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PREVALENCE OF MALARIA INFECTION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT KOGI STATE SPECIALIST HOSPITAL, LOKOJA, KOGI STATE

***Audu-Ohida, H., Babable, S. K. and Ajakaiye, A.**
Department of Biological Sciences, Federal University Lokoja, Kogi State, Nigeria.
*Corresponding author: halimaau.28@gmail.com 08032921171

Abstract

This study was carried out between March to August, 2016, to determine the prevalence of malaria parasite infection among pregnant women attending Kogi State Specialist Hospital. Both thick and thin smears were made using peripheral blood and stained with Giemsa for malaria parasite diagnosis using light microscopy. Of the 120 samples examined, 30 (25 %) were positive for *P. falciparum* parasite infection. Age group 18-22 years recorded the highest prevalence rate of 13 (10.83 %) and the difference between age group of pregnant women was statistically significant ($p<0.05$). Primigravida women recorded highest infection rate of 18 (15 %), however, those in first trimester recorded the highest prevalence of 16 (13.3 %) followed by 8 (6.7 %) by those in the second trimester. The results show that pregnant women are indeed predisposed to malaria infection as they are immuno-suppressed especially at early stage and as a primigravida and as teenage mothers than multigravida and older mothers. More efforts are needed to control malaria during pregnancy. Therefore, it is necessary to design an effective public health education programme specifically for this vulnerable group and also the routine intermittent preventive treatment should be administered emphatically at hospitals or health care centres levels in Lokoja, Kogi State.

Keywords: Kogi, Pregnancy, Prevalence, Primigravida, *P. falciparum*

Introduction

Malaria is a life threatening parasitic disease transmitted by female Anopheles mosquitoes. Malaria in pregnancy is a significant public health problem including considerable risks for the pregnant woman, her foetus and new born child ranging from maternal illness, jaundice; low birth weight and death in some cases as the adverse effect of *P. falciparum* infection in pregnancy are most pronounced for women in their first pregnancy (Takem *et al.,* 2013 and WHO 2019). Malaria

infection in Sub Saharan Africa (SSA) accounts for over one million deaths yearly in the region, these deaths are primarily among children under 5 years and pregnant women. The burden of malaria among pregnant women and general population in sub Saharan Africa cannot be over emphasized (Ogbu *et al.,* 2015). Nigeria has accounted for 25% and 30% of infant and child deaths respectively and 11% maternal mortality (Audu & Abdulsalam 2015). Maternal mortality is twice in pregnant women, the protection of pregnant women living in endemic countries has been of particular interest to many national malaria control programmes because of their low immunity. In endemic areas, acquired immunity though established is liable to break down under the condition of stress in pregnancy (Ukibe *et al.,* 2016).

Nigeria being a hyper endemic area for malaria disease coupled with immunosuppression during pregnancy, call for assessment of prevalence of malaria among pregnant women is crucial. This will help to monitor the intermittent preventive treatment policy for pregnant women and measure the overall impact of treated mosquito nets being distributed during ante natal clinic visit. This will further prevent or curtail severe complications of malaria infection for both mother and child during pregnancy. Therefore, this study seeks to determine the prevalence of malaria among pregnant women attending antenatal clinic at Kogi State Specialist Hospital.

Materials and Methods

Study area and Population.

This study was conducted in Lokoja metropolis. Lokoja is located at longitude 7.49 north and latitude 6.45 east in Kogi state, it has a total land area of about 29,833 sq.km. The study was carried out at the Kogi State Specialist Hospital Lokoja, north central geopolitical zone of Nigeria. The hospital is a state hospital with a high number of patients including pregnant women coming to seek medical attention. The vegetation is Guinea savannah with mean annual rainfall of 250cm. Malaria transmission is throughout the year (Ogbu *et al.*, 2015)

Ethical Consideration

Approval for the study was obtained from the Research Ethics Committees of Kogi State Specialist Hospital (KSSH) Lokoja Kogi State.

Blood Sample Collection

A total of 120 samples were collected. The blood specimen were collected by venous puncture from pregnant women and put into collection tubes containing Ethylene-diamine-tetra acetic acid (EDTA) to prevent coagulation.

Laboratory procedures

Giemsa-stained thick and thin blood smears were performed using previously described protocol (Ngasala and Bushukatale, 2019). Thick and thin blood smears were prepared on same slide and labelled, Giemsa stain technique was used according to routine practice. The slides were examined by light microscopy under oil immersion objective at 100 magnifications. Thick smear was used for parasite quantification while thin smear for

parasite species identification.
The number of parasites was counted per 200 white blood cells (WBCs) assuming 8000 WBCs/microliter. At least 100 thick film fields were examined before a slide was considered negative. Parasite density was calculated as:

Number of parasite counted × 8000/ 200 (Ngasala and Bushukatale, 2019)

Statistical Analysis

Categorical variables (gestation and gravidity) were presented as frequency and percentages in the study and Chi-square analysis was used at 95% confidence interval. P-value less than 0.05 were considered significant during the study.

Results

A total of one hundred and twenty (120) blood samples were collected from pregnant women attending Kogi State Specialist Hospital, Lokoja for antenatal care and tested for malaria parasites infection; out of which 90 (75 %) were negative while 30 (25 %) were positive. Specie identification was done microscopically using thin smears and all identified parasites were *Plasmodium falciparum* specie.
The prevalence of malaria parasite among pregnant women in this present study with respect to age shows women between ages of 18-22 had highest prevalence of the infection 13(10.83 %) with no significant difference ($p<0.05$) as shown in Table 1.

Table 2 also shows the percentage distribution of malaria parasite in pregnancy according to gravida. Prevalence of malaria with respect to parity was not statistically significant ($p<0.05$) in this study. Primigravida 18(15 %) mothers were more infected than secundigravida 7(5.83 %) and multigravida 5(4.2 %). The percentage distribution of malaria parasites in pregnant women by gestation reveals highest prevalence of 16(13.3 %) observed among women in their first trimester of pregnancy followed by 8(6.67 %) in the third trimester [($P< 0.05$) see table 3].

Table 1: Prevalence of malaria parasites among pregnant women based on age group

Age group (years)	Number Examined	positive cases (%)
18-22	58	13(10.83)
23-27	26	6(5)
28-32	18	5(4.16)

33-37	8	4(3.33)
38-42	10	2(1.67)
43-47	0	0
TOTAL	**120**	**30(25)**

P-Value = 0.038

Table 2: Prevalence of malaria infection in relation to number of pregnancies (gravidity)

Gravida	Number examined	Number positive
Primigravida	39	18(15%)
Secundigravida	45	7(5.83%)
Multigravida	36	5(4.2%)
Total	**120**	**30(25%)**

P-Value = 0.014

Table 3: Frequency of malaria infection in pregnancy with respect to gestation

Gestation	Numbers Examined	Numbers Positive
First trimester	65	16(13.3%)
Second trimester	26	8(6.7%)
Third trimester	29	6(5%)
Total	**120**	**30(25%)**

P-Value=0.032

Discussion

The overall prevalence of *Plasmodium falciparum* infection in this study was 25% among pregnant women attending antenatal clinic at Kogi State Specialist Hospital, Lokoja, Kogi State. This relatively low frequency observed in this study could be linked to the urban settting of the study area as previous studies have observed higher transmission of malaria in rural areas than in urban areas (Cisse *et al.,* 2014). This implies that about 25 % of the study participants and their neonates

are at risk of being exposed to malaria complications such as anaemia, jaundice, abortion, low birth weight, still birth. This rate is lower than some previous studies done in Nigeria (Ogbu *et al.,* 2015; Fana *et al.,* 2015; Adebayo *et al.,* 2015; Audu & Abdulsalam, 2015; Frank *et al.,* 2016; Ukiebe *et al.,* 2016 and Ejike *et al.,* 2017) who reported 38.8 %, 41.6 %, 57.7 %, 30 %, 66.7 %, 73.1 % and 40.5 % respectively in different parts of the country. However this study corresponds to the findings of Wogu *et al*. (2013) in Port Harcourt and Bolaji and Clem (2014) in Lagos who both reported 25% in their studies as well. Meanwhile the prevalence rate observed in this study is higher than works carried out in various parts of the Nigeria (Agomo *et al.,* 2009; Joseph *et al.,* 2017; Oluwagbemiga *et al.,* 2018 and Emmanuel *et al.,* 2018) where 7.7%, 13%, 2% and 19.9% were recorded respectively and beyond (Cisse *et al.,* 2014; Muhammed Sohail *et al.,* 2015 and Anabire *et al.,* 2019) as 18.1 %, 5.4 % and 13.4 % were noted respectively. Although, this study was carried out during the dry season; the malaria prevalence rate observed may be due to sanitation problems (no proper drainage/sewage disposal systems), stagnant water bodies which served as suitable breeding habitats for malaria vectors. This temporal and spatial variation in malaria in different parts of Nigeria could be premised on many factors such as the environmental and climatic factors prompting mosquito vectors, vector competency and availability of preventive measures (Audu & Abdulsalam 2015).

Age distribution also influenced the prevalence of malaria among the pregnant women as seen from results of this study where younger pregnant women experienced the highest incidence of infection; this could be premise on the status of their immunity. The findings from this study agree with Ogbu *et al.* (2015), Ukiebe *et al*. (2016) and Ejike *et al*. (2017). This result may be due to immunity built against malaria parasites as individual's age increases which is in line with existing knowledge stating that high prevalence at lower ages and low prevalence at higher ages is due to the existence of natural immunity to infectious diseases including malaria which pregnant women acquire as their age increases (Fana *et al.,* 2015 and Kweku *et al.,* 2017).

With regards to gravidity, primigravida and secundigravida had a higher infection rate than the multigravida. This is so as parasiteamia is usually common and heavier in first time mothers. The malaria prevalence rate observed among primigravidae in this study i.e. 18 (15%), is lower in respect to previous work done (Ukiebe *et al.,* 2016 and Ejike *et al.,* 2017). The analysis of malaria in pregnancy in Africa revealed that parasitaemia is significantly common and heavier in primigravida than secundigravida and multigravida (Van Ejik *et al.,* 2015). As shown from the results, primigravida have highest frequency of malaria infection then secundigravida and multigravida recording the least. Takem et al. (2013) identified the factors responsible for susceptibility of primigravidae to malaria as inhibition of type 1 cytokine

responses. Cell-mediated immune responses to malaria antigens are more markedly suppressed in first pregnancy than in subsequent pregnancies and levels of anti -VAR2CSA specific IgGs increase with parity and are associated with favourable pregnancy outcome so that malaria risk decrease with increasing parity. The multigravidae are presumably less infected because immunological memory from the first pregnancy is retained (Kapisi *et al*, 2017).

Gestational period reveals that women in their first trimester have the highest prevalence in this study as compared to second and third trimesters; this study is in line with Ejike et al. (2017). This could be due to loss of immunity at early stage in pregnancy. However, the fewer cases seen in the late stage suggest that the women mount a satisfactory immune response to malaria infection (Takem *et al*,. 2013), or could also be as a result of constant Intermittent Preventive Treatments in Pregnancy (IPTP) given to pregnant women during antenatal care visit which usually commence during the second trimester. Although Frank *et al*. (2016) and Bolaji and Clem (2014) both recorded women in their third and second trimesters having the highest prevalence.

Conclusion

Pregnant women are predisposed to malaria infection at early stage as primigravida and teenage mothers than multigravida and older mothers. Following this result, more effort is needed in control of malaria during pregnancy. Therefore, it is necessary to design an effective public health education programme specifically for this vulnerable group and also the routine intermittent preventive treatment should be administered emphatically at hospitals or health care centres in Lokoja, Kogi State.

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Conflict of interest

Authors declare no conflict of interest.

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