

Pattern of Use of Anti-malarial Drugs among a Cohort of Pregnant Women in Secondary Health Facilities in South-South Nigeria

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ABSTRACT

Malaria is still one of the most common public health problems in Sub-saharan Africa and a leading cause of morbidity and mortality amongst children, pregnant women and people living with HIV/AIDS. With the exception of proper use of insecticide treated nets, over the counter medications are available for prevention and treatment of malaria in pregnancy. The study focused on the usage patterns of antimalarial drugs through an observational approach, surveying 340 pregnant women at antenatal clinics in three Secondary Health Facilities in Uyo Senatorial District, Akwa Ibom State, with a pre-tested structured questionnaire. The parameters investigated include socio-demographic information, clinical data and malaria treatment information. The study showed that 83.38% of the study population had been diagnosed of malaria at least once; 79.46% of the respondents were exposed to Artemisinin-Combination Therapy in the first trimester, while 92.15% were exposed to Artemisinin-Combination Therapy in second/third trimester of the pregnancy. Other drugs used include sulphadoxine-pyrimethamine and quinine. Full adherence to prescribed drugs was observed for 171 (51.66%) and 85 (25.08%) recrudescence within the first month after treatment. There is need for interventions to increase the level of adherence which in turn will reduce the risk of malaria-related complications during pregnancy.

Keywords: Malaria, pregnancy, antimalarial drugs, cohort

I. INTRODUCTION

In 2020, 241 million people contracted malaria in 85 countries. In the same year, 627,000 died from malaria¹. Apart from young children of between six months to five years of age, pregnant women are the second category of people most at

risk of suffering from malaria. This is because immunity is depressed during pregnancy in order to protect the fetus from rejection as foreign tissue by the immune system. In 2018, prevalence of exposure to malaria infection in pregnancy was highest in the West African subregion and Central Africa (each with 35%), followed by East and Southern Africa (20%). About 39% of these were in the Democratic Republic of the Congo and Nigeria. The eleven million pregnant women exposed to malaria infections in 2019 delivered about 872 000 children with low birthweight (16% of all children with low birthweight in these countries), with West Africa having the highest prevalence of low birthweight children due to malaria in pregnancy². Poor outcome for both mother and fetus is associated with pregnancy malaria and results in premature delivery, intrauterine growth retardation, perinatal mortality, anemia, abortion, low birth weight and death of the mother³.

Pregnant women have often been excluded from clinical trials and evidences generated from animal-based studies are not often suitable for extrapolation to indicate teratogenicity in humans. Drug prescription during pregnancy is usually based on the risk/benefit ratio. To reduce the burden of malaria hence the associated complications during pregnancy, a three-pronged approach which includes use of insecticide treated bed nets (ITNs), intermittent preventive treatment with Sulfadoxine/Pyrimethamine (IPT-SP) and effective case management have been recommended. For years, the prophylaxis and treatment of malaria during pregnancy have relied on chloroquine for all three trimesters. With the emergence of chloroquine resistant falciparum malaria, effective alternatives to chloroquine are being employed. The World Health Organization (WHO) recommends use of Artemisinin-based

Combination Therapies (ACTs) for uncomplicated malaria in second and third trimesters of pregnancy and prescription patterns have shown compliance. In 2013, Ugwu et al., showed that quinine was commonly (45.6%) prescribed in first trimester while ACT was commonly prescribed in second/third trimester⁴. A study by Ezeduka et al., showed the prescriptions for non-recommended drugs occurring most often in the first trimester while in the second and third trimesters, up to 79.9% of pregnant women received appropriate medicines for both treatment and prevention of malaria, with artemether-lumefantrine being the most prescribed regimen.⁵

However, there is little independent collaboration of the patterns of use of antimalarial drugs amongst pregnant women. This study therefore assesses and describes the pattern of use of anti-malarial drugs among a cohort of pregnant women in Secondary Health Facilities in Akwa Ibom State.

II. METHOD

Study Area and Population

The study was carried out in Secondary Health Facilities in Uyo, Akwa Ibom State. Akwa Ibom State is located in the coastal southern part of Nigeria, lying between latitudes 4°32'N and 5°33'N, and longitudes 7°25'E and 8°25'E. The State is located in the South-South geopolitical zone, and is bordered on the east by Cross River State, on the west by Rivers State and Abia State, and on the south by the Atlantic Ocean and the southernmost tip of Cross River State. It is made up of thirty-one Local Government Areas and three senatorial districts.

The State's health delivery is through a system of formal and informal private and public health facilities. It has a total of 615 health facilities out of which 232 are registered privately owned facilities⁶. There are 34 Secondary Health Care facilities in Akwa Ibom State that conduct focused antenatal care, take deliveries and conduct postnatal care⁷.

The study was an observation of a cohort of pregnant women, irrespective of gestational age, presenting for booking at antenatal clinics in three Secondary Health Facilities all in Uyo Senatorial district, Akwa Ibom State.

Sampling and Data Collection

The data for this research was collated between October 2020 and December 2022. Using a malaria prevalence of 73.1% from a previous study in South East Nigeria⁸, at a 95% confidence

interval (CI), a 5% margin of error and making provision for a non-response rate of 10%, the minimum sample size required was 332. However, for ease of data collection, collation and analysis, 340 women were enrolled for the study. Using the average number of attendees at ANCs in the three General Hospitals, a proportionate allocation was done where 179, 89 and 72 from each antenatal clinic pregnant women were enrolled for the study. These women were 18 years and above, diagnosed of uncomplicated *P. falciparum* malaria, exposed to antimalarial drugs during index pregnancy, resided within the catchment area of the health facility and provided informed consent. Women who had medical, psychiatric, or social conditions that interfered with their ability to provide an accurate medical history or give informed consent were excluded from the study.

A pre-tested structured questionnaire was administered to consenting pregnant women. The questionnaire comprised socio-demographic information, clinical data and malaria treatment information.

Statistical Analysis

Numerical variables were summarised in frequencies and percentages.

Ethical Consideration

Ethical approval was obtained from the Ethical Committee of the University of Uyo Teaching Hospital (UUTH/AD/S/96/VOL.XXI/56). The study protocol and the rationale for the study was explained carefully in appropriate language, most commonly Ibibio and/or English, with questions answered as needed. A signed or finger-marked informed consent was obtained from all participants.

III. RESULTS

Characteristics of the Study Population

A total of 340 pregnant women from the antenatal clinics of the three Secondary Health facilities in Uyo Senatorial District were enrolled into the study and 331 completed the follow-up. Out of this number, 7 (2.12%) were between 40-49 years while 170 (51.36%) were between 30-39 years. Majority of the pregnant women were from the Ibibio tribe (78.25%), 43.81% had at least a tertiary education and 86.71% were married (Table 1).

Clinical data of pregnant women at Secondary Health facilities in Uyo exposed to antimalarial

Table 2 shows that 155 (46.83%) of all the pregnant women were in their last trimester while 24 (7.25%) were in the first trimester, 233 (70.39%) had babies before the index pregnancy and 83.38% had been diagnosed of uncomplicated malaria at least once (Figure 1).

Table 2 and Figure 1 here

Malaria Treatment During Pregnancy

As shown in Figure 2 and 3, the drugs used in treatment of uncomplicated falciparum malaria amongst the respondents were Artemisinin-based Combination Therapy (ACTs), Sulfadoxine pyrimethamine (SP), Quinine (QN) and other antimalarials. Out of the 263 that indicated use of ACTs in the first trimester, 221 were exposed to Artemether-Lumefantrine (AL), 16 took Artesunate-Mefloquine (AM), 11 were exposed to Dihydroartemisinin-piperazine (DP) while 15 were exposed to other ACTs. In the second/third trimesters, 305 women acknowledged use of ACTs, 101 used SP, while 23 and 31 were exposed to quinine and other antimalarial drugs respectively.

(Figure 2 & 3 here)

Compliance and Recrudescence

There were 171 pregnant women who reported full compliance. The reasons for the not fully complying ranged from cost, unpleasant taste, duration of dosage to adverse effect. 25.68% had a relapse within one month of treatment.

(Table 3 here)

IV. DISCUSSION

In this study, more than 83% of the population reported to have had at least one episode of malaria during the index pregnancy. This is not surprising since malaria is a serious public health problem in Nigeria and accounts for 20% of all hospital admissions, 30% of outpatient visits and 10% of hospital deaths⁹. Raimi and Kanureported 52% prevalence in Lagos¹⁰; Ekanem et al.,¹¹ showed more than 50% in Akwa Ibom; and Gunn et al.,¹² reported 99% prevalence in Enugu State. Pregnant women are more at risk of malaria infection than the non-pregnant women; women in their first pregnancy are at a high risk of developing severe, life-threatening malaria-associated complications because they attract at least twice as many mosquitoes as the non-pregnant women^{13 14 15 16}. The more than 13% cases with 4-6 episodes of malaria in the present study, further

highlights the importance of having safe and effective drugs to clear the parasites during pregnancy.

It is common knowledge that rational use of anti-malarial drugs for treatment of falciparum malaria in pregnancy in each country is determined by several variables that include therapeutic efficacy of drugs against *P. falciparum*, maternal and foetal adverse events, safety concerns, and treatment cost-effectiveness. A review of 35 national guidelines on drug treatment and prevention of malaria in pregnancy showed 10 (28.6%) recommend oral quinine plus clindamycin as first-line treatment for uncomplicated malaria in the first trimester; artemether-lumefantrine, was adopted by 26 (74.3%) of the guidelines for treating uncomplicated or complicated malaria in the second and third trimesters¹⁷. Currently, intermittent preventive therapy (IPT) using Sulphadoxine-pyrimethamine is recommended and can be administered with little or no safety concerns. This study showed that 79.76% and 30.51% of pregnant women in the three health facilities received Sulphadoxine-pyrimethamine in the first and second/third trimesters respectively. This is similar to earlier reports of 65.45% exposure by Kasso et al.,¹⁸ in Akwa Ibom State. Other studies showed 45.6% prescription of quinine and less than 10% ACTs in the first trimester⁴. Tagboretal., recorded more than 40% exposure to mefloquine, about 10% to artemisinin-based regimens and, 15.2% and 14.7% exposure to chloroquine and quinine, respectively.¹⁹

Although AL is not recommended as first-line treatment for malaria during first trimester of pregnancy, it was used by 66.77% of women in this study. It is probable that some women intentionally did not disclose their pregnancies to their healthcare providers. Alternatively, some women may have been pregnant and were prescribed AL before they were aware of their status as it is not routine practice to perform a pregnancy test before administration of medications to women of childbearing ages at outpatient clinics. When taken as a category and irrespective of the timing during pregnancy, exposure to AL was the highest in this study, similar to studies by Mosha et al.,²⁰ who recorded a 54% exposure to AL during pregnancy. This observation suggests that AL is a popular drug. It reflects its high accessibility in most of the health facilities and by drug vendors in the country.

For decades, therapeutic adherence has been a subject of continued clinical concern. Humans in general, particularly in today's stressful environment, avoid inconvenience and change.

However, factors that decrease adherence like inadequate finances, drugs that must be taken several times a day, adverse effects (especially on developing fetus), knowledge of the effect of non-adherence, forgetting to take drugs and effect on taste buds are peculiar, but not limited to pregnant women. Some studies have focused on assessing patient adherence to antimalarials. Adherence levels, based on pill count was estimated to be 40% and 70%^{21, 22}; having an above secondary level education improved adherence²³; adherence was greater for those travelling to sub-Saharan Africa compared with central America²⁴. Majority of the respondents in this study comply with the prescribed dosage of the antimalarial drugs. This could be attributed to attendance of ANCs where instructions are constantly echoed and the fact that most of the respondents have had at least a Secondary education.

V. CONCLUSION

This study has highlighted the pattern of use of antimalarial drugs among a cohort of pregnant women attending antenatal clinics. It was observed that pregnant women are susceptible to malaria infection and are exposed to various antimalarial medications. The use of Artemether-lumefantrine in all three trimesters was higher than other antimalarial drugs. Adherence to drug regime was high in the study mostly because the women regularly attended antenatal sessions and were educated. However, personal protection and vector control measures using insecticide-treated mosquito nets have proven highly efficacious in reducing morbidity and mortality in areas of high, moderate and low malaria transmission and should be encouraged. There is also need for interventions to increase the level of adherence because malaria is an acute infectious disease and the pathogens are only killed when the full dose is taken. Subtherapeutic dosages as a result of patients not completing their dosages could lead to drug resistance and this could alter the progress made towards eradicating malaria in developing countries.

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Competing Interests

Authors have declared that there are no competing interests.

REFERENCES

- [1]. World Health Organization (WHO). World Malaria Report. Geneva: World Health Organization 2020
- [2]. World Health Organization (WHO). World Malaria Report. Geneva: World Health Organization 2019
- [3]. Mwangoka G, W, Kimera SI, Mboera LEG. Congenital Plasmodium falciparum infection in neonates in Muheza District, Tanzania. *Malaria Journal*, 2008; 7:117
- [4]. Ugwu EO, Ifeikigwe ES, Obi SN, Ugwu AO, Agu PU, Okezie OA. Anti-malaria prescription in pregnancy among general practitioners in Enugu State, South East Nigeria. *Nigerian Medical Journal* 2013; 54(2):196-199
- [5]. Ezenduka CC, Ogbonna BO, Ekwunife OI, Okonta MJ, Esimone CO. Drugs use pattern for uncomplicated malaria in medicine retail outlets in Enugu urban, Southeast Nigeria: implications for malaria treatment policy. *Malaria Journal*, 2016; 24(13):243.
- [6]. Anonymous. Akwa Ibom, Nigeria, Data and Statistics. <http://nigeria.opendataforafrica.org/apps/atlas/Akwa-Ibom> (Retrieved 6th January 2020).
- [7]. Ubike S, Ubike N, Mbanugo JI, Ikeakor LC. Prevalence of malaria among pregnant women attending antenatal clinics in hospitals in Anambra, South-East, Nigeria. *Nigerian Journal of Parasitology*, 2016; 37:240.
- [8]. Essien C, Mgbekem GA, Okareh TO. Knowledge of healthcare providers in secondary health care facilities towards exclusive breastfeeding among HIV positive mothers in Akwa Ibom State, Nigeria. *Asian Journal of Medicine and Health*, 2018; 12(3): 1-12.
- [9]. Federal Ministry of Health (FMOH). National artemisinin combination therapy anti-malarial policy. 2005;1-32
- [10]. Raimi OG, Kanu CP. The Prevalence of malaria infection in pregnant women living in suburb of Lagos, Nigeria. *African Journal of Biochemistry Research*, 2010; 4(10): 243-245.

- [11]. Ekanem EI, Agan TU, Efiok EE, Ekott MI, Okodi E. A study of anemia in women with asymptomatic malaria parasitaemia at their first antenatal care visit at the General Hospital, Ikot Ekpene, Akwa Ibom State, Nigeria. *Asian Pacific Journal of Tropical Medicine*, 2010; 3(7): 567-570
- [12]. Gunn JKL, Ehiri JE, Jacobs ET, Ernst K E, Pettygrove S, Kohler LN. Population-based prevalence of malaria among pregnant women in Enugu State, Nigeria: The Healthy Beginning Initiative. *Malaria Journal*, 2015; 14:(438)
- [13]. Ansell J, Hamilton KA, Pinder M. Short-range attractiveness of pregnant women to *Anopheles gambiae* mosquitoes. *Transaction of the Royal Society of Tropical Medicine and Hygiene*, 2002; 6:113–116.
- [14]. Ayoola OO, Gemmell I, Omotade OO, Adeyanju OA, Cruikshank JK, Clayton PE. Maternal Malaria, Birth Size, and Blood Pressure in Nigerian Newborns: Insights into the Developmental Origins of Hypertension from the Ibadan Growth Cohort. *PLoS ONE*, 2011; 6:9
- [15]. Rovira-Vallbona E, Monteiro I, Bardaji A, Serra-Casas E, Neafsey DE, Quelhas D. VAR2CSA Signatures of High *Plasmodium falciparum* Parasitaemia in the Placenta. *PLoS ONE*, 2013; 8:7.
- [16]. Ndam NT, Denoed-Ndam L, Doritchamou J, Viwami F, Salanti A, Nielsen MA. Protective antibodies against placental malaria and poor outcomes during pregnancy, Benin. *Emerging Infectious Diseases*, 2015; 21:5
- [17]. Khalid AJ, Khaja AI, Sequeira RP. Drug treatment and prevention of malaria in pregnancy: a critical review of the guidelines. *MalariaJournal*, 2021; 20:62
- [18]. Kasso T, Oboro IL, Maduka O, Awopeju ATO, Paul NI, Yaguo-ide LE, Chijioke-Nwauche, IN, et al., Malaria Preventive Practices among Pregnant Women in Akwa Ibom State, Southern Nigeria. *Annals of Case Reports and Images*, 2019; 19(3): 1-8
- [19]. Tagbor H, Antwi G, Dogbe J. Safety of antimalarial drugs exposure during pregnancy. *Research and Reports in Tropical Medicine*, 2014; 5:23-33
- [20]. Mosha D, Guidi M, Mwingira F. population pharmacokinetics and clinical response for artemether-lumefantrine in pregnant and nonpregnant women with uncomplicated *Plasmodium falciparum* malaria in Tanzania. *Antimicrobial Agents Chemotherapy*, 2014; 58:4583–92.
- [21]. MacE KE, Mwandama D, Jafali J. Adherence to treatment with artemether-lumefantrine for uncomplicated malaria in rural Malawi. *Clinical Infectious Diseases* 2011; 53(8): 772-779
- [22]. Onyango EO, Ayodo G, Watsierah CA. Factors associated with non-adherence to Artemisinin-based combination therapy (ACT) to malaria in rural population from holoendemic region of western Kenya. *BMC Infectious Diseases* 2012; 12(143)
- [23]. Shady I. (2015). Determinants of adherence with malaria chemoprophylactic drugs used in traveler’s health. *Clinical Journal Travel Med*. 2015:163716
- [24]. DePetrillo JC, Siger C, Bergagnini IA, Kolakowski P, Edwards B, Smith MA. Assessment of adherence to atovaquone-proguanil prophylaxis in travelers. *Journal Travel Medicine* 2010; 17:217-220

Table 1. Distribution of Pregnant Women Exposed to Antimalarial Drugs According to Socio-Demographic Characteristics (n=331)

Variables	Frequency	Percentage
Age (years)		
<20	11	3.32
20-29	143	43.20
30-39	170	51.36
40-49	7	2.12
≥50	0	0
Ethnic Group		
Ibibio	259	78.25
Igbo	43	12.99

Hausa	5	1.51
Yoruba	11	3.32
Others	13	3.93
Marital Status		
Married	287	86.71
Single	44	13.29
Educational Status		
No formal Education	34	10.27
Primary	46	13.90
Secondary	106	32.02
Tertiary	145	43.81

Table 2. Clinical data of pregnant women at secondary health facilities in Uyo exposed to antimalarial (n=331)

Variables	Frequency	Percentage
Gestational Age		
First Trimester	24	7.25
Second Trimester	119	35.95
Third Trimester	155	46.83
Unknown	33	10.00
Gravidity		
Primigravida	98	29.61
Multigravida	233	70.39
Malaria Diagnosis		
Physical Examination	89	26.88
Microscopy	48	14.50
RDT	233	70.39
Self-Recognition	34	10.27

Table 3: Compliance and Recrudescence

Variables	Frequency	Percentage
Compliance		
Fully	171	51.66
Not fully	118	35.65
No response	42	12.69
Reason for non-compliance		
Cost	42	35.59
Unpleasant taste	28	23.73
Duration of dosage	22	18.64
Frequency of administration	11	9.32
Adverse effect	15	12.71
Recrudescence		
Within one month	85	25.68
Within Two Months	83	25.08
Within 3-6 months	109	32.93
No response	54	16.31

Figure 1. Malaria episodes during index pregnancy

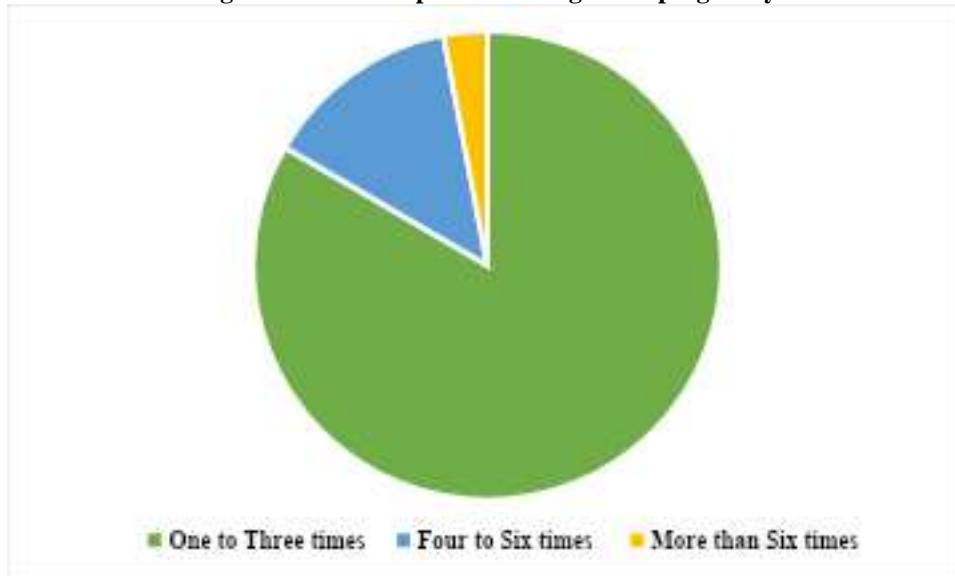


Figure 2: Pattern of use of Antimalarial drugs during Pregnancy

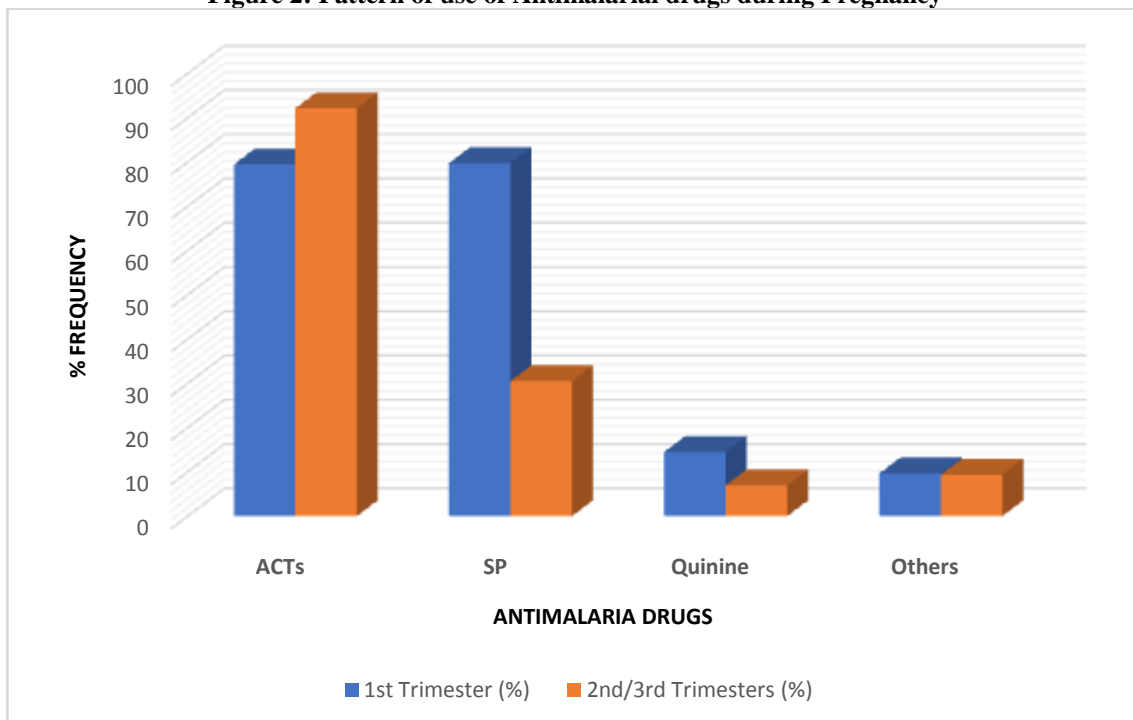


Figure 3: Pattern of Exposure to ACTs during Pregnancy

