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EC NURSING AND HEALTHCARE
Research Article

Prevalence of Malaria among Pregnant Women in Imo State University Teaching Hospital (Imsuth), Orlu, Imo State, Nigeria

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Received: March 05, 2021; **Published:** April 16, 2021

Abstract

Introduction: Malaria during pregnancy is a major concern because of its adverse effect on fetus. The study was on pregnant women who visited Imo State University Teaching Hospital (IMSUTH), Orlu, Nigeria from February 2014 to June 2017 for their antenatal care.

Objective: The purpose of the study is to ascertain malaria prevalence and its effect on the fetus among pregnant women in IMSUTH.

Method: Shortly before birth peripheral blood smear was obtained from each participant into sterile EDTA container for laboratory analysis for malaria identification. The study comprised of 936 pregnant women who came for antenatal care during the period of study.

Result and Discussions: The findings revealed that 317 (33.9%) had peripheral malaria parasite with malaria intensities of 43.2% having one plus (+), 37.5% and 19.3% had ++ and +++ respectively. Primigravidae had more (59.7%) malaria parasite than other gravidities whereas multigravidae were less (21.5%) affected, 43.2% of the population had malaria intensity of one plus (+). There is significant relationship between malaria prevalence among pregnant women in IMSUTH and their gravidity status ($x2 = 124.82$; $P < 0.05$). Age bracket of 36 - 45 years were more exposed (52.8%) to malaria infection. Malaria intensity of one plus (+) increases as the age of the population increases whereas, malaria intensity of ++ decreases with age. There is significant relationship between malaria prevalence among pregnant women in IMSUTH and their age groups ($x2 = 44.28$; $P < 0.05$).

Recommendation: The study recommended regular environmental sanitation to get rid of mosquitoes, use of mosquito treated bed nets, prompt treatment of malaria in pregnancy and health education.

Keywords: *Prevalence of Malaria; Pregnant Women*

Introduction

According to World Health Organization, malaria is described as a disease of the poor and underdeveloped countries and it remains a serious health problem. Ninety percent of global deaths sue to malaria occurs in Sub-Saharan Africa [1]. Fifty percent of the global malaria deaths occurs in Nigeria, Ethiopia, Uganda and Democratic Republic of Congo. Of all deaths from infectious diseases in Africa, malaria is rated 2nd after HIV/AIDS. Poverty is a major factor in malaria prevention and treatment and more than 60% of Nigerians are poor [2].

Approximately 90% of all malaria illness and death in the world today occurs in sub-Saharan Africa, where the most virulent species of the malaria parasite *Plasmodium falciparum* thrives [3]. Malaria exacts its greatest toll on pregnant women and children, killing an estimated 1 to 2 million children each year and causing illness in a further 300 to 500 million individuals. About 25 million pregnancies that occur in malaria-endemic areas of Africa are at risk of malaria infection each year [3].

Malaria affects not less than 16 million pregnant women in Nigeria annually [4]. Although malaria infection in pregnancy is usually asymptomatic, but it has an adverse perinatal outcomes with a high risk for infant death [5]. Other effects of malaria in pregnancy include high rates of maternal morbidity, fever and severe anemia [6], others are abortion, and placental malaria [7]. Riley., *et al*. opined that between 75,000 and 200,000 infant deaths are associated with malaria infection in pregnancy [8].

Malaria infection during pregnancy is a serious public health problem which affects the pregnant woman, her fetus and the newborn [9]. The symptoms and complications of malaria in pregnancy is dependent on malaria transmission intensity and the level of acquired immunity of the individual. Pregnant women are susceptible and more likely to become infected, have a recurrence, develop severe complications, and also to die from the disease [10].

Although, malaria in pregnancy may be symptomatic but there may be presence of plasmodial parasites in the woman's body which will eventually have a negative impact on her and her fetus; so restricting treatment to pregnant women with malaria symptoms is an inadequate strategy [11]. Areas where natural immunity is high, subclinical infection may be common (e.g. sub-Saharan Africa), whereas those in areas with low immunity have symptoms of malaria infection e.g. the Asia-Pacific region, and South Africa [12].

Malaria in the non-pregnant state is different when compared with those without pregnancy. Severity is high during pregnancy and it's because of impaired immunity due to pregnancy. Placental malaria is characterized by accumulation of *Plasmodium falciparum*-infected erythrocytes in the intervillous space of the placenta which may be rare or absent in the peripheral circulation. It's usually difficult to diagnose such by light microscopy of blood films [12].

Due to restrictions on anti-malarial agents during pregnancy, treatment of malaria in pregnancy can be difficult. Many drugs are contraindicated in pregnancy, due to lack of clinical trials during pregnancy for fear of negatively affecting the fetus. However, it is safe to use artemisinin-combined drugs (ACDs). World Health Organization (WHO) supports the use of intermittent prophylactic treatment during the second and third trimester [13]. Dihydroartemisinin-piperaquine is now under study as an option to replace sulfadoxine-pyrimethamine for intermittent preventive treatment [14].

Materials and Methods

This study was carried out in Imo State University Teaching Hospital (IMSUTH), Orlu, Nigeria. Orlu is a city in Imo State, Nigeria and it lies on the geographical coordinates of 5^0 47^I 0^{II} N, 7^0 2^I 0^{II} E. Orlu (Igbo: *Ọlu*) is the third largest city followed by Okigwe and Akokwa in Southeast Nigeria Imo State with an estimated population of 220,000. It played a critical role as the headquarters for humanitarian relief agencies during the Nigerian civil war (1969 - 1970). The IMSUTH is a tertiary health centre located in Orlu, south eastern Nigeria. It's one of the best tertiary health centres that gives out health services in infectious diseases and immunology. It also serves as a referral site for south eastern states. IMSUTH is a Tertiary Health Institution owned by the State Government. The institution trains medical students, specialists, nurses, house officers and all interns etc.

The study comprised of 936 pregnant women that attended ante natal clinic in IMSUTH from February 2014 to June 2017. Ethical Clearance was obtained from Ethical Committee of the hospital. All participants gave consent for the study. Two senior nursing officers from department of Paediatrics and Obstetrics unit and two senior laboratory technologist of the hospital were recruited for the study. Guidelines for clinical research was adopted for the study.

Data collection involved clinical assessments of maternal peripheral blood. A data collection schedule form (DCSF) was used to record the laboratory result. The DCSF questionnaire was designed as described by [15-17]. Maternal peripheral blood was obtained from each willing participant into sterile EDTA container for laboratory analysis [18]. Identification of asexual stages of *Plasmodium* species on the thick blood film was used to diagnose malaria parasite. Parasite density was determined by counting the number of parasites per high power field and ranged from + (1 - 10 parasites per 100 thick film fields), ++ (11 - 100 parasite per 100 thick film fields), +++ (1 - 10 parasites per single thick film field), and ++++ (more than 10 parasites per single thick film field). For a slide to be considered negative, two hundred high power fields were examined [19]. Statistical analysis was carried out using SPSS for windows version16, Software Package. Non-parametric analysis of Chi-square test was used to test for significance. Differences were considered significant at $P < 0.05$.

Results

Table 1 shows that age group 16 - 25 years (50.5%) had highest proportions of participants than other age groups while age group 46 - 55 years (1.5%) had the least. As age increases, number of participants decreases. For gravidity, the greatest proportion was multigravida women (60.0%) and the least was great grand multigravidae (4.1%). For level of education, all the women had formal education, those with secondary level of education were higher (67.5%). The least school attended was primary education (7.2%). For marital status, majority were married (86.0%) while separated/divorced accounted for 1.6%.

Variables	Category	f	%
Age Group (years)	16 - 25	473	50.5
	26 - 35	377	40.3
	36 - 45	72	7.7
	46 - 55	14	1.5
Gravidity	Primigravida (1st Pregnancy)	258	27.6
	Multigravida (2nd to 4th Pregnancy)	562	60.0
	Grand Multigravida (5th to 6th Pregnancy)	78	8.3
	Great-grand Multigravida (7th pregnancy and above)	38	4.1
Level of Education	No Formal Education	0	0
	Primary Education	67	7.2
	Secondary Education	632	67.5
	Tertiary Education	237	25.3
Marital Status	Single	24	2.6
	Married	805	86.0
	Widowed	92	9.8
	Separated/Divorced	15	1.6

Table 1: *Socio-demographic characteristics of the study participants.*

Table 2 shows that 33.9% of the study population had malaria infection. Primigravidae women had significantly higher infection than other gravidities (P < 0.05). Grand multigravidae (58.1%), primigravidae (40.9%) and great grand multigravidae (36.4%) had higher parasite intensities of +, ++ and +++ respectively. There is significant difference between gravidity status and parasite intensities (P < 0.05).

Gravidity	No. Examined	No. (%) Positive	% Intensities		
			+ (%)	++ (%)	+++ (%)
Primigravida	258	154 (59.7)	60 (39.0)	63 (40.9)	31 (20.1)
Multigravida	562	121 (21.5)	55 (45.5)	46 (38.0)	20 (16.5)
Grand Multigravida	78	31 (39.7)	18 (58.1)	7 (22.6)	6 (19.3)
Great Grand Multigravida	38	11 (28.9)	4 (36.4)	3 (27.2)	4 (36.4)
Total	936	317 (33.9)	137 (43.2)	119 (37.5)	61 (19.3)

Table 2: *Distribution of malaria prevalence according to gravidity.*

^{2} *= 124.82; P < 0.05.*

Table 3 shows that 33.9% of the study population had malaria infection. Age group of 36 - 45 years were more exposed (52.8%) to malaria infection whereas, age bracket of 26 - 35 years were less exposed (23.3%) to malaria infection. Malaria parasite intensity of one plus (+) increases as the age of the population increases whereas, malaria intensity of ++ decreases with age. There is significant relationship between malaria prevalence among pregnant women in IMSUTH and their age groups (^{2} = 44.28; P < 0.05).

Age group (years)	No. Examined	No. (%) Positive	% Intensities		
			+ (%)	++ (%)	+++ (%)
16 - 25	473	186 (39.3)	73 (39.2)	76 (40.9)	37 (19.9)
26 - 35	377	88 (23.3)	39 (44.3)	31 (35.2)	18 (20.5)
36 - 45	72	38 (52.8)	22 (57.9)	11 (28.9)	5 (13.2)
46 - 55	14	5 (35.7)	3 (60.0)	1 (20.0)	1 (20.0)
Total	936	317 (33.9)	137 (43.2)	119 (37.5)	61 (19.3)

Table 3: *Distribution of malaria prevalence according to maternal age.*

^{2} *= 44.28; P < 0.05.*

Discussion

There are a lot of appropriate tools to control malaria, yet, more than 3 million people are at risk of suffering from malaria each year [20]. In 2006, 247 million malaria cases were recorded which caused almost one million deaths [21]. Out of 50 million pregnant women who are at risk of suffering from malaria, more than 50% of them live in sub-Saharan Africa [22]. In these areas at least one in four of these pregnant women has evidence of peripheral malaria or placental malaria [23,24].

The study revealed that 317 (33.9%) of the women had peripheral malaria. Out of 317 that had malaria, 137 (43.2%) had malaria intensity of one plus (+), 119 (37.6%) and 61 (19.2%) had malaria intensities of ++ and +++ respectively. This finding correlates with report of Uko, Emeribe and Ejezie who recorded low prevalence of (31.8%) [25]. The finding is in line with studies carried by Desai, Gutman and L'lanziva were malaria prevalence was 29.5% in East and Southern Africa and 35.1% in West and Central Africa [14]. However, the

finding contradicts Adefioye., *et al.* study in Osogbo, Southwest Nigeria which showed a very high (72%) prevalence of malaria [26]. The difference in the two studies was as a result of population size and time of study. Also, Adefioye., *et al*. study was conducted entirely during rainy season which is a good breeding time for malaria vector [26]. Presence of plasmodial parasites in pregnancy whether symptomatic or non-symptomatic have negative impact on the woman and her fetus so treating only symptomatic pregnant women is regarded as an inadequate strategy [11].

Takem and D'Alessandro opined that subclinical infection is common in areas where natural immunity is high (e.g. sub-Saharan Africa), whereas symptomatic cases are more common in areas with low immunity (e.g. the Asia-Pacific region, and South Africa) [12]. Malaria in pregnancy is different from non-pregnant women due to general impaired immunity of a pregnant woman.

Approximately 90% of all malaria illness and death in the world today occurs in sub-Saharan Africa, where the most virulent species of the malaria parasite *Plasmodium falciparum* thrives [3]. Malaria exacts its greatest toll on pregnant women and children, killing an estimated 1 to 2 million children each year and causing illness in a further 300 to 500 million individuals. About 25 million pregnancies that occur in malaria-endemic areas of Africa are at risk of malaria infection each year [3].

The study found out that malaria prevalence was high in primigravidae than other gravidities. 59.7% of primigravidae had malaria compared to 21.5%, 39.7% and 28.9% for multigravidae, grand multigravidae and great grand multigravidae respectively. There is also significant relationship between malaria prevalence and gravidity status. Primigravidae have more malarial infection and also suffer serious complications [10]. This finding agrees with the result of study by Desai., *et al.* who noted that prevalence of malaria on the mother depends on the level of acquired immunity. It is more severe in non-immune women and primigravidae than other gravidities [27].

Malaria prevalence was high (52.8%) among maternal age groups of 36 - 45 years, followed by 16 - 25 years which had malaria prevalence of 39.3%. maternal age groups of 46 - 55 years and 26 - 35 years had malaria prevalence of 35.7% and 23.3% respectively. Further analysis of this study also revealed that malaria exposure among pregnant women in IMSUTH is significantly dependent on their age groups.

Studies conducted in sub-Saharan Africa found a significant association between maternal age and malaria infection during pregnancy [28-31]. Age-related immunity influence malaria prevalence in childbearing years [30]. Studies indicated that young women of childbearing age are more susceptible than older women to malaria because they are still in the process of acquiring natural immunity to malaria [32-34].

Conclusion

In conclusion, this study recorded 33.9% prevalence of malaria parasitemia among pregnant women attending antenatal clinic in IMSUTH. The prevalence of malaria parasites once brings to fore the endemicity of malaria in Imo State, which is in the savannah belt of south eastern Nigeria.

Recommendation

The study suggests regular environmental sanitation to get rid of mosquitoes, use of insecticide treated bed nets, and prompt treatment of malaria in pregnancy will contribute significantly in reducing both maternal and fetal morbidity and mortality. There is also need for routine intermittent preventive treatment of malaria for pregnant women in this study area.

Acknowledgement

The researchers are grateful for the staff and management of Imo State University Teaching Hospital, Orlu for their support and for granting us ethical clearance for the study.

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