heyward WL, Bender TR, Francis DP, et al. *Acute hepatitis B virus infection: relation of age to the clinical expression of disease and subsequent development of the carrier state. J Infect Dis*. 1985;**151**(4):599-603.
16. Lee C, Gong Y, Brok J, Boxall EH, Gluud C. *Effect of hepatitis B immunisation in newborn infants of mothers positive for hepatitis B surface antigen: systematic review and meta-analysis. BMJ*. 2006;**332**(7537):328-36.

17. Ebonyi State Government Nigeria. People and occupation. Available at: www.ebonyistate.gov.ng/profile.html, Accessed 10th March 2021.
18. Araoye MO. Subjects selection. In Araoye M.O (ed) Research Methodology with Statistics for Health and social sciences Ilorin. *Nathadax publishers* 2003:115-129.
19. Onakewhor, JUE, Offor E, Okonofua, FE, Maternal and neonatal sero-prevalence of Hepatitis B surface antigen (HBsAg) in Benin City. *Journal of Obstetrics and Gynecology* 2021;**21** (6): 583-586.
20. Agbede OO., Iseniya, JO, Kolawole MO, Ojuowa A. Risk factors and sero-prevalence of hepatitis B surface antigenemia in mothers and their preschool age children in Ilorin, Nigeria. *Therapy* 2007;**4**(1): 67-72.
21. Harry TO, Bajani MD, Moses AE. Hepatitis B virus infection among blood donors and pregnant women in Maiduguri, Nigeria. *East Africa Medical Journal* 1994; **70**:596-597.
22. Luka SA, Ibrahim, MB., Iliya, SN. (2008). Seroprevalence of hepatitis B surface antigen among pregnant women attending Ahmadu Bello University Teaching hospital, Zaria, Nigeria. *Nigerian Journal of Parasitology*, **29**(1): 38-41.
23. Ndams IS, Joshua IA, Luka SA, Sadiq HO. Epidemiology of Hepatitis B infection Among Pregnant Women. *Science World Journal* 2008;**3**(3):5-8.
24. Itoua-Ngaporo A, Sapoulou MV, Ibara JR, Iloki LH, Denis F. Prevalence of hepatitis B viral markers in a population of pregnant women in Brazzaville (Congo). *J Gynecol Obstet Biol Reprod (Paris)*. 1995; **24**(5):534-6.
25. Okoth F, Mbuthia J, Gatheru Z, Murila F, Kanyingi F, Mugo F, et al. Seroprevalence of hepatitis B markers in pregnant women in Kenya. *East Afr Med J*. 2006;**83**(9):485-93.
26. Makuwa M, Caron M, Souquière S, Malonga-Mouelet G, Mahé A, Kazanji M. Prevalence and genetic diversity of hepatitis B and delta viruses in pregnant women in Gabon: molecular evidence that hepatitis delta virus clade 8 originates from and is endemic in central Africa. *J Clin Microbiol*. 2008; **46**:754-6.
27. Nacro B, Dao B, Dahourou H, Hien F, Charpentier-Gautier L, Meda N, et al. HBs antigen carrier state in pregnant women in Bobo Dioulasso (Burkina Faso). *Dakar Med* 2000;**45**(2):188-90.
28. Mansour W, Bollahi MA, Hamed CT, Brichtler S, Le Gal F, Ducancelle A, et al. Virological and epidemiological features of hepatitis delta infection among blood donors in Nouakchott, Mauritania. *J Clin Virol*. 2012; **55**:12-6.
29. Candotti D, Danso K, Allain JP. Maternofetal transmission of hepatitis B virus genotype E in Ghana, west Africa. *J Gen Virol*. 2007; **88**:2686-95.
30. Touré-Fall AO, Dièye TN, Sall A, Diop M, Seck M, Diop S, et al. Residual risk of transmission of HIV and HBV, in Senegalese national blood bank from 2003 to 2005. *Transfus Clin Biol*. 2009; **16**:439-43.
31. Madzime S, Adem M, Mahomed K, Woelk GB, Mudzamiri S, Williams MA. Hepatitis B virus infection among pregnant women delivering at Harare Maternity Hospital, Harare Zimbabwe, 1996 to 1997. *Cent Afr J Med*. 1999;**45**(8):195-8.
32. Imade GE, Sagay AS, Ugwu BT, Thacher TD, Ford RW. Seroprevalence of Hepatitis B and HIV infections in pregnant women in Nigeria. *J Med Trop* 2004; **6**:15-21
33. Burk RD, Hwang LY, Ho GY, Shafritz DA, Beasley RP. Outcome of perinatal hepatitis. B virus exposure is dependent on maternal virus load. *J Infect Dis*. 1994; **170**:1418-23.
34. Eke AC, Eke UA, Okafor CI, Ezebialu IU, Ogbuagu C. Prevalence, correlates, and pattern of hepatitis B surface antigen in a low resource setting. *Virol J*. 2011; **8**:12.
35. Thio CL. Hepatitis B, and human immunodeficiency virus coinfection. *Hepatology*. 2009;**49**(5Suppl): S138-45.