

sero - Prevalence and Associated Factors of Hepatitis B Virus among Pregnant Women at Wolkite Health Center

Behre Dari Mosa^{1*}, Tewfik Nesro², Teketel Memiru² and Admasu Haile²

¹ Worabe Comprehensive Specialized Hospital, Worabe Silte Zone, Ethiopia

² Department of Medical Laboratory Sciences, Wolkite University, School of Medicine and Health Science, Ethiopia.

*Corresponding Author: Behre Dari Mosa, Worabe Comprehensive Specialized Hospital, Worabe Silte Zone, Ethiopia.

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Abstract

Introduction: Hepatitis B virus (HBV) is a public health problem worldwide. It is highly endemic in Asia and Sub-Saharan Africa. Even though there was an introduction of universal infants HBV immunization in 2007, distribution of HBV remains a public health problem in Ethiopia.

Objective: To determine the sero-prevalence of HBsAg among pregnant women and to identify Factors associated with the infection.

Methods: A cross-sectional study was conducted from June 1 - August 1, 2021 among pregnant women attending the antenatal clinic (ANC) of Wolkite Health Center. After obtaining written and informed consent, blood sample was collected from 270 pregnant women using consecutive non- duplicative sampling method. Serum was separated from whole blood and tested for using Bioline strip test. Data was collected using pre-structured questionnaire and analyzed using SPSS version 20. Multiple logistic regression analysis was used to determine the association between explanatory variables and the outcome variables. The result was considered statistically significant at $p < 0.05$.

Result: In this study, 270 pregnant women were participated. The overall prevalence of sero-positive HBS Ag among pregnant women was 15(5.6%). The study participants having history of abortion [AOR=0.024; 95%CI (.003-.165), $p=0.000$] and multiple sexual practice [AOR=0.013, 95%CI (.001-.154), $p=0.001$] significantly predictor of Hepatitis B virus infection.

Conclusion: The seroprevalence of hepatitis B virus infection was increased among study participants. From assessed associated factor history of abortion and multiple sexual practice were significantly associated with sero-prevalence of HBV infection. Due to these reason routine screening of women for HBV infection during pregnancy and ANC follow up.

Key words: Hepatitis B virus; associated factors; pregnant women; Wolkite Ethiopia

Introduction

Hepatitis B virus (HBV) is an envelope virus with a viral genome of partially double stranded circular DNA which belongs to the family Hepadnaviridae[1, 2]. HBV causes acute and chronic infections of the liver. It is a major cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Due to its largely asymptomatic nature, viral hepatitis is a silent epidemic; most people are unaware of their infection [3]. Infections by HBV in pregnancy come with its attendant effect on both mother and child [4].

It has been reported that 10-20% of HBsAg positive pregnant women transmit the virus to their babies and women, who are positive for both Auctores Publishing LLC – Volume 6(5)-152 www.auctoresonline.org
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HBsAg and HBeAg, have a chance of transmitting HBV to their newborns at birth nearly 100%. Up to 90% of the newborns born to these mothers go on to develop chronic hepatitis B if they do not receive hepatitis B immune globulin and hepatitis B vaccine at birth [5]. Although this means of transmission has not been reported to be teratogenic, a higher incidence of low birth weight, low intelligence quotient, liver cirrhosis and hepatocellular carcinoma in young adulthood may result [2].

HBV is not directly cytotoxic to hepatocytes but severity of hepatocellular injury is modulated by the strength of host immune responses [6, 7]. The dynamic balance between viral replication and host immune response plays a key role in the pathogenesis of liver disease from HBV infection [8]. There are three possible routes of transmission

of HBV from infected mothers to infants: transplacental transmission of HBV in utero, natal transmission during delivery or postnatal transmission during care of infant or through breast milk. In patients with acute hepatitis B infection 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 [9].

Chronic HBV infection during pregnancy is usually mild but may flare after delivery or with discontinuing therapy [10]. The sero-markers and bio-markers associated with HBV infection include HBsAg, anti-HBs, HBeAg, anti-HBc, IgM-anti- HBc and IgG-anti- HBc. At least one serologic marker is present during the different phases of HBV infection. The presence of a confirmed HBsAg result is indicative of ongoing HBV infection, so all HBs Ag positive persons should be considered infectious. In newly infected persons, HBsAg is the only serologic marker detected during the first 3–5 weeks after infection, and it persists for variable periods at very low levels. The average time from exposure to detection of HBsAg is 30 days (range: 6–60 days). Chronic HBV infection occurs when HBsAg persists for > 6th months in the presence of HBeAg or anti-HBc or detection of IgG-anti- HBc, whereas acute HBV infection occurs within 6th months of infection (detection of IgM-anti- HBc) [11].

Management of chronic HBV infection in pregnancy is mostly supportive with antiviral medications indicated in a small subset of HBV infected women with rapidly progressive chronic liver disease. Because of the high risk of developing chronic HBV among infant born to HBsAg positive mother, administration of Hepatitis B Immunoglobulin (HBIG) in combination with hepatitis B vaccines as post exposure prophylaxis is very important [12].

Materials and Methods

Study setting

Study was conducted at WHC, which is located in Wolkite city administration, Gurage Zone, SNNPR, Ethiopia. Wolkite has a total of an estimated population of 28,279 out of those 13,886 males and 14,393 females. It is found 158 Km southeast from the capital city, Addis Ababa.

Study design and period

Cross sectional study was conducted among pregnant women who attending WHC ANC clinic from June 1 - August 1, 2021.G.C

Source population

All pregnant women who were visiting ANC clinic at WHC during the study period.

Study population

All pregnant women who were signed on informed a consent form.

Eligibility criteria

Inclusion criteria: - All pregnant women those who were in any gestational age, and those who were willing to participate in the study were included in the study.

Exclusion criteria: - pregnant women who were critically sick, unable to answer the questionnaire and on active labor during the study were excluded from the study.

Variable of the study

Dependent Variables: -Sero-prevalence of Hepatitis B virus

Independent Variables: - Socio demographic data and related factors such as age, Occupation, Residence, Educational status, surgical procedure, Place of previous delivery, Gestational age, Body

tattooing, Genital mutilation, History of blood transfusion, History of abortion, multiple sexual practices.

Sample size determination and sampling technique

The sample size was determined using a single population proportion formula with the following

Assumptions: estimate prevalence rate (6.1%) taken from a previous study conducted in a rural hospital in Southern Ethiopia [18], with 95% confidence level, and 3% degree of precision. After considering 10% for the non-response rate, the final sample size was 270. To recruit study participants convenient sampling technique was used until the required sample size was obtained.

Data collection

Socio-demographic data and related factors were collected using a pre-structured questionnaire by the trained BSC nurse through a face-to-face interview.

Specimen Collection and Processing

After written informed consent was obtained approximately 5 ml venous blood samples were collected from each study participant. The collected blood samples were centrifuge at 2000-3000 rpm for 5 minutes to separate the serum part of the whole blood. The separated serum was tested for the presence of HBs Ag by using Rapid Test Cassette.

Laboratory Testing Methods

Rapid HBsAg screening test is a laboratory testing methods biolinerapid strip test has sensitivity of 99.7% and specificity of greater than 99.6 %. It is a qualitative, solid phase, two-site sandwich immunoassay for the detection of HBsAg in serum or plasma. The membrane is pre-coated with anti-HBsAg antibodies on the test band region and anti-mouse antibodies on the control band region. During testing, the serum sample reacts with the dye conjugate (mouse anti HBsAg antibody colloidal gold conjugate) that will be coated in the test strip. The mixture then by capillary action reacts with anti-HBsAg antibodies on the membrane and generates a red band. Presence of this red band indicates a positive result while its absence indicates a negative result.

Data quality control

To ensure the quality of data, training was given for data collectors before starting data collection. Pre-tested was conducted on 5% of the sample size at Wolkite University Hospital to check its consistency, appropriateness, completeness and reliability of the questionnaire.

Data processing and analysis

Data were coded, entered and analyzed by using SPSS version 21 software. Descriptive statistics were used to determine the prevalence of HBS AGE. The association between explanatory variables and the outcome variables was checked by using binary logistic regression model; Variables with a *p*-value of < 0.05 were considered as statistically significant.

Results

Socio-demographic data

In this study, 270 pregnant women were participated in the study with response rate of 100%. From the total study participants (53.7%) were in the age category of 24–28 years. One hundred ninety-three (71.5%) were rural in residence. More than half of the study participants were (56.7%) educational level from 1-8 grades. The majority of the study participants were (54.8) housewife. (57%) of the study participants were gestational age under 2nd tri-minister, (85.6%) there Place of previous delivery at hospital. (**Table 1**).

Variables	Categories	Number	Frequency (%)
Age (in year)	18-23	37	13.7
	24-28	145	53.7
	29-34	51	18.9
	>35	37	13.7
Residence	Urban	77	28.5
	Rural	193	71.5
Educational status	Illiterate	14	5.2
	1-8	153	56.7
	9-12	79	29.3
	Diploma and above	24	8.9
Occupation	Employed	45	16.7
	Housewife	148	54.8
	Merchant	77	28.5
Gestational age	1st trimester	45	16.7
	2nd trimester	154	57
	3 rd trimester	71	26.3
Place of previous delivery	No birth	39	14.4
	Hospital	231	85.6
History of blood transfusion	Yes	29	10.7
	No	241	89.3
Multiple sexual	Yes	11	4.1
	No	259	95.9
History of abortion	Yes	34	12.6
	No	236	87.4
Body tattooing	Yes	5	1.9
	No	265	98.1
Genital mutilation	Yes	264	97.8
	No	6	2.2
History of surgical procedure	Yes	34	12.6
	No	236	87.4

Table 1: Socio-demographic data and related factor of pregnant women attending antenatal care at WHC, from June 1-August 1, 2021 (N=270).

Sero-prevalence and associated factors

In the current study a total of 270 study participants involved. The overall Sero prevalence of HBV infection was 15/270 (5.6%). From associated factors assessed, in the current study history of abortion and multiple sexual practice were significantly associated with prevalence of HBV infection. (Tables 2).

Variables	Categories	HBs Status		Bivariate Analysis		Multivariate Analysis	
		Positive n	Negative n	COR(95% CI)	P-value	AOR(95%CI)	P-value
Age (in year)	18-23	2	12	1			
	24-28	4	149	1.99(.000-0.45)	0.998		
	29-34	5	74	1.74(.427-7.079)	0.440		
	>35	4	20	0.81(.181-3.63)	0.785		
Residence	Urban	9	68	1		1	
	Rural	6	187	0.242(.083-.706)	0.009*	0.208(.028-1.565)	0.127
Educational status	Illiterate	2	12	1			
	1-8	4	149	6.21(1.030-37.42)	0.046		
	9-12	5	74	2.47(.429-14.19)	0.312		
	Diploma and above	4	20	0.833(.132-5.26)	0.846		
Occupation	Housewife	9	139	1			
	Employed	4	41	0.664(.194-2.267)	0.513		
	Merchant	2	75	2.428(.511-11.528)	0.264		
Gestational age	1st trimester	1	44	5.59(.675-46.28)	0.111		
	2nd trimester	6	148	3.13(1.044-9.399)	0.042		
	3 rd trimester	8	63	1			
Place of previous delivery	No birth	3	36	1			
	Hospital	12	219	1.521(.409-5.66)	0.532		
History of blood transfusion	Yes	9	20	0.057(.018-.176)	0.000*	0.151(.019-1.187)	0.072
	No	6	235	1		1	
Multiple sexual	Yes	7	4	0.018(.004-.075)	0.000*	0.013(.001-.154)	0.001**
	No	8	251	1		1	
History of abortion	Yes	10	24	0.052(.016-.165)	0.000*	0.024(.003-.165)	0.000**
	No	5	231	1		1	
Body tattooing	Yes	2	3	0.077(.012-.504)	0.007	0.051(.001-2.324)	0.127
	No	13	252	1		1	
Genital mutilation	Yes	13	251	9.65(1.617-57.62)	0.013	0.456(.016-13.28)	0.648
	No	2	4	1		1	
History of surgical procedure	Yes	3	31	0.554(.148-2.07)	0.380		
	No	12	224	1			

COR: crude odds ratio, AOR: adjusted odds ratio, CI: confidence interval, N: number, 1: reference

Table 2: Seroprevalence of HBsAg infection and Possible risk factors among pregnant women attending antenatal care at WHC June 1-August 1, 2021(N=270).

Discussion

HBV infection during pregnancy can cause serious problems among the newborns. Several efforts have been made in Ethiopia to reduce transmission of HBV to newborns before and during birth. In the current study, the overall sero-prevalence of HBsAg in pregnant women was 5.6%. This shows almost intermediate of HBV infection according to WHO criteria [14]. The current study finding was lower compared to the previous studies done in different region of Ethiopia in rural hospital in Southern Ethiopia (6.1%)[18], Mali (8.0%) [34], Nigeria (8.3%) [45] and Sierra Leone (6.2%) [46] and Hong Kong (10%) [47]. The finding of the current study was higher than study reported in Addis Ababa; central Ethiopia (3%)[20], Jimma; South west Ethiopia (3.7%)[21], Debre-Tabor Hospital (5.3%)[17] and Bahir Dar (3.8%) [19]. The finding was in agreement to similar study findings were reported in Sudan (5.6%) [37]. The difference in prevalence might be due to the difference in hepatitis epidemiology in the general population, study design, sample size and traditional practice.

In the current study regarding socio-demographic status and related factors of the study participants revealed that HBV infection was higher

among pregnant women have history of abortion and multiple sexual practice and had significant association with HBV infection. The odds of having HBsAg was 0.024 times higher risk among pregnant women who had a history of abortion compared to pregnant women who had no a history of abortion. The odds of having HBsAg was 0.013 times higher risk among pregnant women who had multiple sexual practice compared to pregnant women who had no multiple sexual practice. The finding was comparable to study reported from Nigeria [4], Addis Abeba [20], Bahir Dar [19], Jimma [21] and Debre-tabor [17]. The possible reason may be due to HBV might be found in blood and all body fluids that were transmitted during blood transfusion, unsafe any hospital procedure and unsafe sexual practice.

Conclusion

Almost intermediate prevalence of hepatitis B infection was detected among pregnant women attending ANC at WHC. From associated factors assessed, in the current study history of abortion and multiple sexual practice were significantly associated with prevalence of HBV infection. So routine screening of pregnant women for HBV irrespective of basis of

risk factor and intensified prevention targeting this group may reduce mother to child transmission of HBV infection.

Abbreviations

WHC-Wolkite Health Center, HBSAGE -Hepatitis B Surface Antigen, HBV-Hepatitis B Virus, ANC-Antenatal Care

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Authors`contribution

BDM Conceived and designed the protocol, data analysis, writing the original draft, Manuscript preparation and review, **TN**Conceived and designed the protocol, Laboratory work, data collection, data analysis, writing the original draft, **TM** designed the protocol, Laboratory work, data collection, data analysis, writing the original draft, **AH**Conceived and designed the protocol, data analysis, writing the original draft

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Ethical Consideration

The study was approved by the institutional review board of Worksite University, College of Medicine and health sciences (Ref No IRB/101/13). Permission letter was obtained from the WHC Administration office. Before data collection, informed consent was obtained from study participants.

Consent for publication

Not applicable.

Data availability

All relevant data are available within the paper.

Competing Interests

The authors have declared that no competing interests exist

References

- Seeger C, Mason WS. Hepatitis B Virus Biology. *MicrobiolMolBiol Rev* 2000; 64: 51-68.
- Uyar Y, Cabar C, Balci A. Seroprevalence of Hepatitis B virus among pregnant women in Northern Turkey. *Hep Monthly* 2009; 9:146-149.
- WHO. Global policy report on the prevention and control of viral hepatitis: in WHO member states. Geneva 2013.
- Pennap GR, Osanga ET, Ubam A. seroprevalence of Hepatitis B surface antigen among pregnant women attending antenatal clinic in federal medical center Keffi, Nigeria. *Research journal of medical sciences* 2011; 5(2):80-82.
- Apuzzio J, Block JM, Cullison S, Cohen C, Ling Leong S, London WT et al., Chronic Hepatitis B in Pregnancy *A Workshop Consensus Statement on Screening, Evaluation, and Management, Part I*. Obstetrics Report, 2012;37:22-26.
- Ganem D, Prince AM. Hepatitis B virus infection natural history and clinical consequences [published correction appears in *N Engl J Med*. 2004; 351:351]. *N Engl J Med*. 2004; 350: 1118-1129.
- Villeneuve JP. The natural history of chronic hepatitis B virus infection. *J ClinVirol*. 2005; 34(1): 139-142.
- Surakit P, Ray KW, John J. Natural History of Hepatitis B Virus Infection: An Update for Clinicians. *Mayo Clin Proc*. 2007; 82(8):967-975.
- American College of Obstetricians and Gynecologists. ACOG Practice Bulletin No. 86: Viral hepatitis in pregnancy. *Obstet Gynecol*. 2007; 110(4):941-56. PMID: 17906043
- Jonas MM. Hepatitis B and pregnancy: an underestimated issue. *Liver Int*2009; 29: 133-139.
- Hoofnagle JH, DiBisceglie AM. Serologic diagnosis of acute and chronic viral hepatitis. *Semin Liver Dis* 1991; 11:73-83.
- El-Magrahe H, Furarah AR, El-Figih K, El-Urshfany S, Khalifa SG. Maternal and neonatal seroprevalence of Hepatitis B surface antigen (HBsAg) in Tripoli, Libya. *J Infect DevCtries*2010; 4(3):168-170.
- Weinbaum CM, Williams I, Mast EE, Wang SA, Finelli L, Wasley A, Centers for Disease Control (CDC) and Prevention, et al., Recommendations for Identification and Public Health Management of Persons with Chronic Hepatitis B Virus Infection. *MMWR* 2008; 57:1-20. 22
- WHO / EPI/ GEN/ 90.6 1990. WHO. Hepatitis B World Health Organization. [www.who.int/entity/csr/disease/hepatitis/Hepatitis B_whoedscsrlyo2002_2.pdf](http://www.who.int/entity/csr/disease/hepatitis/Hepatitis_B_whoedscsrlyo2002_2.pdf). Accessed 19th October 2011.
- Maddrey WC. Hepatitis B an important Public health issue. *J Med Virol*2000; 61:362-366.
- Kibassa CJ, Msengi AE. Determination of vertical transmission of hepatitis B virus in DaresSalaam. *Tanzania Medical J* 2004;19: 21-25.
- Walle F, Asrat D, Alem A, TadessE ,Desta K. Prevalence of Hepatitis B surfaces Antigen Among Pregnant Women Attending Antenatal care service at Debre-Tabor Hospital, Northern Ethiopia. *Ethiopia J Health Sci*2008; 17(1):13-20.
- Ramos JM, Toro C, Reyes F, Amor A, Gutiérrez F: Seroprevalence of HIV-1, HBV, HTLV-1 and Treponema pallidum among pregnant women in a rural hospital in Southern Ethiopia. *J ClinVirol*2011, 51(1):83-85.
- Zenebe Y, Mulu W, Yimer M, Abera B. Sero-prevalence and risk factors of hepatitis B virus and human immunodeficiency virus infection among pregnant women in Bahir Dar city, Northwest Ethiopia: a cross sectional study. *BMC Infect Disea*2014;14(118) :2-7.
- Tegegne D, Desta K, Tegbaru B, Tilahun T. Seroprevalence and transmission of Hepatitis B virus among delivering women and their new born in selected health facilities, Addis Ababa, Ethiopia: a cross sectional study. *BMC Research Notes* 2014; 7 (239): 2-7.
- Awole M, Gebre-Selassie S. Seroprevalence of HbsAg and its risk factors among pregnant women in Jimma, Southwest Ethiopia. *Ethiop J Health Dev*2005; 19 (1): 45-50.
- Tse KY, Ho LF, Lao T. The impact of maternal HbsAg carrier status on pregnancy outcomes: a case-control study. *J Hepatol*2005;43: 771-775.
- CDC. A Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the United States. Recommendations of the Advisory Committee on Immunization Practices (ACIP) Part 1: Immunization of Infants, Children, and Adolescents. *MMWR*. 2005; 54(16).
- Gambarin-Gelwan M. Hepatitis B in pregnancy. *Clin Liver Dis* 2007;11: 945-63.
- McMahon BJ. Epidemiology and natural history of hepatitis B. *Semin Liver Dis*, 2005; 25 (suppl 1):3-8.
- Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. *J Viral Hepat*, 2004;11 (2): 97-107. 23
- Nagu TJ, BakariM ,Matee MI. Hepatitis A, B and C viral co-infections among HIV infected adults presenting for care and treatment at Muhimbili National Hospital in Dar esSalaam, Tanzania. *BMC Public Health* 2008;8: 416-418.

9.

28. Juszyk J. Clinical Course and consequence of hepatitis B infection. *Vaccine*. 2000;18Supp 1 S23- 5.
29. Obi SN, Onah HE, Ezugwu FO. Risk factors for hepatitis B infection during pregnancy in a Nigerian obstetric population. *J of Obstet and Gynaecol* 2006; 26:770-772.
30. Souza MT, Pinho TLR, Santos MDC, Santos A, Monteiro VL, Fonsêca LMB *et al.*, Prevalence of hepatitis B among pregnant women assisted at the public maternity hospitals of São Luís, Maranhão, Brazil. *The Braz J of Infec Dis* 2012;16(6):517-520.
31. Zhang S, Li RT, Wang Y, Liu Q, Zhou YH, Hu Y. Seroprevalence of hepatitis B surface antigen among pregnant women in Jiangsu, China, 17 years after introduction of hepatitis B vaccine. *Intern J of Gynecol and Obstet* 109 (2010) 194-197
32. Alrowaily A, Abolfotouh M A, Ferwanah MS. Hepatitis B Virus Sero Prevalence Among Pregnant Females in Saudi Arabia. *The Saudi J of Gastroenterology* 2008; 14(2): 70-72
33. Candotti D, Danso K, Allain JP. Materno -fetal transmission of hepatitis B virus genotype E in Ghana, west Africa. *J of General Virology* 2007;88, 2686-2695.
34. Brett M, Rosanna FH, Edward B, Joseph K, Daoda D, Amy C *et al.*, Seroprevalence of hepatitis B surface antigen among pregnant women attending the Hospital for Women & Children in Koutiala, Mali. *S Afr Med J* 2012; 102:47-49.
35. Pontius B, Emmanuel O, Caroline O, Amos DM .High prevalence of hepatitis B virus infection among pregnant women attending antenatal care: a cross-sectional study in two hospitals in northern Uganda. *BMJ Open* 2014;4:e005889. doi:10.1136/bmjopen-2014-005889
36. Entisar AM, Suad MB, Gasim IG, Duria AR, Ishag A. Epidemiology of hepatitis B and hepatitis C virus infections in pregnant women in Sana'a, Yemen. *BMC Pregnancy and Childbirth* 2013, 13:127.
37. Rasha ME, Ahmed AD, Mohamed AE, Mubarak SK and Ishag A. Hepatitis B virus and hepatitis C virus in pregnant Sudanese women. *Virology Journal* 2007, 4:104.
38. Okoth F, Mbuthia J, Gatheru Z, Murila F, Kanyingi F, MugoF, et al., Seroprevalence of hepatitis B markers in pregnant women in Kenya. *East African. Medical J* 2006;83: 485-493.
39. Rashid S, Kilewo C, Aboud S. Seroprevalence of hepatitis B virus infection among antenatal clinic attendees at a tertiary hospital in Dar es Salaam, Tanzania. *Tanzania J of Health Research* 2014; 16(1):1-8.
40. Lenjiso T, TesfayeB, Michael A, Esatu T, Legessie Z. SNNPR Hawassa city Administration Health Department 2010-2012 GTP assessment report booklet. 2013; 9-65.
41. Naing L, Winn T, Rusli BN. Practical Issues in Calculating the Sample Size for Prevalence Studies. *Archives of Orofacial Sciences* 2006; 1: 9-14.
42. Binder A. Double antibody Sandwich ELISA for the **cut- off** value determination of Hepatitis B Surface antigen (HBsAg) in human serum or plasma. *Wiener Neudorf, Austria* 2013; 4-8.
43. Alegbeleye JO, Nyengidiki TK, Ikimalo JI. Maternal and neonatal seroprevalence of hepatitis B surface antigen in a hospital based population in South-South, Nigeria. *International Journal of Medicine and Medical Sciences* 2013, 5(5):241-246.
44. Akani CI, Ojule AC, Oporum HC, Ejilemele AA: Sero-prevalence of Hepatitis B surface antigen (HBsAg) in pregnant women in Port-Harcourt, Nigeria. *Nigeria Post-graduate Medical Journal* 2005, 12(4):266-270.
45. Eke AC, Eke UA, Okafor CI, Ezebialu IU, Ogbuagu C. Prevalence, correlates and pattern of hepatitis B surface antigen in a low resource setting. *Virology Journal* 2011, 8:12.
46. Wurie IM, Wurie AT, Gevao SM. Sero-prevalence of hepatitis virus among middle to high socio-economic antenatal population in Sierra Leone. *West Afr J Med*, 2005; 24 (1):18-20.
47. Kwan LC, Cho Y, Lee SS. The declining HBsAg carriage rate in pregnant women in Hong Kong. *Epidemiol Infect*, 1997;119 (2): 281-283.



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