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Prevalence of malaria and its intervention measures among pregnant women in Orlu local government area of Imo State

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Abstract

Assessment of the prevalence of malaria in pregnant women and its intervention measures was investigated between March and August, 2022. A total of 428 pregnant women not less than 15 years were randomly recruited from five (5) hospitals in Orlu. Result revealed that age group 31-40years, participants with tertiary education, traders/farmers recorded highest participation. Multigravid (50.5%) participated more in the study, followed by secundigravid (33.9%) and primigravid (15.7%) as the least participants; while 55.4% of the participants were in their 3rd trimester. Overall prevalence (42.9%) of malaria was reported among pregnant women under study. Socio-demographic prevalence of the pregnant women shows that age group 21-30years (55.2%), participants with tertiary education (56.7%), and civil servants (50.0%) recorded highest prevalence. Also, it was observed that multigravid (51.4%) had highest prevalence. Result observed no difference in the prevalence significant between primigravid and secundigravid likewise in their trimesters. Participants with ITNs and IPTp usage recorded (47.8% versus 40.1%) prevalence. From the assessment, it was observed that 155(36.2%) pregnant women use IPTp only, 59(13.8%) use ITNs only while 214(50.0%) combine both IPTp + ITNs. The participants 239(55.8%) reported fansidar (Sulfadoxine - Pyrimethamine) as the most preferred drug for malaria treatment during pregnancy. Malaria drug with 3 tablets 357(83.4%) was most preferred; most pregnant women 218(50.9%) reported taking the drug once in 2-3 months while the major source of drug procurement reported healthcare facility 281(65.7%). The use of ITNs should be encouraged during pregnancy as well as the use of intermittent preventive therapy in pregnancy (IPTp) to ensure reduction in the incidence of malaria disease.

Keywords: Preventive therapy in pregnancy, socio-demographic prevalence, intervention

Introduction

Malaria has become a serious health challenge and its persistence is undeniable rather evident in temperate regions. It has a wide range of consequences from medical, social and economic, which seems to be traumatic to affective individuals with disturbing high rate of morbidity and mortality ^[1]. Malaria in pregnancy is a colossal unrestricted health predicament that affects about 25 million women in malaria-endemic areas every year ^[2, 3]. Pregnant women, mostly primigravidae and secundigravidae are predominantly susceptible to malaria than non-pregnant women from the same area ^[4]. Malaria in pregnancy has remained the major source of maternal, infant morbidity and mortality, though it is an avertable and transmittable disease. Worldwide, the menace of this disease is at a higher risk among pregnant women. Malaria is also seen to be the major cause of low birth weight and placental parasitaemia according to World Health Organization ^[5] and Falade *et al.* ^[6]. About 75,000 to 200,000 infant deaths per year are attributable to malaria infection in pregnancy ^[7, 8]. Studies in Nigeria ^[9, 10] reported between 60% and 72% malaria prevalence among pregnant women. A study conducted by Bello and Ayede ^[11] in Nigeria observed that malaria complicates up to 58.1% of pregnancies. Its worthy of note that pregnancy associated malaria is mostly studied by specialist of tropical disease rather than obstetricians and public health policy makers ^[12].

Malaria intervention measures include Intermittent Preventive Treatment in pregnancy (IPTp) and consistent use of Insecticide-Treated Nets (ITNs), distinctively, targeting pregnant women during maternal and child health services ^[13, 14].

This is supported by Ukaegbu *et al.* [15] who observed that placental enlargement is bound to cause dysfunction leading to fetal growth alterations. For IPT to become a successful anti-malaria drug, it involves at least twice administration during the second and third trimesters of pregnancy not considering whether the woman is infected with malaria infection or not [6, 16-17]. Sulfadoxine/Pyrimethamine (SP) the currently recommended drug for IPT strategy has a good safety profile [7, 18-23] and remains a good option for IPT in endemic areas in Africa [23, 24]. The documented side effects of SP in pregnancy from a Nigerian study were dizziness with no congenital malformations or death [6].

Despite the World Health Organization's efforts towards the prevention and control of malaria in pregnancy, yet malaria in pregnancy remains an issue [25]. In Nigeria, malaria in pregnancy is rated as one of the persistent leading prevailing illnesses affecting pregnant women, and in-utero under-five (National Bureau of Statistics (NBS) and FMOH) [26]. This is evident in Ogun State 80.0% and Oyo State 42.0% [27]. Studies related to the assessment of the impact of malaria control strategies in pregnant women in Orlu Local Government Area of Imo State are limited, and in the study area there is no available data on these malaria control strategies use among parturient, thus, this study set out to assess the impact of malaria control strategies in pregnant women in Orlu and its related outcome among pregnant women. Specifically, the study sets out to determine the prevalence of malaria and the intervention measures being used by pregnant women.

Materials and Methods

Study Area

The study was carried out in Orlu Local Government Area of Imo State, Nigeria between March and August, 2022. Its geographical coordinates are 5°47'0E North, 7°2'0N East and its original name is Orlu. Orlu is a local government in Imo State which is one of the five states that make up the south eastern part of Nigeria. The permanent site for Imo State university teaching hospital is in Orlu. The area was purposively chosen because the deplorable environmental conditions fostered by poor governance not only create comfortable breeding sites for mosquitoes but encourages lack of hygiene by occupants of Orlu. Malaria is highly endemic because ignorance, poorly maintained amenities coupled with the above reasons can adversely affect the proper use of available malaria control strategies. The knowledge of control strategies and home management of the malaria among the pregnant women in Orlu L.G.A will be assessed. Factors that militate against the use of the control strategies, measures that can facilitate sustained utilization of the malaria control strategies, the effect of those strategies when properly implemented and their outcome on the mother and her baby after delivery will also be assessed among the pregnant women in Orlu LGA.

Research Design

A survey and experimental research design was used in this study. Experimental research design was used for the determination of effects of implemented malaria control strategies on the babies and their mothers after delivery.

Ethical Consideration

Ethical approval for the study was gotten from the Post Graduate Board of the Department of Zoology, Imo State

University Owerri ethical committee. A letter bearing the name of the university, faculty and department was written to seek for permission from the matrons of selected primary health care facilities and the pregnant women in their antenatal clinics. The letter was endorsed by my supervisors and given to both heads of facilities and antenatal clinics. A consent form was also be prepared and administered to all pregnant women in selected facilities for their approval to follow through all the survey and diagnostic processes involved in this study.

Preliminary visit and selection of study

This study was carried out among pregnant women attending ante-natal clinics in primary health care centers. The researcher pay a preliminary visit to each of the five (5) healthcare centers randomly selected for the study. Approval was sought from the heads/management of the healthcare centers, as the objectives of the research were explained to them, which they in-turn explain to their subjects.

Study/Sample Population

The sample population was determined randomly from five (5) hospitals/clinics /health centers in Orlu Local Government Area. This method was drawn from Araoye (2004). The choice of these hospitals/clinics /health centers was to ensure good spread of the study area. The study population includes pregnant women between the ages of 15years and above. The subjects were people residing in the study area (Orlu Local Government Area). Simple random sampling technique was used to select 76 subjects from Okporo health center, 82 from Umuoma health center, 80 from Amaifeke health center, 94 from Ihioma health center and 96 from Ogberuru health center. The study includes a total of 428 participants.

Selection/training of Personnel

The help of four (4) medical personnel (nurse, medical laboratory scientist, another health worker) will be recruited for the study. They will be duly informed about the aim of the research; they will also be trained appropriately on how to achieve the objectives of the research.

Sample collection and Processing

Fresh capillary blood samples were collected aseptically from those recruited for the study using finger-pricking method as documented by Cheesbrough [28]. A single drop of blood, which is roughly 35µL of blood, is typically used in finger prick tests. The samples were processed immediately using Paracheck Rapid diagnostic Test Kit (Orchid Biomedical Systems, India). Afterward, a drop of the whole fresh capillary blood was applied to the sample "A" and immediately, the sample was blotted. Six drops of the clearing buffer was then introduced into "B" and the setup was allowed undisturbed for 15 minutes, after which the results were read. A pink colored band on the control area shows a negative result, while two pink bands in the control, and shows a positive result. Invalid test was considered when no bands appear on the device. Also, when no pink band appears on the test region without a corresponding band in the control region.

After which, a greater percentage of the rapid diagnostic tests carried out were correlated with microscopy and was taken to Microbiology Laboratory for viewing. A thick blood films was made by applying a drop the patients blood on the centre of a grease-free slide and then was emulsified by rocking in a

circular motion with the aid of another slide. After air-drying, the film was stained with 10% Giemsa for 10 minutes by standard techniques [28]. Then, allow to a dry; after which, a drop of oil immersion was introduced on stained slide and viewed under x100. Each slide was declared positive when one parasite was found per 100 high power fields, and when no one was seen, it was reported as negative. Quality of the microscopic slides was highly ensured by cross checking both the negative and positive slides by well-trained parasitologist.

Statistical Analysis

Categorical variables will be presented as actual numbers and percentages in table forms or figures.

Results

Overall prevalence of malaria among pregnant women attending antenatal in some in Orlu was shown in table 1. From the result, overall prevalence of malaria among pregnant women was 184(42.9%) of which women from Umuoma health center recorded a slight higher prevalence of (46.3%), followed Ihioma health center (43.6%), Amaifeke health center (42.5%), Ogberuru health center (41.7%) while Okporo health center (40.8%) as the least. Table 2 shows prevalence of malaria among pregnant women in relation to age, educational level, occupation, gravidity and trimester. Prevalence in relation to age revealed that age group 21-30years recorded highest prevalence of 85(55.2%), followed by age group 31-40years (40.1%), while age groups 15-20years and > 40years had prevalence of (32.6%) and (25.5%), respectively. In relation to educational level shows highest malaria prevalence (56.7%) among pregnant women with tertiary education, those with primary education had prevalence of (42.1%), secondary recorded (33.9%) while dropouts had only (15.8%). Occupational prevalence also revealed that civil servants (50.0%) had highest, followed by traders/farmers (45.0%), Students/unemployed (42.8%) and House wife (23.3%). The result showed no significant difference among the parameters (age, educational level and occupation) examined, ($p < 0.05$). Prevalence of malaria among pregnant women in relation to gravidity and trimester was tabulated in table 3. It was observed that multigravid 111(51.4%) had highest prevalence. Result observed no significant difference in the prevalence between primigravid and secundigravidae likewise in their trimesters. Prevalence of malaria among pregnant women in relation to the use of ITNs and IPTp was shown in table 4. It was observed that the prevalence of malaria among those with ITNs usage recorded 76(47.8%) while those with IPTp usage recorded 108(40.1%). Assessment of the control strategies of malaria among pregnant women according to hospitals was shown in table 5. From the assessment, it was observed that 155(36.2%) pregnant women use IPTp only, 59(13.8%) use ITNs only while 214(50.0%) combine both IPTp + ITNs.

Table 1: Overall prevalence of malaria among pregnant women attending antenatal in Orlu

Hospitals	No. Exam.	No. Infected (%)	No. Uninfected (%)
Okporo Health Center	76	31(40.8)	45(59.2)
Umuoma Health Center	82	38(46.3)	44(53.7)
Amaifeke Health Center	80	34(42.5)	46(57.5)
Ihioma Health Center	94	41(43.6)	53(56.4)
Ogberuru Health Center	96	40(41.7)	56(58.3)
Total	428	184(42.9)	244(57.0)

Table 2: Prevalence of malaria among pregnant women in relation to age, educational level and occupation

Variables	No. Exam. (N = 428)	No. Infected (%) (N = 184)	No. Uninfected (%) (N = 244)
Age in years			
15-20	46	15(32.6)	31(67.4)
21-30	154	85(55.2)	69(44.8)
31-40	177	71(40.1)	106(59.9)
> 40	51	13(25.5)	38(74.5)
Educational Level			
Primary	19	8(42.1)	11(57.9)
Secondary	177	60(33.9)	117(66.1)
Tertiary	194	110(56.7)	84(43.3)
Drop out	38	6(15.8)	32(84.2)
Occupation			
Students/unemployed	138	59(42.8)	79(57.2)
Trader/farmer	171	77(45.0)	94(54.9)
Civil Servant	76	38(50.0)	38(50.0)
House wife	43	10(23.3)	33(76.7)

Table 3: Prevalence of malaria among pregnant women in relation to gravidity and trimester

Variables	No. Exam. (N = 428)	No. Infected (%) (N = 184)	No. Uninfected (%) (N = 244)
Gravidity			
Primigravid	67	23(34.3)	44(65.7)
Secundigravid	145	50(34.5)	95(65.5)
Multigravid	216	111(51.4)	105(48.6)
Trimester			
1 st Trimester	46	19(41.3)	27(58.7)
2 nd Trimester	134	57(42.5)	77(57.5)
3 rd Trimester	248	108(43.5)	140(56.5)

Table 4: Prevalence of malaria among pregnant women in relation to the use of malaria intervention strategies (ITN and IPTp)

Variables	No. Examined	Use (%)	
		No. Infected	No. Uninfected
Insecticide Treated Nets (ITNs)	159	76(47.8)	83(53.2)
Intermittent preventive treatment in pregnancy (IPTp)	269	108(40.1)	161(59.9)
Total	428	184(42.9)	244(57.0)

Table 5: Assessment of the control strategies of malaria among pregnant women according to hospitals

Hospitals	IPTp (%)	ITNs (%)	IPTp + ITNs (%)	Total (%)
Okporo Health Center	21(27.6)	11(14.5)	44(57.9)	76(17.8)
Umuoma Health Center	25(30.5)	9(10.9)	48(58.5)	82(19.2)
Amaifeke Health Center	30(37.5)	15(18.8)	35(43.8)	80(18.7)
Ihioma Health Center	41(43.6)	13(13.8)	40(42.6)	94(21.9)
Ogberuru Health Center	38(39.6)	11(11.5)	47(48.9)	96(22.4)
Total	155(36.2)	59(13.8)	214(50.0)	428(100.0)

Discussion

There is a much increased vulnerability to malaria disease in pregnancy due to its inhibition to immune system by the parasite in other to ensure establishment and non-rejection of the foetus [29]. A prevalence of 42.9% has been reported among the study group. This result justified a prevalence of (61.9%) of malaria in pregnancy despite ownership of ITNs [30] but differed from other studies conducted by authors in Nigeria and outside [31, 32]. Malaria disease was seen to be prevalent during the multigravida (51.4%) and 3rd trimester (43.5%) of pregnancy and then decreased later in primigravid

(34.3%) and in the first trimester (41.3%) respectively. This finding was believed not to confounding for the following reasons.

Primigravidas used prophylaxis more significantly compared to multigravidas, this contrasts with a study in Abuja, Nigeria where parity had no significant association on IPT use^[37]. However, an insignificantly higher proportion of the multigravida completed at least two doses of IPT as stipulated when compared with the primigravida, this concurs with the finding by Olorunda *et al.*^[38]. Though the reason for this was not sought in this study, it is possible that these women learnt of the benefits of adequate malaria prophylaxis in their previous pregnancies. Also the trimester of IPT initiation did not differ with gravid status.

More so, this study observed that majority of the women who had ITN did not sleep under it, therefore the high prevalence of malaria. It became obvious that the ITNs usage may have been abused due to some human; mostly social and environmental factors. Consequently this study agrees with Ricolta *et al.*^[39] and Ivan *et al.*^[40] who reportedly observed that only but few pregnant women sleep under ITNs.

IPT protected parturient from malaria attack, evidenced by the fact that the proportion of parturient who took IPT and still had malaria attack was about (40.1%) compared to (47.8%) of the pregnant women who did not take IPT but rather made use ITNs. This result agreed with a study where those who took IPT 23% still have malaria infection compared to 78% of those who did not take IPT, a significant observation in keeping with other studies in Nigeria^[4] and elsewhere^[41]. From the assessment, it was observed that 155(36.2%) pregnant women use IPTp only, 59(13.8%) use ITNs only while 214(50.0%) combine both IPTp + ITNs.

The assessment of the drugs used in the control of malaria among pregnant women revealed difference types IPTp such as Fansidar (Sulfadoxine-Pyrimethamine), Lonart (Arthemeter-Lumenfantrin), chloroquine (Chloroquine phosphate), mepacrine (Mepacrine hydrochloride), laridox (Sulfadoxin-Pyrimethamine), daraprim (Pyrimethamine) and Camoquin (Amodiaquine). From the result, it was discovered that fansidar (Sulfadoxine-Pyrimethamine) was the most preferred drug as responded by the pregnant women under study with a percentage of (55.8%), seconded by Lonart (Arthemeter-Lumenfantrin) with (9.3%). Lonart was given to pregnant women from 2nd trimester and above.

Pregnant women took anti-malaria drugs with at least 3 tables (83.4%) and they took it once in 2-3 months (50.9%).

Mothers who did not take IPT were more likely to have low birth weight babies when compared with mothers who did, a significant observation in keeping with other findings. On the same vein, a comparison of the birth weight of the babies from mothers who took between one to three doses of IPT revealed that those who had three doses had the highest mean birth weight. This corroborates the finding of a study by Kayentao *et al.*^[42] whose data provided support for the new WHO recommendation that pregnant mothers should be given at least 3 doses of IPT with a dose given at each scheduled antenatal care visits in the 2nd and 3rd trimester. Other researchers have also found that giving a third dose of IPT using SP further reduces the risk of low birth weight compared with the standard 2 dose regimen^[43]. Upon multiple comparisons to know how the mean birth weights differed from each other using the least significant difference, the asterisked mean differences with accompanying confidence intervals were significant.

Conclusion and Recommendations

This study has been able to establish a high malaria prevalence among pregnant women who do not have or use any form of malaria preventive measures such as ITNs and IPTp, in spite of the popularity given to the use of these protective measures. The study showed high prevalence of malaria among pregnant women of all ages especially, age group 21-30years, likewise pregnant women with tertiary education and civil servants. In the same vein, high malaria prevalence was discovered among multigravida women. Fansidar (Sulfadoxine-Pyrimethamine) dominated the participants' choice of drugs use for malaria control, especially those with 3tablets. Majority of the participated have taken the malaria drugs once in 2-3 months while healthcare facility was found to be the main source of procurement. Therefore, the study recommends that the use of ITNs and IPTp should be encouraged and strictly adhered to during pregnancy in order to reduce the incidence of this dangerous disease; as well as increasing knowledge on the benefits attributable to the use of these intervention measures may possibly enhance the usage of the interventions.

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