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High Prevalence of Hepatitis-B Surface Antigen in Pregnant Women Observed in Southwest Nigeria: A Potential Risk for Vertical Hbsag Transmission

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Authors' contributions

This work was carried out in collaboration between all authors. Author SAO involved in developing study concept performed the laboratory analysis. Author BOI performed the statistical analysis, wrote the first and final draft of the manuscript. Author AAO developed the study concept and approved laboratory protocols. All authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aim: Nigeria has been classified among the nations highly endemic for viral Hepatitis with a seroprevalence of 2.7-13.3% in normal population. The study determines the seroprevalent rates of hepatitis B virus based on trimester stages in a population of pregnant women.
Study Type: Case control.
Place of Study: Department of Microbiology, Obafemi Awolowo University, Ile Ife.
Materials and Methods: In this case-control study, a total of 300 pregnant women sampled in the population were attending ante-natal clinic at the Obafemi Awolowo University Teaching Hospital, Ile-Ife, Southwest Nigeria. A rapid one-step diagnostic strip method was used for Hepatitis B surface antigen (HBsAg) detection and Smart check HBsAg Immunoassay used for confirmation. The study had a structured questionnaire to

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generate baseline information. One-way analysis of variance (ANOVA) using statistical Package for Social Sciences (SPSS) version 18.
Results: High prevalence of HBsAg was observed in pregnant women that are married (6.67%), have multiple sexual partners (7.76%) and indulge in transactional sexual behaviour (7%). Awareness of HbsAg transmission to the fetus by the pregnant mothers (0.95%) and previous HbsAg testing were low (3%). Differentials in the 1st, 2nd and 3rd pregnancy trimesters showed 42.9%, 10.9%, and 18.4% prevalent rates respectively.
Conclusion: The result expresses high potential and possible risk associated with HbsAg vertical transmission during the 1st and 2nd trimester of pregnancy. Therefore, proactive approach targeted at this population should be designed to reduce HbsAg transmission to the fetus.

Keywords: HBsAg; horizontal transmission; perinatal transmission; Nigeria; pregnancy trimester.

1. INTRODUCTION

Hepatitis B virus (HBV) is reported to be 50 to 100 times more infectious than the human immunodeficiency virus (HIV) and is of considerable occupational hazard to health workers [1]. Hepatitis B is a serious public health issue all around the world. In spite of the current available vaccine, Africa and the Pacific region have the highest prevalence of HBV infection globally [2]. Transmission at early stage can occur through perinatal transmission, vertical transmission from an infected mother to her infant, or horizontal transmission [3]. The death toll of HBV is of significant level especially amongst women. It is well documented that HBV-related liver cancer is implicated in about 1 million deaths and is the cause of up to 5-10% of liver transplant cases [4,5]. However the risk of transmission to the fetus seems high, about 70-90% transmission rate are possible to the fetus towards the end of second trimester of pregnancy [6,7]. Of these, about 90% of infected infants develop into chronic carriers [8]. Even children born to HBsAg-positive mothers but not infected perinatally are still at a high risk of infection at early years.9 Current investigation on prevalence of HBV amongst pregnant women in Nigeria has revealed 8.2% infection rate in the Northeast [9] and 6.5% in the Northwest [10].

The route of transmission of the HBsAg serves as a diagnostic parameter to evaluate the prevalence of the disease in a given area [11]. In low endemic regions such as the United States and Western Europe the major route of transmission are through unprotected sexual contact and intravenous drug administration [12]. However, in moderately prevalent regions such as Eastern Europe, Russia and Japan, the primary mode of transmission is through lesions and prevalence is highly observed amongst children. Regions such as China, South East Asia and parts of Africa have rerecorded the highest prevalence of infection resulting from vertical transmission [13]. Comparatively, vertical transmission formed the major mode of transmission in high endemic regions, especially in the developing countries of Africa [14]. Infected mothers are not only a potential source of horizontal transmission of HBsAg but also pose a lethal threat to their offspring. In the absence of proper drug administration, the infected mother has a 20% risk of vertical transmission while risk could be as high as 90% if Hepatitis B “e” antigen (HBeAg) is also present in the mother’s serum. Proper diagnosis, treatment and education of infected mothers is imperative in preventing the spread of infection to the newborn.

The current study therefore investigates the seroprevalence of HBsAg based on trimester stages in a population of pregnant women. Data on these are scarce as previously reported works were devoid of pregnancy trimester information.

2. MATERIALS AND METHODS

2.1 Study Population and Sample Collection

Informed consent was obtained from 300 women attending antenatal clinic at Obafemi Awolowo University Teaching Hospital Complex (OAUTHC), Ile-Ife, South west Nigeria. In this cross-sectional study the sample was collected for a period of 3 months (June to August). Random sampling was used to recruit the subjects. They were grouped according to their trimester stage.

2.2 Questionnaire Sampling

Information was extracted for demographic data from patients by use of a short sentence structured questionnaire. Interpretation and explanation in local language was readily given to the subjects in the form of assistance. Secrecy and confidentiality of information was adhered to. Subjects were grouped according to the trimester stage of their pregnancy.

2.3 Ethical Clearance

Sample was collected according to the Nigerian National Ethics and Operational Guidelines for Research on Human Subjects (NNEOGRHS). Ethical clearance was obtained from Obafemi Awolowo University, Ile-Ife.

2.4 Laboratory Analysis

HbsAg detection was done using Clinotech Hepatitis B diagnostics kit (Clinotech diagnostics and Pharmaceuticals, Canada).The result was confirmed using Smart check HBsAg Immunoassay kit (Globalmed South Africa, PTY, Ltd Cape Town). Manufactures instruction and assay procedure was adhered to. Whole blood (2ml) was aseptically collected through venipuncture technique. Sera were separated within 2hr of blood sample collection, centrifuged at 2500rpmx5mins and stored at-10℃ in labelled test tubes.

2.5 Statistical Analysis

The values were expressed as mean±SD (Standard deviation). The statistical analysis was carried out by one way analysis of variance (ANOVA). The Pearson value was considered significant at ($p<0.05$) using Statistical Package for Social Sciences (SPSS) version 18.

3. RESULTS

3.1 Key Socio-demographic and Behavioural Characteristics of Subjects Attending Antenatal Clinic

Socio-demographic and behavioural characteristics of the subjects were presented in Table 1.The prevalence was significantly increased ($P<0.05$) in married women (6.67%),

those with multiple sexual partners (7.76%), low condom use (9.1%), engaged in transactional sex (7%), had forced sex (11.11%), low awareness of HBsAg transmission to the unborn (8.53%) and HBsAg testing (8.54%). Conversely, casual sexual partner was reduced (3.5%).

Table 1. Key socio-demographic and behavioural characteristics of subjects attending antenatal clinic

Exposures	Category	No. examined (n=300)	No. positive	Prevalence
Marital status†	Married	195	14	6.67
	Unmarried	15	3	1.42
Marital status†	Married	195	14	6.67
	Unmarried	15	3	1.42
Ever earned money	Last 1 year	215	18	6.54
	Never	60	5	1.81
Sexual activity	MSP	99	17	7.76
	Lifetime P	120	5	2.28
Condom use	Yes	30	9	3.91
	No	200	10	4.34
Used condom during last sex	Yes	210	3	1.36
	No	10	20	9.1
Ever engaged in transactional sex	No	150	6	3
	Yes	50	14	7
Most recent partner was casual	No	40	14	7
	Yes	160	7	3.5
Ever had forced sex	Yes	121	19	11.11
	No	50	2	1.17
Ever tested for HBsAG	Yes	09	3	1.51
	No	190	17	8.54
Awareness of HBsAg transmission to the unborn	No	203	18	8.53
	Yes	08	2	0.95

MSP=Multiple sexual partner, Lifetime P=Lifetime Partner

3.2 Seroprevalence of Hbsag in Relation to Pregnancy Trimester

The subjects had an average age of 32±19. The prevalence of HbsAg was significantly high at the 1st trimester (42.9%) of pregnancy when compared with that of 2nd (10.9%) and 3rd (18.4%) trimesters. There was an observed significant reduction during the 2nd trimester. However, no significant difference in the ages of the subjects was found as relative to the trimester stages. Seven percent (7%, n=21) of the expectant mothers screened were at the first trimester in which 42.9% (n=9) were seropositive. Fifty-five percent (n=165) were in the second trimester with prevalence of 10.9% (n=18) while 38% (n=114) were in the third trimester of pregnancy with 18.4% (n=21) prevalent rate Table 2.

Table 2. Seroprevalence of HBsAg in relation to pregnancy trimester

Trimester	Age (yrs)	No. examined	HBsAg status (sero+ve)	Prevalence (%)
First	33±13	21	9	42.9
Second	28±18	165*	18	10.9*
Third	35±10	114*	21	18.4*
Total	32±19	300†	48†	16*

** Significant difference on comparison with first trimester*

4. DISCUSSION

Hepatitis B virus undoubtedly is a serious and common liver infection globally, most especially in sub-Saharan Africa. The predisposition of seropositive expectant mothers to transmit the virus to the fetus seems to be high and places the unborn child to a high risk of getting infected. Relatively government and individual efforts are not matching the rate of the infection coupled with obvious absence of basic knowledge of HBV infection from expectant mothers to the fetus.

Some key demographic figures obtained from the ethnic community shows that in seropositive expectant mothers, married women recorded a higher prevalence than those of singles, this is also reported by other studies in Nigeria [15]. This could be possible because most ethnic communities uphold the traditional practise of unprotected sex at all times in marriage. Therefore, transmission of any infection is easily passed on to the other partner. Similarly, women with multiple sexual partners showed a higher prevalence of the infection which corresponds with low condom use. The result shows unprotected sexual intercourse with infected person as a potent agent of HBsAg transmission as also reported by Obi et al [16]. Sexual transmission accounts for most adult HBV infections in the United States [17]. About 25% of the regular sexual contacts with infected individuals results in HBsAg sereropositivity [18]. Meanwhile, it has also been reported that over 60% of sexually active respondents in Nigeria have two or more sexual partners [19]. It is important to note that engagement in transactional sex is not an attribute of unmarried or single persons. The results here showed a significant number of married women engaged in transactional sex with a resultant higher prevalence of HBV infection. Transactional sex as used in the study refers to some sexual activity as a result of economic circumstances**.** It could be acceptable here that direct need for material support plays a role in poor women's decisions to readily accept sexual proposals from men [20]. Therefore, poverty and lack of women empowerment are contributing factors for increased transactional sexual activity amongst married women.

Patients in the first pregnancy trimester had the highest HBsAg prevalence (42.9%) while those in the second and third trimesters had a respective lower prevalence of 10.9% and 18.4%. Knowledge of HBsAg prevalence in pregnancy trimester is vital in evaluating the possibility of vertical transmission, possible vaccination and/or management of the infection to prevent onward transmission to the fetus. If infection is noticed at the first trimester, the risk of neonatal infection is about 10%. In contrast, infection during the third trimester causes threats of 80%-90% vertical transmission if prophylactic therapy is not administered [21]. Our study however, did not investigate the transmission rate to the neonates hence the study's limitation.

In this study, there was relatively high risk and possibility of HBsAg vertical transmission if not managed as could be deduced from the high prevalence detected in the first trimester. Other studies have also identified chronic HBV infection in pregnancy in China [22], multiple sexual partnership and drug abuse as a risk factor of the infection [23].

5. CONCLUSION

Currently, an easy-to-follow algorithm has been developed to assist health workers in evaluating and managing HBsAg-positive pregnant women. These guidelines [24,25] should be adhered to especially in places where standardized guides are not available for pregnant

women. It is imperative that all pregnant women be screened for the HBV marker, hepatitis B surface antigen as recommended by CDC. The result also expresses high potential and possible risk associated with HBsAg vertical transmission during the 1st and 2nd trimester of pregnancy. Therefore, proactive approach targeted at this population should be designed to reduce HBsAg infection of the fetus.

CONSENT

All authors declare that 'written informed consent was obtained from the subjects for publication of this case study according to the Nigerian National Ethics and Operational Guidelines for Research on Human Subjects (NNEOGRHS).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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