Prevalence of Malaria among Pregnant Women attending Antenatal clinic in Grimard Catholic Hospital, Anyigba in Kogi State, Nigeria

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Abstract: Malaria remains a potentially life threatening disease globally with Nigeria having the highest number of reported cases in sub-Saharan Africa. Thus, we conducted a study to determine the prevalence of malaria infection among pregnant women attending antenatal section of the Grimard Catholic hospital, Anyigba. Two millilitres of blood sample was obtained by venipuncture from 150 consented pregnant women. A structured questionnaire was administered to each participant to obtain information on their age, gravidity, gestation period and level of education. Sample from each subject was screened for the presence of *Plasmodium falciparum* using the rapid diagnostic test (RDT) and the Giemsa-stained thin and thick blood films microscopic technique. A total of 49(32.66%) out of 150 pregnant women examined were infected with *P. falciparum* with the age group 18-22 years having the highest rate 30(20%) of malaria infection. Malaria infection was however not statistically associated with age group differences (P>0.05). Prevalence of malaria was higher in primigravidae 28(18.67%) and women in their third trimesters 29(19.33%). A significant association exists between gravidae and malaria infection (p<0.05). Semi-educated pregnant women had higher prevalence of 32(21.33%) compared to the highly educated women who had lower prevalence of 11.33%. The high prevalence of malaria in this study emphasizes the need to implement more robust strategies to prevent and control this infectious menace in pregnancy.
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1. Introduction

Malaria is a life-threatening parasitic disease that is transmitted mostly by the female Anopheles mosquitoes. This disease remains one of the most complex and overwhelming medical challenges in the tropical and subtropical regions of the world. Globally, approximately 214 million cases of malaria occur annually and 3.2 billion people are at risk of infection (WHO, 2015). World health report showed that Malaria was responsible for approximately 438,000 deaths in 2015 with sub-Saharan Africa alone having about 90% of cases (WHO, 2015). Malaria is a disease of poverty, poorly distinguishable on clinical grounds from a host of other poverty-associated febrile illness contributing to high morbidity and mortality in the tropics, particularly in the sub-Saharan Africa where majority of the 2 to 3 million global deaths per year occur (WHO, 2000; Bell *et al*., 2006).

An increased risk of malaria during pregnancy was observed over 60 years ago by Wickramasariya (Steketee and Mutabingwa, 1999). Pregnancy exacerbates malaria through a non-specific activity of the immune system. The protective anti-plasmodial activity is suppressed at pregnancy and this has clinical consequences with important public health implications on pregnant women (Beeson *et al*., 2000). Malaria in pregnancy continues to be a major public health problem in sub-Saharan Africa, and pregnant women are a specific risk group for *Plasmodium falciparum* (Odaibo, 2005; Brabin, 1983). This is because in pregnancy, there is a transient depression of cell mediated immunity that allows allograft retention. This interferes with resistance to various infectious diseases (Meeusen *et al*., 2001). Thus, susceptibility to malaria and the severity of its clinical manifestations in pregnancy can be partly explained by the observed immuno-supression mediated by pregnancy associated hormones and proteins and the cyto-adherent properties of the subpopulation of malaria parasites infecting the human placenta (Moormann *et al*., 1999; Beeson *et al*., 2000).

Annually, about 24 million women during pregnancy are affected by malaria in sub-Saharan Africa (Steketee *et al*., 2001). Although *Plasmodium falciparum* infection in pregnancy in the sub region is usually asymptomatic, it largely contributes to adverse prenatal outcomes with a high risk for infant death particularly in areas of lower malaria endemicity

(Steketee *et al*., 2001). Globally, between 75,000 and 200,000 infant deaths per year are attributed to malaria infection in pregnancy (Steketee *et al*., 2001; WHO, 2003). In Nigeria, approximately 25-30% corresponding to 300,000 children under five years die each year due to malaria (Odaibo, 2005).

In part of sub-Sahara Africa where malaria is endemic, pregnant women often have a high frequency and density of *Plasmodium falciparum* parasitaemia, with high rates of maternal morbidity including fever, severe anaemia, abortion and stillbirth. The low birth weight in new born is often a result of intrauterine growth retardation that is associated with malaria (Steketee *et al*., 2001; Bouvier *et al*., 1997). The severe effects of malaria on pregnant women and the adverse prenatal outcomes associated with it, makes early diagnosis of malaria absolutely imperative. Early and accurate diagnosis and appropriate case management are essential to addressing the malaria burden in pregnancy and its outcome. These have been advocated consistently by the World Health Organization (WHO) as one of the main interventions of the global malaria control strategy (WHO, 2000; Bell *et al*., 2006).

In malaria-endemic countries, the protection of pregnant women from mosquitoes that spread the disease remains a priority to many National Malaria Control Programmes because of their vulnerability to malaria. The recent World Malaria report, which indicated that Nigeria accounts for a quarter of all malaria cases in the 45 malaria-endemic countries in Africa, clearly showed the challenge of malaria in Nigeria (WHO, 2008). The principal impact of malaria infection is due to the presence of parasites in the placenta causing maternal anaemia (potentially responsible for maternal death when severe) and low birth weight (LBW) (Newman *et al*., 2003; Rogerson and Boeuf, 2007). Despite considerable efforts to control malaria, it is still the most prevalent and devastating disease in tropical Africa with pregnant women and children ≤5years the groups particularly at risk of severe cases (WHO, 2008). Malaria infection in pregnant women and children is frequently associated with anaemia, cerebral malaria, fever, hypoglycaemia, pulmonary oedema and pueperal sepsis (WHO, 2008). Mortality can occur from severe malaria and haemorrhage (WHO, 2008).

In light of the aforementioned, this study was designed to assess the prevalence of malaria parasitaemia among pregnant women accessing antenatal clinic at the Grimard catholic hospital, Anyigba in order to generate an up-to-date data that could be used to inform policy makers on health issues in infection control in this region.

2. Materials and Methods

2.1 Study Area/Population: This study was carried out in Anyigba metropolis, a town located on latitude 7º 15! -7º 29! N and longitude 7º 11!-7º 32! E in Dekina Local Government (LGA) of Kogi-East (Ifatimehin *et al*., 2009). Anyigba has an estimated population of 130,000 comprising of most ethnic groups in Nigeria. Igala ethnic group dominates the population of Anyigba with farming as the major occupation of the people.

2.2 Ethical Consideration: Ethical approval was obtained from the hospital management board on issues relating to health.

2.3 Sampling: A total of 150 pregnant women attending antenatal clinic (ANC) at the Grimard Catholic Hospital, Anyigba were enrolled in the study during the period of June-August 2013 and their blood samples were collected and analysed for malaria parasites. After informed consent was obtained, a structured questionnaire was administered to each participant to obtain information on socio-demographic and obstetric factors including parity, trimester, age and educational status. Cross-sectional study was the design used.

2.4 Collection of Samples: Blood samples were aseptically collected into ethylyne-diammine tetraacetic acid (EDTA) bottles to in accordance with Moody, (2002) and Alonso *et al*., (1994). About 4ml of blood sample was obtained by vernipuncture from each patient using a sterile needle and syringe. Each blood sample was analysed for malaria parasite. For confidentiality, no personal identifiers (names, address, etc) were used on the blood sample of the participants. Instead, bar-coded numbers were used to ensure anonymity of the donors, to facilitate laboratory procedures and minimize the chances of errors during the handling of the blood specimens. All specimens were analyzed within 1 hour of collection.

2.5 Assay Procedure

- **Malaria rapid diagnostic test**

Rapid diagnostic test kit (Care Start™ Malaria HRP2, G0141, LOT D21M0) was used. The kit is an immuno-chromatographic dipstick assay that detects histidine-rich proteins produced by *P. falciparum* in whole blood specimens using the mechanism of antibody antigen reaction. The assay was performed at room temperature as specified by the manufacturer. The Test device was removed from the foil pouch and used immediately. The Test device was placed on a clean and level surface and the disposable dropper was held vertically and blood drawn up to the fill line. The blood was transferred using the inset dropper into the specimen well by squeezing the sample pipette. Two drops of Assay buffer (60ul) were added into the assay buffer well and the timer was started. Air bubbles were avoided from being trapped in the specimen well. A positive result was indicated by two visible lines on

both the test and control region. The result was read within 20 minutes.

- **Microscopic Examination and Giemsa staining**

Giemsa-stained thick and thin blood films were performed and the Plus System was used for the determination of parasite density. Grease free slides were used and a small drop of blood was spread out in a circle at the centre of the slides with a micropipette in other to make the thick film. For the thin film, a drop of blood using a micropipette was placed at 1cm from the end of the slide, a cover slip was placed on the slide at an angle of 45^0 and a thin film was made by gently pushing the cover slip forward to produce feathered edge where the cells were in a monolayer. A grease pencil was used to label the slides, which were allowed to air dry at room temperature, and were fixed after drying in methanol for one minute, making it ready for staining. The Giemsa stain was carried out using standard quality control procedure as described by Cheesbrough (2005).

2.6 Data Analysis: Data generated in this study was analyzed using SPSS version 16 for windows. Differences in proportion were compared using chi square and p-value < 0.05 was set as the level of statistical significance.

3. Results

Table 1 shows that 49 (32.67%) out of 150 pregnant women tested were positive for malaria parasite whereas 101 (67.33%) were negative.

Table 1: Prevalence of malaria parasite among pregnant women in Anyigba

Malaria status	Frequency	Percentage
Positive	49	32.67%
Negative	101	67.33%
Total	**150**	**100**

Table 2 shows the prevalence of malaria parasite in pregnant women with respect to age (years) Gravidae, Trimester and Educational status. A breakdown of infected individuals in relation to their age group shows that the age group 18-22 years had the highest prevalence rate of 30(20%), followed by 23-27 years and 28-32 years which respectively had 9.33% and 2.00% while age group 33-37 and 38-42 years had the least prevalence of 0.67% each. Prevalence according to gravidae shows primigravidae 28(18.67%) were more infected than secundrigravidae 13(8.67%) and multigravidae 8(5.33%). The difference between gravidae in relation to malaria infection was statistically significant ($p<0.05$). Highest prevalence of 29(19.33%) was observed in women in their third trimester followed by 15(10%) in the second trimester and 5(3.33%) in the first trimester which had the least. The semi-educated pregnant women had higher prevalence rate of 32(21.33%) compared to the 17 of (11.33%) among educated patients. Statistical analysis showed that there were no significant differences between age group, trimester, level of Education and the presence of malaria infection in pregnant woment ($p>0.05$).

4. Discussion

The overall prevalence of *Plasmodium falciparum* infection in this study was 49(32.67%). This is higher than the 26%, 6.8% and 5.6% prevalence rates earlier reported in Port Harcourt by Wogu *et al*., (2013), Calabar by Uko *et al*., (1998) and Plateau by Damen and Daminabo, (2017) respectively. The high prevalence of malaria infection in this study may be attributed to the poor drainage and lack of proper sewage disposal systems that is common in the study area. Another likely reason for the higher prevalence may be linked to flooding which coincides with the study period. Flooding coupled with rain could bring about stagnant water bodies which constitute suitable breeding sites for malaria vectors. Prevalence rate from present study is however lower than the 42% reported in Ghana (Mockenhaupt *et al*., 2000), 57.5% reported in Gabon (Boyou – Akotet *et al*., 2003), 54% reported in South East Nigeria (Nduka *et al*., 2006). This variation may be attributed to different climatic conditions, less rainfall, and surface water that serve as mosquito breeding sites.

Age distribution greatly influences the prevalence of malaria among the pregnant women in this study as the prevalence of malaria decreases with increasing age. This may be due to immunity built against malaria parasites as individual age increases. This result support the finding of Bouyou-Akotet *et al.* (2003) who reported high prevalence at lower ages and low prevalence at higher ages and attributed it to the existence of natural immunity to infectious diseases including malaria which pregnant women acquires as their age increases.

Malaria infection was higher among the primigravidae than in the secundigravidae and multiparous pregnant women. The higher prevalence of malaria observed among primigravidae in this study is comparable with the finding of Mofolorunsho et al., (2014) among pregnant women attending health care facility in Lokoja. Finding from our study justifies the assertion that parasitemia is significantly common and heavier in primigravidae than the secundigravidae and multigravidae pregnant women in Africa (McGregor, 1984). The significantly higher malaria infection in the primigravidae compared to the secundigravidae and multigravidae supports the observation that in an area where transmission is high, the level of acquired pregnancy immunity against malaria is expected to be

significant, as such; the primigravidae is more affected (WHO, 2003; Brain, 1998).

Table 2: Prevalence of malaria parasites in pregnant women with respect to age (years), Gravidae, Trimester and Educational status

Variable	Number Examined	Number Positive (%)	p-value
Age group (years)			
18-22	71	30 (20.00%)	
23-27	37	14(9.33%)	0.159
28-32	24	3(2.00%)	
33-37	8	1(0.67%)	
38-42	10	1(0.67%)	
Total	150	49(32.67%)	
Gravidae			
Primigravidae	49	28 (18.67%)	
Secundrividae	39	13 (8.67%)	0.002
Multigravidae	62	8 (5.33%)	
Total	150	49 (32.67%)	
Trimester			
First	24	5(3.33%)	
Second	65	15(10.00%)	0.08
Third	61	29(19.33%)	
Total	150	49(32.67%)	
Educational status			
Educated	60	17 (11.33%)	
Semi- educated	90	32(21.33%)	0.508
Total	**150**	**49(32.67%)**	

Women in their third trimester had the highest level of parasitemia in this study. This finding is consistent with the earlier reports of Mofolorunsho et al., (2014) in Lokoja, Nigeria and Adam et al. (2005) in Eastern Sudan. The semi-educated pregnant women had the highest prevalence rate compared to the highly educated category in this study. Reason for the higher malaria rate in the less educated women may be unconnected with the fact that they are more exposed to malaria parasite due to bad environmental condition and their life styles (Adefioye *et al.*, 2007). The highly educated pregnant women are likely more enlightened on the danger posed by malaria during pregnancy and could implement strategies in infection control and prevention. Therefore, a health education programme about the disease that targets less enlightened women will result in a significant reduction in malaria in this region and the country at large.

5. Conclusion

The high prevalence of malaria infection among pregnant women in this study in comparison with several other reports from similar studies in Nigeria reaffirms the endemicity of the disease in the country. Malaria should therefore be recognized as a priority in health care especially among pregnant women living in malaria endemic areas like Anyigba. Innovative and integrated control measures are urgently needed to reduce malaria prevalence significantly in this region. These should include community mobilization and health education of the general populace on the importance of using insecticide treated nets to control malaria and cleaning of waterways to discourage breeding sites of mosquitoes.

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