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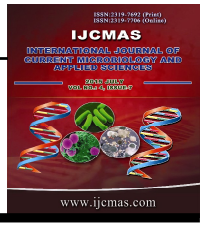

Original Research Article

Malaria, Anaemia and HIV Status of Pregnant and Non-pregnant Women in a Nigerian Rural Community

Airueghionmon, Uyi-Ekpen[2], Esebelahie, Newton Oghenejabor[3]* and Omoregie, Richard[1,2,4]

[1]Comprehensive Health Centre, Udo, Edo State, Nigeria
[2]Department of Medical Microbiology, University of Benin Teaching Hospital, P.M.B 111, Benin City, Edo State, Nigeria
[3]Department of Medical Laboratory Science, Faculty of Health Sciences and Technology, College of Health Sciences, Nnamdi Azikiwe University, Awka, Nigeria
[4]School of Medical Laboratory Sciences, University of Benin Teaching Hospital, P.M.B. 1111, Benin City, Edo State, Nigeria
**Corresponding author*

Keywords

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A B S T R A C T

Maternal mortality is a major health problem in developing countries. This study aim at determining the prevalence of malaria, anaemia and HIV among pregnant and non-pregnant women in a rural community in Nigeria. Blood was obtained from 705 subjects consisting of 562 pregnant women and 143 aged matched non-pregnant women within a four year period in Udo community, Nigeria. The blood samples were used to diagnosed malaria, anaemia and HIV using standard techniques. Generally, non-pregnant women have significantly higher prevalence of malaria and HIV compared to pregnant women (P<0.0001). Pregnancy was significantly associated with anaemia (OR=3.214, 95% CI=2.089, 4.962, P<0.0001). This same picture was observed when data was considered yearly. Among pregnant women the only co-morbidity observed was HIV and anaemia (2.31%) while all co-morbidities- HIV and malaria (9.79%); HIV and anaemia (10.49%); HIV, malaria and anaemia (5.59%) were observed among non-pregnant women. An overall prevalence of 1.42%, 51.96%, and 3.38%; and 35.66%, 25.18% and 16.78% malaria, anaemia and HIV was observed among pregnant and non-pregnant women respectively in Udo community. Interventions to stem the tide of malaria, anaemia and HIV among women in Udo community are advocated.

Introduction

Maternal mortality continues to be a major health problem in the developing world with nearly 600,000 women dying each year as a result of complications of pregnancy and child birth (Brabin *et al.*, 2001). It has been suggested that majority of the current adolescents in the world will suffer untimely disease and death (Brabin and Brabin, 2005). Human immunodeficiency virus (HIV) and malaria are responsible for much of the

disease burden affecting female adolescents who suffer disproportionately from these combined infections relative to other age groups.

This is due to a high HIV incidence during the period when many adolescent become pregnant for the first time – an event which greatly increases their susceptibility to *Plasmodium falciparum* malaria (Brabin and Brabin, 2005). Approximately 30 million pregnant African women are exposed to the risk of malaria infection every year (Ouma *et al.,* 2007)

Anaemia is one of the haematological complications that have been reported among HIV patients and pregnant women (Omoregie *et al*., 2009a *;* Oladeinde *et al.,* 2011).

Maternal anaemia is one of the adverse manifestations of malaria in pregnancy. The causes of anaemia is usually multifactorial in origin and includes malaria, nutritional deficiencies, infectious diseases, genetic red blood cells disorder, ignorance, poverty and gender bias (Ouma *et al.,* 2007 ; Oladeinde *et al.,* 2011).

Poverty, malnutrition and low educational status are known to be the driving forces for acquiring HIV infections and these factors are rife in rural communities in Nigeria (Lareto, 2006; Imoh *et al.,* 2009).

There is no report on the prevalence of malaria, HIV and anaemia among pregnant women in Udo - a rural community in Edo state, Nigeria. Against this background, this study was conducted to determine the prevalence of HIV, anaemia and malaria parasitaemia among pregnant and non-pregnant women in Udo community within a four year period.

Materials and Methods

Study area

The study was carried out at the Comprehensive Health Centre, Udo. Udo is a rural community in Ovia Southwest Local Government Area of Edo State, Nigeria. Ovia Southwest LGA has a population of 138,072 (National Population Commission, 2006). Udo is a rural community with the inhabitant predominantly farmers. The Comprehensive Health Centre serves the Udo community as well as neighbouring communities. The Comprehensive Health Centre is a Primary Health Centre that is under the management of the University of Benin Teaching Hospital, Benin City, Nigeria. The study was conducted from 1st January, 2005 to 31st December, 2008.

Study population

A total of 705 subjects consisting of 562 pregnant women and 143 aged matched non-pregnant women that served as controls were used for this study. The pregnant women were attending the Comprehensive Health Centre, Udo (first time visit) while the non-pregnant women were apparently healthy individuals in the community. Exclusion criteria included signs and symptoms of malaria and any other ailment. Informed consent was obtained from each subject prior to specimen collection. The Ethical Committee of the University of Benin Teaching Hospital, Benin City, Nigeria, approved the protocol for this study.

Collection and processing of specimen

Ten millilitres of blood was collected from each subject and dispense in 5ml amounts in ethylene diamine tetra acetic acid (EDTA) and plain containers. Sera sample obtained

from the clotted blood specimen was used to diagnose HIV following the national algorithm as previously described[9]. The anticoagulated blood was used to detect malaria parasites and haemoglobin concentration. For malaria parasite, thick blood films were made from each blood sample and allowed to air-dry. Slides were stained in 3% Giemsa stain for 30 minutes, rinse in tap water and allow to air dry. The stained films were examined for malaria parasites by microscopy using X100 oil immersion objective lens. A total of 200 fields per film were examined.

Haemoglobin estimation was determined using an auto analyzer – Sysmex KX 21 (Sysmex Corporation, Kobe Japan). Anaemia was defined as haemoglobin concentration less than 11g/dl for pregnant women and less than 12g/dl for non-pregnant women (Oladeinde *et al.,* 2011).

Statistical analysis

Data were analyzed using Chi square (X^2) test or Fisher's exact test as appropriate and odd ratio analysis using the statistical software INSTAT®.

Results and Discussion

Malaria parasite and HIV was associated with non-pregnant status while anaemia was associated with pregnancy. The overall prevalence of malaria, anaemia and HIV among pregnant women was 1.42%, 51.96% and 3.38% respectively. While among non-pregnant women the prevalence for malaria, anaemia and HIV were 35.66%, 25.18% and 16.78% respectively (Table 1). A similar picture was observed yearly in all the years with exception of 2005, where anaemia was insignificantly associated with pregnancy (Table 2).

The only co-morbidity observed among pregnant women was HIV and anaemia while among non-pregnant women all co-morbidities were observed (Table 3).

HIV and malaria are responsible for much of the disease burden affecting female adolescent who suffer disproportionately from these combined infections relative to other age groups. This is due to a high HIV incidence during the period when many adolescent become pregnant for the first time – an event which greatly increases their susceptibility to *Plasmodium falciparum* malaria (Brabin and Brabin, 2005).

Anaemia is one of the haematological complications that have been reported among HIV patients and pregnant women (Omoregie *et al.,* 2009b; Oladeinde *et al.,* 2011).

Maternal anaemia is one of the adverse manifestations of malaria in pregnancy. The cause of anaemia are usually multi-factorial in origin and includes malaria, nutritional deficiencies, infectious diseases, genetic red blood cells disorder, ignorance, poverty and gender bias (Ouma *et al*., 2007; Oladeinde *et al.,* 2011).

There is no report on the prevalence of malaria, HIV and anaemia among pregnant women in Udo – a rural community in Edo state, Nigeria. Against this background, this study was conducted.

The overall prevalence of malaria, anaemia and HIV among pregnant women were 1.42%, 51.96%, and 3.38% while in non-pregnant women, the prevalence were 35.66%, 25.18 and 16.78% respectively. Pregnancy was only significantly associated with anaemia (OR = 3.214; 95%CI = 2.089, 4.962; P Value = <0.0001).

Table.1 Prevalence of malaria, anaemia and HIV among pregnant and non-pregnant women

Parameter.	No. Tested	No. Positive (%)	OR	95% Confidence Interval	P.Value
MP					
Pregnant	562	8 (1.42)	0.026	0.011 , 0.059	< 0.0001
Non-pregnant	143	51 (35.66)	38.389	16.868 , 90.695	
Anaemia					
Pregnant	562	292 (51.96)	3.214	2.089 , 4.962	< 0.0001
Non pregnant	143	36 (25.18)	0.311	0.202 , 0.479	
HIV					
Pregnant	562	19 (3.38)	0.15	0.077 , 0.291	< 0.0001
Non pregnant	143	27 (16.78)	6.652	3.434 , 12.943	

Table.2 Yearly prevalence of malaria, anaemia and HIV among pregnant and non- pregnant women

Year/Parameter	No. Tested	No. Positive(%)	OR	95% Confidence Interval	P.Value
2005					
MP					
Pregnant	68	2 (2.94)	0.036	0.006, 0.229	
Non pregnant	11	5 (45.5)	27.500	4.363, 173.32	<0.0001
Anaemia					
Pregnant	68	44 (64.7)	3.208	0.852, 12.078	
Non pregnant	11	4 (36.4)	0.312	0.083, 12.078	0.1461
HIV Status					
Pregnant	68	3 (4.4)	0.081	0.015 ,0.437	
Non pregnant	11	4 (36.4)	12.381	2.289 ,66.980	0.0039
2006					
MP					
Pregnant	245	4 (1.6)	0.021	0.007, 0.067	
Non pregnant	43	19 (44.2)	47.698	14.994, 151.73	<0.0001
Anaemia					
Pregnant	245	50 (20.4)	0.356	0.180, 0.704	
Non pregnant	43	18 (41.9)	2.808	1.421, 5.548	0.0042
HIV Status					
Pregnant	245	5 (2.0)	0.091	0.028, 0.294	
Non pregnant	43	8 (18.6)	15.360	4.667, 50.548	<0.0001

2007					
MP					
Pregnant	172	1 (1.3)	0.010	0.001, 0.083	
Non Pregnant	30	11 (36.7)	99.000	12.102, 809.90	<0.0001
Anaemia					
Pregnant	172	162 (94.2)	81.000	25.559, 256.70	
Non pregnant	30	5 (16.7)	0.012	0.004, 0.039	<0.0001
HIV Status					
Pregnant	172	8 (4.7)	0.195	0.062, 0.611	
Non pregnant	30	6 (20.0)	5.125	1.636, 16.060	0.0077
2008					
MP					
Pregnant	77	1 (1.3)	0.035	0.005, 0.276	
Non pregnant	59	16 (27.1)	28.279	3.622, 220.80	<0.0001
Anaemia					
Pregnant	77	36 (46.8)	4.878	2.107, 11.295	
Non pregnant	59	9 (15.3)	0.205	0.089, 0.975	0.0002
HIV Status					
Pregnant	77	3 (3.9)	0.225	0.058, 0.873	
Non pregnant	59	9 (15.3)	4.440	1.145, 17.219	0.0445

Table.3 Malaria, anaemia and HIV comorbidity patterns among pregnant and non-pregnant women

Comorbidity	Pregnant (562)	Non pregnant (143)
HIV and MP	0 (0 %)	14 (9.79 %)
HIV and Anaemia	13 (2.31 %)	15 (10.49 %)
HIV, MP and Anaemia	0 (0 %)	8 (5.59 %)

This finding agrees with a recent report from another rural community in Edo state, Nigeria, and haemodilution was suggested as the mechanism for anaemia in pregnancy (Oladeinde *et al.*, 2011).

The prevalence of malaria was significantly higher in non-pregnant women compared to pregnant women (P> 0.0001). This is surprising as the pregnancy status is known to reduce immunity of pregnant women and make them susceptible to infections. It has been reported that *P. falciparum* infection during pregnancy is usually asymptomatic and remain undetected (Ouma *et al*., 2007). Our patients were asymptomatic for malaria. In Udo community as well as most communities in Africa, pregnant women are attended to by traditional birth attendants who normally gives traditional herbal remedies for the treatment of malaria. These may explain the findings in this study.

The findings that pregnancy was not associated with HIV infection agrees with a previous report (Oladeinde *et al.*, 2011). In contrast to Oladeinde *et al*., (2011) report, non-pregnant women had approximately 3 to 13 folds significant (P > 0.0001) increased risk of acquiring HIV. Non-pregnant women may engage in non-safe sex with multiple sexual partners and thus may increase their chances of acquiring HIV than the pregnant women who are mostly likely to be married and will have sex only with their husband as local culture forbids infidelity among married women. Irrespective of year of study (2005 – 2008) a similar trend was observed between pregnant and non-pregnant women in terms of malaria parasitaemia, anaemia and HIV status.

Comorbidity pattern observed among pregnant and non-pregnant women from Udo community differs in this study. HIV and anaemia in combination were the only comorbidity observed among pregnant women with a prevalence of 2.31%. HIV infection in pregnancy is associated with adverse maternal and fetal outcome (Oladeinde *et al.,* 2011). The current HIV/AIDS interventions by the President's Emergency Plan for AIDS Relief (PEPFAR) do not cover rural communities including Udo . Consequently, pregnant women in Udo community are not candidates for prevention of mother to child transmission (PMTCT) program. This will ultimately increase the number of infants born with HIV.

Among non-pregnant women, all co-morbidities were observed with a prevalence of 9.79%, 10.49%, and 5.59% for HIV, MP and anaemia respectively. Non-pregnant women may be more actively engage in activities such as farming, fetching of water from streams and rivers as well as risky sexual behavior which may increase their risk of acquiring these co-morbidities.

Among pregnant women in Udo, the prevalence of anaemia was significantly higher while among non-pregnant women, the prevalence of malaria parasitaemia and HIV infection was significantly higher. Interventions by appropriate agency are advocated to stem the tide of malaria, anaemia and HIV among women in Udo community.

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