



## Status of Malaria Infection among Pregnant Women Attending General Hospital Aliero, Kebbi State, Nigeria

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### ABSTRACT

Malaria in pregnancy is one of the most important preventable causes of low birth weight deliveries, and it is the major causes of severe maternal anemia leading to maternal morbidity and mortality. This study was designed to evaluate the prevalence of malaria among pregnant women attending General Hospital, Aliero. Blood samples were collected from 200 pregnant women and examined for malaria parasites. The overall prevalence of malaria infection was 60.0%. Malaria prevalence was significantly higher in women of younger age-groups than older women ( $P < 0.05$ ), and based on the trimesters of pregnancy, 2<sup>nd</sup> trimester (71.4%) had the highest prevalence ( $P < 0.05$ ). There is a strong statistical significant relationship between the prevalence of malaria and mode of treatment. Pregnant women that visit the hospital for malaria treatment had the least prevalence (48.3%), followed by those that embark on self medication (90.0%). The sole individual that combine both methods (visiting hospital and self medication (100%) is infected and those pregnant women that neither visited the hospital nor take self medication are all infected (100%). Conclusively, malaria control in pregnancy is necessary so as to reduce the incidence of adverse pregnancy complications.

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### INTRODUCTION

Malaria is a mosquito borne infectious disease affecting humans and other animals caused by parasitic protozoans (group of single-celled microorganisms) belonging to plasmodium types (Caraballo, 2014). Malaria causes symptoms that typically include fever, fatigue, vomiting and headache. In severe cases it can cause yellow skin, seizures/coma, or even death. Malaria derives its name from an Italian expression "Malaria" (i.e bad air/foul air common in marshy area. The name was given due to the type of the disease caused by *plasmodium* species (Shanks, 2005). The life cycle of malaria parasites: a mosquito transmits infection by taking a blood meal. First, sporozoites enter the bloodstream, and migrate to the liver; they infect liver cells: where they multiply into merozoites, rupture the liver cells, and return to the

bloodstream; the merozoites then infect red blood cells, where they develop into ring forms, trophozoites and schizonts that in turn produce further merozoites. Sexual forms are also produced, which if taken up by a mosquito, will infect the insect and continue the life cycle.

Malaria is the most important parasitic disease of mankind and a major public health problem in Nigeria. Malaria is a risk for 97% of Nigeria's population (Mbanugo and Ejims, 2000). Pregnant women and children under the age of 5 years are usually regarded as high risk groups (Mbanugo and Ejims, 2000). Pregnant women are particularly prone to malaria infection as a result of physiological reduction in cellular immune response which is associated with pregnancy state (Scholarpurka, 1999; Klufio, 2003). This physiological immune suppression is believed



to be as a consequence of the exaggerations of steroid hormones which are associated with pregnancy state (Aliyu and Mommoh, 2011) and these hormones have immune suppressive and anti-inflammatory effects. Malaria is highly endemic in the tropical and subtropical countries, Nigeria inclusive, thus increasing the susceptibility of pregnant women in these countries there by raising the rate of infections since transmission is stable and occurs throughout the year (Onyenekwe and Meludu, 2002). Previous studies have reported a variation in the prevalence rates of malaria ranging from as low as 5% to as high as 99% depending on the location of study, sample size used or the method of screening (Mommoh, 2011; Gunn, 2015).

Malaria transmission is influenced by certain environmental and socio-economic factors which include among other things sanitation, housing, literacy, and poverty. Nigerian federation, is burdened by most of these challenges hence the high transmission of malaria parasites and the consequent increased rate of infection especially in pregnant women and children under the age of 5 years. In areas of low and unstable transmission, such as in many regions in Asia and the Americas, women do not acquire substantial anti malaria immunity, and are susceptible to episodes of acute and sometimes severe malaria, and fetal and maternal death. In areas with stable malaria transmission, such as in most of sub Saharan Africa, infection with *Plasmodium falciparum* in pregnancy is characterized by predominantly low-grade, sometimes sub-patent persistent or recurrent parasitaemia. These infections frequently do not result in acute symptoms yet are a substantial cause of severe maternal anaemia (Guyatt *et al.*, 2001) and of low birth weight (LBW), and as such are a potential indirect causes of early infant mortality; because most of these infections remain asymptomatic, and therefore undetected and untreated, prevention of malaria in pregnancy is especially important in these settings. Malaria is a devastating parasite transmitted by the bite of infected anopheles mosquitoes. It is responsible for infecting 100-300 million annually (Casals, 2004). In humans

malaria is caused by *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae*, and rarely *Plasmodium knowlesi* (Mueller, 2007). Most deaths are caused by *P. falciparum* because *P. vivax*, *P. ovale*, and *P. malariae* generally cause a milder form of malaria. The species *P. knowlesi* rarely causes disease in humans. Malaria is typically diagnosed by the microscopic examination of blood using blood films, or with antigen-based rapid diagnostic tests. Methods that use the polymerase chain reaction to detect the parasites DNA have been developed, but are not widely used in areas where malaria is common due to their cost and complexity (Nadjm and Behrens, 2012).

Methods used to prevent malaria include medications, mosquito elimination and the prevention of bites. As of 2020, there is one vaccine for malaria (known as RTS, S) which is licensed for use (WHO, 2016). The presence of malaria in an area requires a combination of high human population density, high anopheles mosquito population density and high rates of transmission from humans to mosquitoes and from mosquitoes to humans. If any of these is lowered sufficiently, the parasite eventually disappears from that area, as happened in North America, Europe, and parts of the Middle East. However, unless the parasite is eliminated from the whole world, it could re-establish if conditions revert to a combination that favors the parasite's reproduction.

Malaria is treated with antimalarial medications; the ones used depends on the type and severity of the disease. While medications against fever are commonly used, their effects on outcomes are not clear, (Meremikwu, 2012). Providing free antimalarial drugs to households may reduce childhood deaths when used appropriately. Programmes which presumptively treat all causes of fever with antimalarial drugs may lead to overuse of antimalarials and undertreat other causes of fever.

## MATERIALS AND METHODS

The study was carried out at General Hospital Aliero, Kebbi State, North-Western Nigeria. It is located in the South-East of the state, between the Longitude of 42°E, 36°W and



Latitude of 12.44°N, 113°S (Kebbi State Diary, 2003). Aliero town covers a total of 412 square kilometers of land mass with population of over 125,785 inhabitants (NPC, 2006). It became a separate entity in November 1996, after being carved out of Jega Local Government Area. The Local Government Area shares common borders with Gwandu by the North-East, on the South west by Jega, on the East by Tambuwal Local Government Area of Sokoto State, and in the North West by Birnin-Kebbi (Bunza, 2008). It has a mixed rural and urban population. It has no proper drainage and irrigation facilities. The climate of Aliero is a typical tropical type characterized with two major seasons of wet and dry season. The wet starts May to October with precipitation ranging from 10mm in June to 31mm in October with characteristic intense local thunder within a short period. The temperature varies between 40°C to 45°C. However, March and April are usually the hottest months of the season. The topography is flat and slightly undulating with compact strong, stony and brown soil.

Ethical clearance to conduct the study was granted by the Kebbi State University of Science and Technology Aliero Research and Publication Committee. Introduction letter was granted by the Head of Department Animal and Environmental Biology, and permission to conduct the research was also granted by the Ministry of Health Gwadagwaji Sectoriate BirninKebbi and H O D Laboratory General Hospital Aliero Local Government.

The study population comprises 200 pregnant women attending ante-natal care at General Hospital Aliero, Kebbi State Nigeria.

A well structured questionnaire was self administered to 200 women recruited at General Hospital Aliero on first antenatal visit or registration to capture information on biodata and history of pregnancy.

Blood sample were collected from the 200 pregnant women with the assistance of a

medical personnel. Fingers (thumb of the left hand) of each pregnant women were disinfected using absorbent cotton wool damped with 70% ethanol. A drop of blood was collected by finger prick with sterile blood lancet each from the pregnant women. The tip of the finger was squeezed until blood appeared. Using a grease free, clean, dry microscopic glass slide, the blood samples were collected and transported to be viewed under the microscope (Greenwood, 2005).

A drop of blood was placed on a cleaned and dried microscopic glass slide. An applicator stick was used to make a thick blood film and was allowed to air dried. The film was flooded with Giemsa stain and was allowed to stain for 10 minutes. The stained blood film was rinsed with water and was allowed to air dried. A drop of immersion oil was placed on the dried thick blood film. The film was mounted onto a microscope and was viewed using x40 and x100 objective lenses for malaria parasite identification were seen as bluish purple with reddish nuclei. Plasmodium falciparum are widely spread in tropics with high parasitaemia only trophozoite and gametocytes were seen. In the trophozoites, small ring has larger rings in heavy infections, its often with one or two chromatin dots and lie on red cell membrane. In gametocytes, has many rings forms, crescent or sausage shaped and contain several parasites.

The analysis based on prevalence of malaria among pregnant women was analyze using simple percentage. Chi-square ( $X^2$ ) was used to assess significant differences. The level of significance was considered at  $P < 0.05$ .

## RESULTS

The prevalence of malaria was highest, 65/110(59.1%) among age-group 20-29 years and the least 04/07(57.1%) was recorded among age group 40 years and above. There is a strong significance association among the three age-group and malaria infection (Table 1).

**Table 1:** Prevalence of Malaria Parasite in Relation to Age of Pregnant Women

Age (Years)	No. Examined	No. Positive	(%) Prevalence	P-value
10-19	53(26.5%)	34(28.3%)	64.2%	
20-29	110(55.0%)	65(54.1%)	59.1%	0.000



30-39	30(15.0%)	17(14.1%)	56.7%
40 and Above	07(3.5%)	04(3.30%)	57.1%
<b>Total</b>	<b>200(100%)</b>	<b>120(100%)</b>	<b>60.0%</b>

$X^2 = 69.53$ ,  $df = 3$ .

Malaria prevalence significantly varied between women at different trimester stages, 2<sup>nd</sup> trimester had the highest level of infection 80/112(71.4%), followed by 1<sup>st</sup> trimester 24/44(54.5%) and 3<sup>rd</sup> trimester which has lowest

level of infection 16/44(36.4%). 2<sup>nd</sup> trimester women are more infected by malaria than 1<sup>st</sup> and 3<sup>rd</sup> trimester, there is significance association between malaria infection and trimester of pregnancy (Table 2).

**Table 2:** Prevalence of Malaria in Relation to Trimester of Pregnancy

TRIMESTER	NO.EXAMINED (%)	NO.POSITIVE (%)	(%) PREVALENCE	P-value
1 <sup>st</sup> (trimester)	44(22.0%)	24(20.0%)	54.5%	0.000
2 <sup>nd</sup> (trimester)	112(56.0%)	80(66.7%)	71.4%	
3 <sup>rd</sup> (trimester)	44(22.0%)	16(13.3%)	36.4%	
<b>Total</b>	<b>200(100%)</b>	<b>120(100%)</b>	<b>60.0%</b>	

$X^2 = 60.8$ ,  $df = 2$ .

There is a strong statistical significant relationship between the prevalence of malaria and mode of treatment. Pregnant women that visit the hospital for malaria treatment had the least prevalence (48.3%), followed by those that embark on self medication (90.0%). The sole

individual that combine both methods (visiting hospital and self medication (100%) is infected and those pregnant women that neither visited the hospital nor take self medication are all infected (100%) (Table 3).

**Table 3:** The Prevalence of Malaria among Pregnant Women with Respect to mode of Treatment

Mode of Treatment	No. Examined	No. Positive	(%) Prevalence	P-value
Visiting Hospital	145(72.5%)	70(58.3%)	48.3%	0.000
Self-Medication	50(25.0%)	45(37.5%)	90.0%	
Both Methods	01(0.50%)	01(0.83%)	100%	
None	04(2.00%)	04(3.33%)	100%	
<b>Total</b>	<b>200(100%)</b>	<b>120(100%)</b>	<b>60.0%</b>	

$X^2 = 111.4$ ,  $df = 3$ .

## DISCUSSION

The overall prevalence of malaria among pregnant women recorded in the study was 60.0%. This result was observed to be higher than some earlier reports by Ogbusuet *et al.*(2004); Igwe *et al.* (2007) which recorded 20.0% and 11.0% in Anambra and Owerri, respectively. The result also is lower than the result of Mockenhaupt *et al.*(2000); Opara *et al.*(2004) who reported a prevalence rate of 41.0% in Uyo and 42.0% in Ghana respectively. The result is slightly lower than the report of Nduku *et al.*(2006) who reported 52.6% prevalence rate in Aba. The high malaria

prevalence rate observed in this study may be due to the sanitation problems (no proper drainage or sewage disposal systems) and flooding (stagnant water bodies are suitable breeding habitats for malaria vectors) which are predominant in the study area. Malaria parasitaemia in relation to age showed the significantly higher prevalence of malaria among younger age-groups of pregnant women 20-29 years with highest positive infection 59.1% when compared to older age- groups 30-39, 40 and above with least positive infection indicates higher susceptibility of younger women to malaria infection. Previous reports have been



documented Keating *et al.*(2004). Age variation in malaria prevalence is believed to be due to differences in natural immunity to infection been reported to increase with age (Bouyou *et al.*, 2003; Mbanugo *et al.*, 2005). Second trimester has the highest prevalence when compared to other stages is consistent with previous reports by Keating *et al.*(2004) and Chukwuoch *et al.*(2012). The increased prevalence is believed to result from reduction of acquired immunity to malaria at this stage. This situation seems to reverse during the 3rd trimester when malaria prevalence was lowest. In treating and preventing malaria, mostly prefer self-medication than visiting hospital. A total number 145 of people visited hospital 70(58.3%) were infected with malaria parasite. Out of 50 that used self-medication method 45(37.5%) has malaria infection and 1(0.83%) of the subjects that used both methods, 4(3.33%) were infected which has the highest level of infections.

#### CONCLUSION AND RECOMMENDATION

In conclusion, the overall present study reveals high prevalence of malaria among pregnant women attending General Hospital Aliero, and the prevalence of malaria among pregnant women in relation to age show high prevalence among younger age group, the prevalence of malaria in relation to months of pregnancy (trimester). Second trimester has the highest prevalence of malaria parasite.

- i. Malaria control measures including Intermittent Preventive Treatment for Pregnant women (IPTP) and giving of Long Lasting Insecticides Treated nets (LLINs) to pregnant women should continue especially at the ante natal clinic of the health care centers.
- ii. Awareness on the danger of malaria in pregnancy and the potential benefits to expectant mother will help to improve the rate of early attendance at the clinics.
- iii. Personal protection from mosquito bite should be recommended. This includes avoiding of stagnant water, tidying up of the environment regularly, reduction of the number of anopheline mosquitoes by eliminating breeding

sites, killing larvae, pupae and adult mosquitoes.

#### REFERENCES

- Aliyu, W. I., Mommoh, A. A. (2011). Prevalence of malaria parasitaemia amongst asymptomatic pregnant women attending a Nigerian teaching hospital. *Annals of African Medicine*, **10**(2);171-174.
- Bahadur, S., Pujani, M., Jain, M. (2011). Use of rapid detection tests to prevent transfusion-transmitted malaria in India. *Asian J Transfus Sci* Vol. **(4)**:140-141.
- Caraballo H (2014). "Emergency department management of mosquito-borne illness: Malaria, dengue, and west Nile virus". *Emergency Medicine Practice*. **16** **(5)**: 1–23.
- Claire L. Mackintosh, James G. Beeson, Kevin Marsh. Clinical features and pathogenesis of severe malaria, *TRENDS in parasitology* December (2004);**20**(12)
- Cowman AF, Berry D, Baum J (2012). "The cellular and molecular basis for malaria parasite invasion of the human red blood cell". *Journal of Cell Biology*. **198** **(6)**: 961–71.
- Gamble C, Ekwari JP, terKuile FO, et al. (Cochrane Infectious Diseases Group) (April 2006). "Insecticide-treated nets for preventing malaria in pregnancy". *The Cochrane Database of Systematic Reviews* **(2)**: CD003755.
- Gitau, G.M., Eldred, J.M. (2005). Malaria in pregnancy: clinical, therapeutic and prophylactic considerations. *The Obstetrician and Gynaecologist*.; **7**:5-11.
- Greenwood, B.M., Bojang, K., Whitty, C.J., Targett, G.A. (2005). "Malaria". *Lancet*. **365** **(9469)**: 1487-1498.
- Gunn, J. K., Ehiri, J. E., Jaccob, E. T., Erst, K. C., pettygrove, S., Kohler, L N., Haenchen, S. D., Obiefune, M.C., Ezeanolue, C. O., Ogidi, A. G., and Ezeanolue, E. E. (2015). Population-based prevalence of malaria among pregnant women in Enugu State,



- Nigeria: The healthy beginning initiative. *Malaria Journal*, **14**:438.
- Isba, R., Zani, B., Gathu, M., Sinclair D, et al. (Cochrane Infectious Diseases Group) (February, 2015). "Artemisinin-naphthoquine for treating uncomplicated Plasmodium falciparum malaria". *The Cochrane Database of Systematic Reviews* (2): CD011547.
- Keating, G.M. (2012). "Dihydroartemisinin/piperaquine: A review of its use in the treatment of uncomplicated Plasmodium falciparum malaria". *Drugs*. **72** (7): 937–961.
- Larviciding to prevent malaria transmission". *The Cochrane Database of Systematic Reviews*. **8**: CD012736.
- Manyando, C., Kayentao, K., D'Alessandro, U., Okafor, H.U., Juma, E., Hamed, K. (2011). "A systematic review of the safety and efficacy of artemether-lumefantrine against uncomplicated Plasmodium falciparum malaria during pregnancy". *Malaria Journal*. **11**: 141.
- Mbanugo, J. I. and Ejims, D. O. (2000). Plasmodium infections in children aged 0-5 years in Awka Metropolis, Anambra State, Nigeria. *Nigeria Journal of Parasitology*. **21**:55-59.
- Meremikwu, M.M., Odigwe, C.C., AkudoNwagbara, B., Udoh, E.E. (2012). Meremikwu MM (ed.). "Antipyretic measures for treating fever in malaria". *Cochrane Database of Systematic Reviews*. **9** (9): CD002151.
- Mueller, I., Zimmerman, P.A., Reeder, J.C. (2007). "Plasmodium malariae and Plasmodium ovale the "bashful". *Malaria Trends in Parasitology*. **23** (6): 278–283.
- Nadim, B., Behrens, R.H. (2012). "An malaria parasites update for physicians". *Infectious Disease Clinics of North America*. **26** (2): 243–259.
- Onyenekwe, C.C., Meludu, S.C. (2002). Prevalence of asymptomatic malariaparasitaemia amongst pregnant women in Nnewi, south-east Nigeria. *Indian Journal of Malariology*, Sep-Dec. **39**(3-4): 60-65.
- Pates, H. and Curtis, C. (2005). "Mosquito behaviour and vector control". *Annual Review of Entomology*. **50**: 53-70.
- Peter Van den Eede et al. (2009). Human plasmodium knowlesi infections in young children in central vietnam. *Malaria Journal*; **8**:249. doi:10.1186/1475-8-249.
- Raghavendra, K., Barik, T.K., Reddy, B.P., Sharma, P., Dash, A.P. (2011). "Malaria vector control: From past to future". *Parasitology Research*. **108** (4): 757–779.
- Sarkar, P.K., Ahluwalia, G., Vijayan, V.K., Talwar, A. (2009). "Critical care aspects of malaria". *Journal of Intensive Care Medicine*. **25** (2): 93–103.
- Scholarpurka, S.L., Mahajar, R.C., Gupta, A.N and Wangoo, A. (1999). Cellular immunity in pregnant and non-pregnant women with malaria infection. *Asia Oceania Journal of ObstGyncol*. **16**:27-32.
- White, N.J. (2011). "Determinants of relapse periodicity in Plasmodium vivax malaria". *Malaria Journal*. **10**: 297.
- WHO, (2016). Malaria vaccine: WHO position paper January (2016) (PDF). *Weekly Epidemiological Record*. **91** (4): 33-52.