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STUDY ON MALARIA INFECTION IN PREGNANT WOMEN ATTENDING PRIMARY HEALTH CARE CENTRES IN GOMBE METROPOLIS, GOMBE STATE, NORTHEAST, NIGERIA

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ABSTRACT
Malaria in pregnancy is a major contributor to adverse maternal and perinatal outcome. In hyper-endemic areas like Nigeria, it is a common cause of anaemia in pregnancy in both immune and non-immune individuals and it has been aggravated by poor socioeconomic circumstances. This study determined the prevalence of malaria infection in relation to age group, gravidity and trimesters among pregnant women attending antenatal clinic in Primary Health Care Centers within Gombe metropolis, Gombe State. Four hundred (400) pregnant women, aged between 15-45 years voluntarily participated during study which was conducted in the rainy season from the months of June- September, 2015, when malaria infection is usually high. Blood samples were collected and then thin film was made and stained with Giemsa using parasitological standard procedure. Demographic data was collected using Chi-square to determine association between variables. The results showed very high prevalence of 91% for malaria among the study subjects. The finding showed that the difference was statistically significant (p<0.05) between malaria, gravidity and trimesters. But in the other hand, the difference was not statistically significant (p>0.05) between malaria and age group. It suggested routine mobilization and intensified antenatal care among pregnant women in order to avert complications associated with malaria parasites during pregnancy along with the distribution of Insecticide Treated Nets.

Keywords: Malaria, Pregnancy, Age, Gravidity, Trimester.

INTRODUCTION

Malaria is a life threatening parasitic disease and is considered as a complex and overwhelming public health problem. The disease is caused by four species of *Plasmodium* parasites (*P. vivax, P. falciparum, P. malariae and P. ovale*), and is transmitted through the bite of infected female *Anopheles* mosquito during blood meal. About 40% of the global populations live in areas where malaria transmission occurs (Joel and Abimbola, 2012). Of this population, the disease threatens the lives of about 3.2 billion people and exerts a great toll on vulnerable pregnant women, killing an estimated one to two million yearly (Joel and Abimbola, 2012). The disease is estimated to cause at least 300 to 500 million clinical cases each year worldwide, and *Plasmodium falciparum* cause majority of the infections (Joel and Abimbola, 2012). .

More than 90% of world estimated cases of malaria occurred in Africa, South of Sahara and subtropical region, where the specific populations at risk include pregnant women and children of less than five years of age. The disease accounts for an estimated 25% of all childhood morbidity (Lengeler, 2009). In adult and pregnant women, its common symptoms include headaches, weakness, fever, aches, high body temperature (chills and rigors) and loss of appetite (Lengeler, 2009). It may also manifest in more than normal sleeping, nausea and vomiting. The gross consequences of severe malaria include coma and death (Lengeler, 2009).

The illness imposes great burden on the society as it has adverse effect on the physical, mental and social well being of the people as well as the economic development of nation (Ayodele, *et al*., 2007). Nigeria alone accounts for nearly 25% of the total malaria related problem within Africa (Carter Centre, 2010). Malaria infection during pregnancy can have adverse effects on both the mother and the fetus, including maternal anemia, fetal loss, premature labour, intrauterine growth retardation, delivery of low birth weight babies (less than 2.5kg) and sometimes maternal death (Kochar, *et al*., 1999), pulmonary edema and renal failure in mothers (Steketee *et al.*, 2001). In Nigeria, malaria infection is more likely to result in severe anaemia and delivery of low birth weight infants, which has been identified as a leading cause of poor infant survival and development in Africa (Luxemburger, 2001).

Malaria in pregnancy is a major cause of maternal morbidity and mortality and it's also increase fetal wastages (Mutabingwa, 1994) and holds severe consequences which range from anaemia to severe complications such as cerebral malaria, pulmonary edema and renal failure in the mother (Steketee *et al.*, 2001). This study is aimed at determining the prevalence of malaria infection among pregnant women attending Antenatal Care in Gombe metropolis.

MATERIALS AND METHODS

Study Area: The study was conducted in Gombe metropolis, Gombe State. The area is located between latitude $10^0$14"0"N and $10^0$19"0"N longitude $11^0$8"0"E and $11^0$12"0"E and altitude 500 meters above sea level. The area has a total population of 268,000 with a total land area of 52.434 square kilometers (Fig. 1).

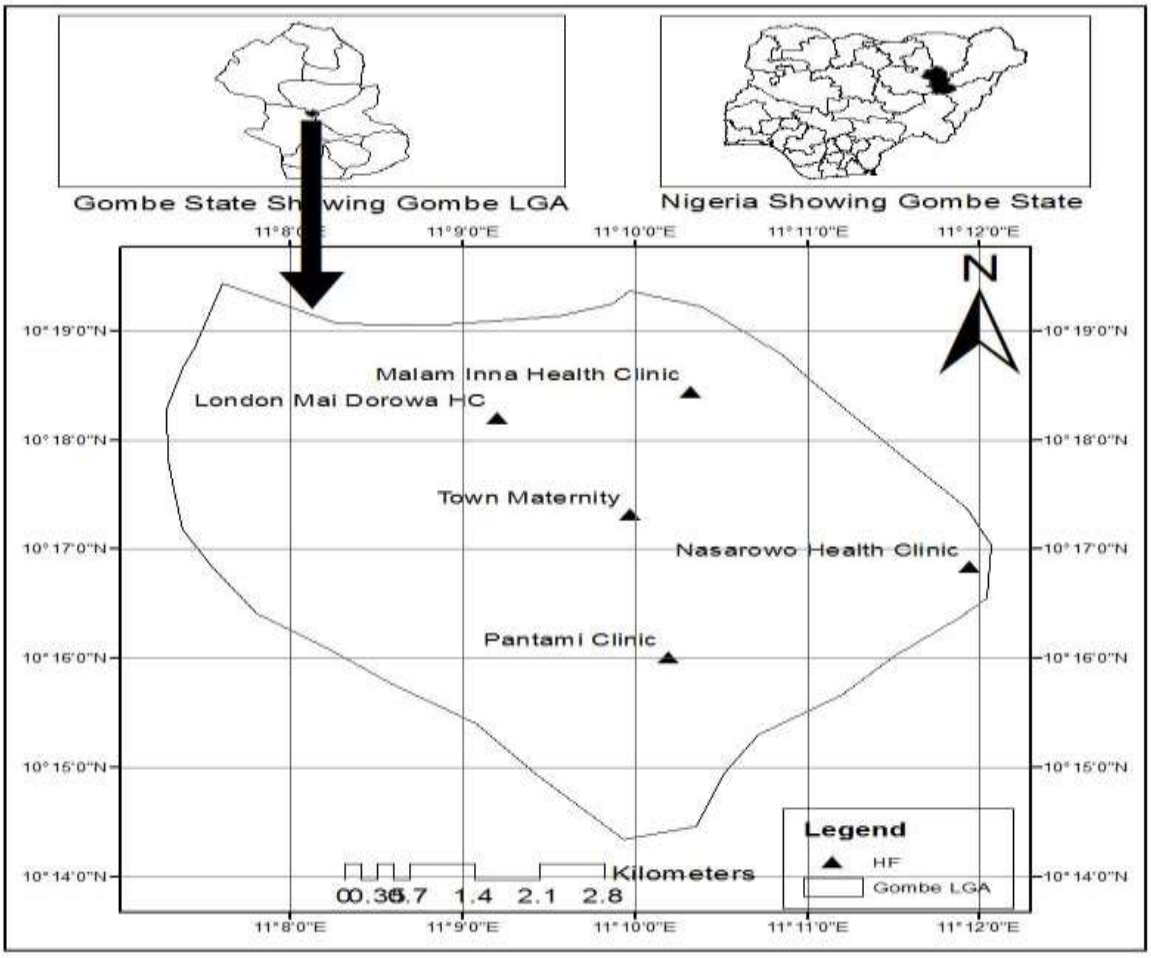

Fig. 1: Map showing selected study areas
Source: Gombe State University GIS laboratory, 2015.

Study Subject: Four hundred (400) blood samples of pregnant women aged 15-45years attending antenatal clinic were collected in five (5) Primary Health Centers (PHC) from the months of June-September, 2015.

Determination of sample size: The sample size for this study was determined using the formula suggested by Araoye (2004). For a study population greater than 10,000, the following formula is applicable $n = \frac{Z^2PQ}{d^2}$.

Where

n=the desired sample size (when population is greater than 10,000)

z=the normal standard deviation, usually set at 1.96 (or 2.0) which corresponds to 95% confidence level

p=the proportion in the target population estimated to have a particular characteristic. If there is no reasonable estimate then use 50% (i.e. 0.50)

q=1.0-p

d=degree of accuracy desired usually set at 0.05 or occasionally at 0.02.

$$n=\frac{(1.96)^2\times0.6(1-0.6)}{(0.05)^2} = 384$$

Then sixteen (16) samples were added and Four hundred (400) pregnant women employed for the study.

Samples were collected every week for sixteen 16 weeks based on the turn-out of the pregnant women in each selected center (i.e. Disproportionate stratified random sampling technique). The maternities were selected within a study area (i.e. Multistage sampling technique), from each angle and one in the middle. The samples were immediately transported to the laboratory of Federal Teaching Hospital Gombe, for analysis with the aid of Medical Laboratory Scientists.

Blood Samples Collection*:* Blood samples were collected from pregnant women attending antenatal clinic whose consent was required to participate in the study. A soft tubing tourniquet was fastened on to the upper arm of the donor to enable the appearance of a suitable vein. The puncture site was cleaned with mentholated spirit (methanol), and venal puncture was made with the aid of a needle attached to a 5mls

syringe. The tourniquet was removed immediately, and then 2mls of blood sample was collected and put into a labeled Ethylene Diamine Tetra-acetic Acid (EDTA) container as described by Cheesbrough (2009).

Slides preparation and examination procedure: The collected blood samples were analyzed within 3-4 hours after collection. Thin and thick blood films were made on clean slides and labeled accordingly as recommended by Cheesbrough (2009) to determine the malaria parasites. Briefly: a drop of blood sample was placed on the center of a slide and spread out with a corner of another slide to cover an area of about four times its original area; after which the reverse side of the slide was cleaned with cotton wool and allowed the film to air-dry for at least 30 minutes at 37^{o}C. The slides was immersed for 20-30 minutes in a staining jar containing Giemsa stain freshly diluted with 20 volumes of buffered water (pH 7.2). The slides were washed in buffered water pH 7.2 for 3 minutes. Thereafter, they were made to stand upright to dry in the rack for eventual examination of the slides under microscope, using oil immersion at X100 magnifications to observe Plasmodium parasites (Cheesbrough, 2009).

Data Analysis: The data generated were analyzed using Statistical Package for Social Science (SPSS) version 23. Chi-square test was conducted to determine the relationship between the variables. Then Statistical significance difference was set at confidence level (p=0.05).

Ethical consent/Approval Research: approval for this work was obtained from the Coordinator, Primary Health Care Department, Gombe Local Government, Gombe State with approval form number (PHCC/GM/15/0055). The consent of the participants was obtained verbally and few among them filled the consent forms provided.

RESULTS

Out of four hundred (400) samples collected, 364(91%) subjects were malaria positive. Table 1 showed that the prevalence of malaria infection was significantly higher among pregnant women between 15-24years age group 169(42.3%), followed by those between 25-34years age group 156(39%) and the lowest were women between 35- 45years age group 39(9.8%). The difference however was not statistically significant (p>0.05). Table 2 highlighted the prevalence of malaria infection in relation to gravidity. Gravidity was statistically significant (p<0.05) where multigravid women 216(54%) had the highest prevalence of malaria infection, followed by primagravid women 76(19%) and secundigravid women 72(18%). The difference was statistically significant (p<0.05). Table 3 showed the prevalence of malaria infection in various trimesters. Malaria prevalence followed the trend of 3rd trimester 217(54.2%) to 2nd trimester 95(23.8%) and 1st trimester 52(13%) in that order of occurrence. The difference was statistically significant (p<0.05).

Table 1: Prevalence of Malaria Infection based on age groups

Age	Number of Examined	Number/percentage of Infected
15-24years	191	169(42.3)
25-34years	168	156(39)
35-45years	41	39(9.8)
Total	**400**	**364(91)**

(X^2Cal=3.037, X^2tab=5.991,df = 2, p>0.05)Not significant

Table 2: Prevalence of Malaria Infection based on Gravidity

Gravidity	Number of Examined	Number/percentage of Infected
Primigravidae	95	76(19)
Secundigravidae	80	72(18)
Multigravidae	225	216(54)
Total	**400**	**364(91)**

(X^2Cal=19.743, X^2tab=5.991,df =2 p<0.05) Significant,

Table 3: Prevalence of Malaria Infection based on Trimester

Trimesters	Number of Examined	Number/percentage of Infected
1st Trimester	62	52(13)
2nd Trimester	109	95(23.8)
3rd Trimester	229	217(54.2)
Total	**400**	**364(91)**

(X^2Cal=9.767, X^2tab=5.991, df=2 p<0.05) Significant

DISCUSSION

The results of this study showed higher prevalence of malaria infection (91%) among pregnant women in Gombe metropolis, which differ with the study conducted in Benin City by Bankole *et al.,* (2012), they recorded 78.9%. The difference in the studies might result to the fact that Gombe had a hot temperature responsible for the breeding of mosquitoes and poor compliance to the mosquito vector preventive measures can contributes.

In highly endemic areas where semi immune adults usually have substantially acquired resistance to local strains of plasmodia, the prevalence of clinical malaria is higher and its severity is greater in pregnant women than in non-pregnant women (Uko *et al*., 1998). This study also agreed with the work of Yoriyo and Hafsat, (2014), which recorded prevalence rate of 92% and has confirm the high prevalence rate of malaria in Gombe State. This might be due to the low immunity during pregnancy.

The prevalence rate of 91% in this study is slightly higher than the report of Adefiaye *et al.,* (2004), who recorded the prevalence rate of 72%, also higher in studies in Calabar (Uko *et al.,* 1998) and Lagos (Anorlu *et al.,* 2001) as well as in India (Rogerson *et al.,* 2007). The high prevalence rate of 91% as observed in this study may be due to the fact that this study was carried out during the rainy season. The rainy season in the study area usually starts late in April and ends in September, but sometimes extends to October. The rainy season provides available surface water and pools as breeding sides of mosquito vector and subsequently the spread of the disease.

The high prevalence rate recorded in this study is contradicts the report of Marielle *et al.,* (2003) conducted in Gabon, who reported the prevalence rate of 57% in pregnant women, and was higher in primagravid (first pregnancy) than multigravid (three and above pregnancy); and in women within the age group 36-39 years. While this study recorded the highest prevalence rate of 54% in multigravids than 19% in primagravid and 42.3% of women within the age group 15-24 years. In these vulnerable populations, multigravid women remain the most susceptible; they are more often infected than primagravid. This may be due to the fact that most of the multigravid women are not using ITNs as preventive measures. It may be also due to the high rate of multigravid subjects 225 out of 400 (Table 2).

The prevalence we observed was also significantly higher than prevalence observed in previous studies. In this study, we observed that the prevalence of malaria was significantly higher among pregnant women between 15- 24 years age group than those within 25-34 and 35-45 years age groups, which recorded 42.3%, 39% and 9.8% respectively. This observation is in line with findings from the previous reports in Ibadan, Nigeria Falale *et al.,* 2008) and in Gabon (Dolo *et al.,* 2005), where it was reported that young women were more susceptible to malaria infection than the older ones.

CONCLUSION

The study has demonstrated high rate of malaria infection of 91% when compared with other previous findings elsewhere. Malaria parasites are common health issues associated with pregnancy and pregnant women were vulnerable to malaria infection especially among those within the range of 15-24 years age group (42.3%), multigravids (54.0%) and third trimester women (54.2%) as indicated in this study.

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