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A Retrospective Study of The Seroprevalence of Antibodies to HbsAg, HIV-1/2 And Syphilis Amongst Pregnant Women At Booking In A Tertiary Hospital In Port Harcourt, Southern Nigeria.

Iyalla Caroline[1], Omunakwe Hannah[2] Okoh Dorathy Adaunwo[2]
[1](*Department Of Haematology, Blood Transfusion And Immunology, Faculty Of Basic Medical Sciences, College Of Health Sciences, University Of Port Harcourt, Rivers State,Nigeria)*
[2](*Haematology Unit, Department Of Pathology, Braithwaite Memorial Specialist Hospital, Port Harcourt, Rivers State, Nigeria)*

Abstract: *HIV, HBV and Syphilis infections during pregnancy increase the risk of maternal morbidity and mortality, and also pose a risk to the foetus due to maternal to child transmission. Co-infections of HBV with HIV further worsen maternal morbidity and mortality. The aim of this study was to determine the seroprevalence of antibodies to HIV-1/2, HBsAg and Syphilis amongst pregnant women booking for antenatal care. The screening records of women who registered for antenatal care between 2004 to 2013 at the Braithwaite Memorial Specialist Hospital in Port Harcourt, Nigeria were reviewed. The seroprevalence of HIV-1/2, HBV and Syphilis was 5.9%, 4.89% and 7.28% respectively. There was an association between maternal age and seroprevalence rates for all infections, with HIV seroprevalence being significantly more common within the 30-39 age groups. Of those positive for antibodies to HIV-1/2, 25.3% were also positive for syphilis while 22.9% were also positive for HBsAg. The prevalence rates of HIV, HBsAg and Syphilis in the study is worrisome. While access to antenatal care and intervention programmes have helped in the reduction of maternal to child transmission of these infections, problems of late or non-registration for antenatal care have continued to be a limitation.*

Keywords: *Hepatitis B virus, Human Immunodeficiency Virus, Syphilis, Pregnancy, Port Harcourt, Nigeria.*

I. Introduction

Women especially in the reproductive age are more vulnerable to infections with HBV, HIV and Syphilis and these infections pose serious consequencies on both mother and baby. About 2.1 million pregnant women worldwide are estimated to have active syphilis, and about 69% of these pregnancies will have adverse outcomes [1]. Syphilis in pregnancy is associated with about 200,000 stillbirths and foetal losses, and 90,000 neonatal deaths annually [2] as it damages both the placenta and umbilical cord thus compromising foetal viability and growth [3]. Other adverse outcomes include low birth weight and congenital syphilis in the neonate [4]. Maternal to Child transmission depends on the stage of the infection [5], transmission rate could be 100% if the mother has early syphilis and infectivity reduces overtime with the transmission rate being almost zero with latent infection [5]. With interventions such as antenatal screening and treatment of infected mothers, stillbirth and perinatal deaths due to syphilis could be reduced by 50% [1]. This however has to be done early in pregnancy as the gestational age at which treatment is initiated influences the risk of adverse outcome [6].

HBV causes chronic infection in about 380million people worldwide [7], about 65million of these infections are in Africa [8]. About 15-40% of people with chronic infections develop liver disease and cirrhosis [9] , extra hepatic manifestations such as PAN and glomerulonephritis are seen in about 20% of both chronic and active HBV infection [10]. Gestational diabetes mellitus, antepartum haemorrhage and preterm delivery are also reported to be more common with chronic maternal HBV infection [11, 12]. HBV infections cause about 600,000 deaths annually [13]. The risk of maternal to child transmission is about 70-90% being worse with HBsAg- and HBeAg positive mothers compared to HBsAg-positive and HBeAg-negative mothers [14]. Maternal to child transmission occurs more frequently during delivery [15] and 90% of infected infants would develop chronic infection [13,14]. Screening during antenatal care is done for pregnant women universally, and prophylaxis with anti-HBV immune globulins along with HBV vaccine administered to neonates at birth [16]. Mothers who are positive for HBSAg are also given anti-HBV immune globulins [15]. However, in about 3% of cases, vertical transmission still occurs despite these measures [17, 18].

Epidemiological surveys show a high prevalence of HIV amongst pregnant women in Africa [19-22] and vertical transmission rates reported are between 25 to 30% [23]. Apart from mother to child transmission, other attendant issues of HIV in pregnancy are the impact on maternal mortality and morbidity, and the clinical implications of HIV/HBV co-infection. About 6.2% of maternal deaths in Africa are attributable to HIV/AIDS

[24]. HIV infected pregnant or postpartum women have 8X higher mortality than HIV negative women, it is reported that roughly 24% of postpartum deaths are attributable to HIV [24]. Pregnancy may accelerate HIV infection [25] and there is a high incidence of direct obstetric complications in HIV infected pregnant women [26].HIV infected women are reported to be at greater than 3x the risk of infections and puerperal sepsis compared to HIV negative women. HIV positive pregnant women are also reported to have an increased risk of hypertensive disease [26], anaemia in pregnancy [27] and haemorrhage due to thrombocytopenia [28]. A specific goal to half HIV related mortality in pregnancy or postpartum by 2015 was set in the UN General Assembly in 2011 [29]. In developing countries like Nigeria, as part of the prevention of maternal to child transmission, pregnant women are screened for HIV at booking for antenatal. Infected mothers are treated and their new born given prophylaxis anti-retroviral drugs. This study aimed at determining the seroprevalence of these infections in pregnant women who booked for antenatal care at a tertiary institution in Port Harcourt, Nigeria.

II. Materials And Methods

Study design: This is a retrospective study; the antenatal records of pregnant women who registered for antenatal were reviewed.

Study site and population:

The study was carried out in the Braithwaite Memorial Specialist Hospital, a government owned specialist hospital located in Port Harcourt, Niger Delta region of Nigeria. The study population consisted of a total of 37,506 pregnant women who booked for antenatal care between 2004 and 2013 at the BMSH.

III. Methodology

The data were obtained from laboratory and PMTCT registers. From these records, HIV-1/2 screening results were available for 37, 464 women while results for HBsAg and VDRL screening were available for 37,447 and 14,003 women respectively. This thus formed the population for HIV, HBsAg and VDRL seroprevalence study. Other information obtained from these registers consisted of age, educational status, parity, and gestational age at booking.

HIV-1/2 screening in our centre is done with 2 test kits, the determine © HIV-1/2 test kits from Abbot Laboratory Illinois, USA and the Unigold © HIV-1/2 test kits from Trinity Biotech, Dublin Ireland. HBsAg screening and VDRL screening are done with test kits from specific Diaspot © from Indonesia.

Statistical analysis

The data obtained was analysed using the software epi/info version 6.0. Statistical significance was set at ≤ 0.05.

IV. Results

A total of 37,506 women booked for antenatal care within this period. The mean (+_SD) age of the women was 30.0 (+_4.66) years, (range 11 to 49years). Majority of the pregnant women belonged to the 20-29year age group. Most of the women registered in the 2nd trimester (61.6%) and were multigravida (57.5%). HIV-1/2 screening results were available for 37, 464 women, 2203 (5.9%) were positive for HIV-1/2 while 94.1% were negative. TABLE I shows the relationship between the seroprevalence of HIV-1/2 and maternal factors. HIV was more prevalent in the 30-39year age group, those with primary education (5.54 %%) and in primigravida. There was also an association between gestational age at booking and HIV seropositivity in the women.

HBsAg screening results were available for 37, 447 women. Complete data for parity, age, gestational age and educational status were not available for all of these women, however, 1827 of them (4.89%) tested positive while 95.11% were negative. TABLE II shows the relationship of HBSAg seropositivity and maternal factors. HBsAg was also more prevalent in the 30-39year age group (5.19%), those with tertiary education (5.47%) and women in the first trimester (6.64%).

The prevalence of syphilis was 7.28% (1019/12,971). As shown in TABLE III, Syphilis was more prevalent in the 40-49year group (7.50%), though this was not significant. Syphilis was also associated with low educational status, parity and gestational age. Among the HIV-1/2 positive women, (25.3%) also were also positive for syphilis while 22.9% were also positive for HBV infection.

Figures And Tables

Table I: The Seroprevalence Of HIV-1/2 Related To Sociodemographic And Obstetric Factors.

HIV-1/2					
Characteristics	**Positive (n / %)**	**Negative (n / %)**	**Total**	**Chi-square**	**P-value**
Age group				19.6311	0.001*
10-19	24(3.64)	635(96.35)	659		
20-29	1152 (5.91)	18336(94.08)	19488		
30-39	1000 (6.03)	15585(93.97)	16585		
40-49	27(3.69)	705 (96.31)	732		
Educational status				21.51	0.001*
Primary	5 (6.67)	70 (93.33)	75		
Secondary	978 (6.46)	14173 (93.54)	15151		
Tertiary	1201 (5.54)	20495(94.46)	21696		
Parity				1.2361	0.5390
Primigravida	432 (13.46)	2777(86.54)	3209		
Multigravida	679 (13.0)	4544(87.0)	5223		
Grand multigravida	79 (12.21)	568 (87.79)	647		
Gestational age				14.6376	0.001*
1st Trimester	345 (6.64)	4849(93.36)	5194		
2nd Trimester	1274(5.65)	21289(94.35)	22563		
3rd Trimester	540(6.14)	8254(93.86)	8794		

*p-value is significant

Table II: The Seroprevalence Of Hepatitis B Related To Sociodemographic And Obstetric Factors.

HEPATITIS B					
Characteristics	**Positive (n / %)**	**Negative (n / %)**	**Total**	**Chi-square**	**P-value**
Age group				13.7357	0.0327*
10-19	18(2.84)	615(97.16)	633		
20-29	916 (4.7)	18556(95.3)	19472		
30-39	861 (5.19)	15715(94.81)	16576		
40-49	32 (4.48)	682 (95.52)	714		
Educational status				48.1785	0.001*
Primary	4 (5.06)	75 (95.94)	79		
Secondary	628 (4.13)	14579 (95.87)	15207		
Tertiary	1183 (5.47)	20440(94.53)	21623		
Parity				2752.7126	0.001*
Primigravida	559 (17.36)	2661(82.64)	3140		
Multigravida	868 (16.64)	4348(83.36)	5007		
Grand multigravida	89 (13.93)	550 (86.07)	604		
Gestational age				147.1809	0.001*
1st Trimester	383 (7.36)	4833(92.64)	5217		
2nd Trimester	1161(5.16)	21357(94.84)	22518		
3rd Trimester	257(2.92)	8545(97.08)	8802		

*p-value is significant

Table III: The Seroprevalence Of Syphilis Related To Sociodemographic And Obstetric Factors.

SYPHILIS					
Characteristics	**Positive (n / %)**	**Negative (n / %)**	**Total**	**Chi-square**	**P-value**
Age group				2.4793	0.479
10-19	6(4.07)	143(95.97)	149		
20-29	475 (7.39)	5954(92.75)	6429		
30-39	514 (7.25)	6578(92.75)	7092		
40-49	32 (7.50)	296 (92.50)	328		
Educational status				8.9745	0.0113*
Primary	4 (21.05)	15 (78.95)	19		
Secondary	326 (6.69)	4545 (93.31)	4871		
Tertiary	687 (7.57)	8384(92.43)	9071		
Parity				1607.4218	0.001*
Primigravida	351 (21.65)	1270(78.35)	1621		
Multigravida	572 (23.37)	1876(76.63)	2448		
Grand multigravida	79 (27.82)	205 (72.18)	284		
Gestational age				582.341	0.001*
1st Trimester	413 (17.66)	1926(82.34)	2339		
2nd Trimester	270(3.34)	7824(96.66)	8094		
3rd Trimester	321(9.44)	3080(90.56)	3401		

V. Discussion

Antenatal care policy requires all pregnant women to be screened for HIV-1/2, HBV and Syphilis at booking. The prevalence rate of 5.9% observed in this study for HIV-1/2 is consistent with prevalence of 5% in 2003[30] in a sentinel study in Nigeria but is slightly lower than the rate of 6.6% reported in 2008[31] and 7.2% reported in 2006[32]. Prevalence rates from other cities within Nigeria show variations, seroprevalence rates reported are in 3.8% in South eastern Nigeria between 2005/2006 [33], 8.2% in Jos, Northern Nigeria (2005) [34] and an increase from 3% in 2003/2004 to 10.2% in 2010 in Edo state [35], Southern Nigeria. A higher rate of 11% was also reported in PH by Frank Peterside et al in 2011[22] and 11.7% in 2012[36]. This explains that the transmission of HIV-1/2 may be increasing as our data also show an increase in the seroprevalence of HIV-1/2 over the years. One study reported an increase from 1.8% to 5.0% in 2003[30]. While this trend is worrisome, access to antenatal care and intervention programmes have continued to help in the reduction of maternal to child transmission of HIV, thus reducing the paediatric burden of HIV/AIDS. However, these efforts may not be yielding enough results as many women in this part of the world still do not access ANC or do so late in pregnancy. To support this fact is the finding of a much higher prevalence of 25.4% amongst unbooked pregnant women who were admitted at another tertiary institution in PH [37].

The burden of HIV amongst pregnant women is more in developing and underdeveloped countries, within these countries major variations in the prevalence occur from one region or city to the other. Various studies from Sub Saharan Africa report alarming prevalence rates of HIV in pregnancy within particular regions while lower rates are recorded in other regions. In South Africa, a prevalence of 41.6% was reported among pregnant women in a particular region [21], while a prevalence of 30% was reported amongst pregnant women in Malawi [38]. Within Ethiopia, prevalence rates of 11.9% [19], 10.7% [20] and 9.6% [39] have been reported from different regions. Low rates of HIV-1/2 prevalence are also reported in other parts of Africa, 1.9% in Democratic Republic of Congo [40] and 2% in Tanzania [41]. The differences in the prevalence rates from one region to the other can be explained by differences in sexual behaviours, genetic, environmental and socioeconomic factors.

This study found higher prevalence in the 30-39year age group followed by the 20-29year age group. The association between HIV prevalence and maternal age has not been consistent; some have reported higher prevalence in those who are less than 25years of age [22, 41, 42], while others report higher prevalence in the 25-29year age group followed by the 30-34year age group [39, 43]. Some studies however do not find any association between maternal age and HIV prevalence [33]. This study also shows HIV to be more prevalent amongst women with less formal education; this may be that better educated people have more knowledge about HIV prevention.

Africa is said to be highly endemic for HBV infections, high prevalence rate reported are 9.5% in Gabon [44], 12.6% in Ghana [45], 13.8% in Senegal [46], 15.5% in Mali [47] and 10.2% in Zimbabwe [48]. The WHO in 1990 grouped Nigeria as highly endemic for HBV infections with prevalence rates >8%. The overall HBsAg seroprevalence in this study (4.89%) falls within the value for intermediate endemicity, it is similar to prevalence rates observed in the same city in 2005 (4.3%) [49] and in 2013 (6%) [50]. It is also similar to the reported prevalence rates of 4.6% in Enugu [51], 5.7% in Ilorin 52, 6.6% in Keffi [53] and 6.79% in Ado-Ekiti [54]. The rate in this study is however higher than the 2.2%, 2.19% and 2.89% reported in Onitsha [55], Benin[56] and Port Harcourt[57] respectively. Higher prevalence rates are reported in Bauchi (17.2%) [58], Minna (12.3%) [59], Markudi (11%) [60], 9.5% in Gwagwalada [61], 7.9% in Kano [62] and 12.6% in North Central [63]. Most, if not all of the high prevalence rates are recorded in the northern part of Nigeria while intermediate prevalence rates are seen in the southern regions. Thus, it can be concluded that there appear to be a pattern of intermediate endemicity in Southern Nigeria but high endemicity in Northern Nigeria.

The level of endemicity of HBV infection amongst pregnant women in Nigeria is thus worrisome considering the consequencies both for the mother's health and that of her baby. However, as earlier mentioned, the risk of vertical transmission of HBV infection is more when mothers are HBsAg +ve and HBeAg +ve. HBeAg is associated with high viral loads and crosses the placenta to cause tolerance in the neonate which can lead to chronic infection. Presently, only HBsAg screening is done routinely for pregnant women receiving antenatal care, thus this study only reports the seroprevalence of antibodies to HBsAg. About 41% of pregnant women positive for HBsAg are said to be positive for HBeAg [64]. Mbaawuaga et al reported that about 30% of people who are positive for HBsAg are also positive for HBeAg [60] while Yakasai et al reported 62.5% [62]. It is thus recommended that HBeAg screening be implemented so that women who are at higher risk of transmitting the infection to their babies can be identified.

HBV infection in this study was more prevalent amongst the 30-39year age group, those with tertiary education; there has been no consistent pattern of age prevalence for HBV infection in pregnant women from other studies. Studies reported an increase prevalence with increasing age, an increased prevalence in 40-44years [53], 26-30years 54, [55], 20-29years [56, 57], 18-24years [58, 62] and 10-19years [60]. Explanations

for higher prevalence in younger age group is high risk sexual practices while the duration of exposure to the risks of HBV explains why this infection is sometimes observed more in the older age group. Low educational status has been associated with HBV infection in pregnant women from several studies [53, 54, 58].It is expected that multiparous women should have a higher prevalence of HBV infection because of the increased risk of exposure during previous deliveries, surgeries or blood transfusion. A higher prevalence of HBV infection is noted in nulliparous women in this study. This is consistent with observations from other studies in Nigeria which also reported increased prevalence in nulliparous women [50, 55], however some studies report higher prevalence in multiparous women [53, 54]. While information about risk factors are not available from our data as this is a retrospective study, studies which reported higher prevalence in nulliparous women also report an increase in risk factors such as termination of pregnancies and multiple sexual partners amongst these group of nulliparous women[50].

The prevalence rate for syphilis in this study falls in between values obtained from other African countries [65-67]. It is however lower than values from other parts of Nigeria which have shown continuous low prevalence rates of 1.1% over a 10year period [68] and 0.13% in 2006[69] in Ibadan (South West), 0.6% [70] and 0.7% [71] in Onitsha (South east).The marked differences in the prevalence recorded in our study and others from within Nigeria maybe due to different sexual behaviours and health risks amongst different communities. In addition, the test used for this study was the VDRL and confirmation was not done with TPHA. Some studies in Nigeria have questioned the relevance of routine antenatal screening for syphilis especially with the VDRL test kit because of the decline and continuous low prevalence rates [68-71]. At low rates however, it is still cost-effective to screen for syphilis than to treat congenital syphilis that may result if antenatal screened is stopped. Moreover, screening would also prevent spread to partners and other complications. Even with routine screening in place, infections with syphilis and stillbirths still occur. The reasons being that a good number of women still do not access antenatal care; a rate of 30.7% for syphilis was recorded at the point of delivery amongst women who did not have antenatal care in South Africa [72]. Also, the fact that only 12, 971 pregnant women out 37,506 women who booked for ANC had results for VDRL screening show that not all women who attend ANC get tested for syphilis and there is no proper follow up for results. For the screening policy to be effective early registration for ANC should be encouraged and there should be a system of tracking women who did not return for results.

VI. Conclusion

The seroprevalence rates of HIV-1/2, HBsAg and Syphilis in pregnant women in this study is worrisome considering the consequencies both for the mother's health and that of her baby. The HBeAg screening should be implemented so that women who are at higher risk of transmitting the infection to their babies can be identified. The VDRL screening should not be discontinued but rather the TPHA introduced as a confirmatory test for those positive for VDRL. Access to antenatal care and intervention programs have continued to help in the reduction of maternal to child transmission of these infections, thus reducing the paediatric burden of the diseases they cause. However problems of late or non-registration for antenatal care in this part of the world also limits these results. Also, there is need to double the efforts and measures to curb the horizontal transmission of these infections.

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