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Malaria Prevalence among Pregnant Women in Relation to Parity, Gestation Period and Age in Gombe, North Eastern Nigeria

ALI, R

Department of Zoology, Modibbo Adama University, P.M.B. 2076, Yola, Nigeria.
**Corresponding Author Email: rufaialimautech@gmail.com; Tel: +2348135571505*

ABSTRACT: This study was conducted in order to determine malaria prevalence in relation to parity, gestational period and age of the pregnant women in Gombe, Nigeria. Three hundred and eighty four (384) pregnant women who registered for antenatal care in five randomly selected health care facilities (Tudun Wada Primary Health Care, Idi Health Clinic, Madaki Health Clinic, Pantami Primary Health Care And Gombe Town Maternity) residing within Gombe Local Government Area, Gombe State, Nigeria, constituted the study population. Five (5) ml of the maternal peripheral blood was obtained from each participant by the use of a sterile syringe and placed in a sterile Ethylene Diamine Tetraacetic Acid (EDTA) container for laboratory analysis. The malaria parasite was detected by microscopic examination of Giemsa-stained thick blood films. A high prevalence of 78.4% was observed among the studied population, with the primigravidae having higher prevalence (87.8%) than the multigravidae (73.6%). Women in second trimester recorded the highest prevalence (81.6%) followed by those in third trimester (76.4%), then the first trimester (68.4%). In relation to age, younger women (17 – 20 years) had the highest prevalence (88.4%) of malaria parasitaemia followed by 21-25 years category (79.1%), while those above 25years had the lowest prevalence (67.7%).significant association between age and malaria infection was established. The vulnerable age group need to be cautious of their exposure to mosquitoes' bites so as to reduce the pressure on the already overstretched health facilities.

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Malaria infection is a major public health problem in sub-Saharan Africa, especially in pregnancy due to its association with poor fetal and maternal outcomes (Sule-Odu *et al*., 2002; Omo-Aghoja *et al*., 2008). The parasites are transmitted from the blood of an infected host to the blood of an uninfected person through bite (inoculative method) by female Anopheles mosquito. There are five species of Plasmodium that can infect human, these are; *Plasmodium malariae*, *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, and *Plasmodium knowlesi* (Foster *et al*., 2014).

The burden of malaria infection during pregnancy is caused mainly by *Plasmodium falciparum* the most common species in Africa (Alaku *et al*., 2015). Malaria in pregnancy is a health problem requiring multidisciplinary and multidimensional solutions. Pregnant women constitute the main adult risk group for malaria and 80% of death due to malaria in Africa occurs in pregnant women and children below 5 years (Abe and Olusi, 2011; Nwaorgu and Orajaka, 2011). In malaria transmission areas, pregnant women, in particular primigravidae, are known to be susceptible to malaria and to have higher prevalence and densities of parasitaemia than are non-pregnant women from the same population (Desai *et al*., 2007) The risk varies with the age of the pregnant woman, possibly due to cumulative exposure to malaria over a lifetime, and with parity, as a result of pregnancy-specific immunity acquired after exposure to malaria in previous pregnancies.

The consequences of malaria infection during pregnancy will depend on maternal malaria immune status; however, infections are associated with maternal anaemia and fetal growth retardation, and can

**Corresponding Author Email: rufaialimautech@gmail.com; Tel: +2348135571505*

result in acute illness, pregnancy loss or preterm delivery, and even maternal mortality.

MATERIALS AND METHODS

Study Area: The research was conducted in six randomly selected wards out of 11 wards in Gombe Local Government Area, Gombe State Capital. Gombe Local Government Area is situated at Latitude 10^0 17' N and Longitude $11^0$10' E with an altitude of 500 M above sea level. The Local Government Area has a total population figure of 250,000 (National Population Census, 2006).

Study Population: Three hundred and eighty four pregnant women who registered for antenatal care in five randomly selected health care facilities (Tudun Wada Primary Health Care, Idi Health Clinic, Madaki Health Clinic, Pantami Primary Health Care And Gombe Town Maternity) residing within Gombe Local Government constituted the study population. The number of participants was determined using Araoye (2004) sample size determination formula.

Ethical Consideration: A written approval to conduct the study was granted by the authority concerned after which study participants were informed on the research and its purpose, and their consent was obtained for participation in the study before sample collection.

Blood Sample Collection: Five (5) ml of the maternal peripheral blood was obtained from each participant by use of a sterile syringe and placed in a sterile Ethylene Diamine Tetraacetic Acid (EDTA) container for laboratory analysis as described (Cheesbrough, 2009). The blood sample was collected with the help of a qualified and certified laboratory scientist recruited for the study.

Parasitological and Haematological Tests: Malaria Parasite Screening: The malaria parasite was detected by microscopic examination of Giemsa stained thick blood films. The parasitaemia was expressed as number of malaria parasite per microlitre of blood.

Thick Blood Film Preparation: A thick blood smear was prepared by spreading a drop of blood placed on the centre of a clean grease free slide. This was allowed to air-dry for ten minutes. It was then rinsed under tap water, air-dried and a drop of immersion oil placed on it for examination with x100 objectives (Cheesbrough, 2009).

Parasite identification: Positive slides were identified and interpreted on the basis of microscopy by using standard method described (Cheesbrough, 2009).

RESULTS AND DISCUSSION

In this study, a total of 384 women were enrolled from five selected PHCs located in Gombe Local Government Area as follows Gombe Maternity Clinic 123 (32.0 %), Pantami Clinic 61 (15.9%), Madaki PHC 42 (10.9%), Idi PHC 88 (22.9) and Tudunwada PHC 70 (18.2 %). Out of the total individuals enrolled, 301 (78.4%) tested positive for malaria parasite, of which 272 (90.4%) were categorized as having mild malaria while 25 (8.3%) had moderate malaria and only 4 (1.3%) had severe malaria. Majority of the participants are within the age range 26-40 years, in third trimester and were multigravid.

Malaria Prevalence in Relation to Parity, Gestational period and Age: As for the parity, Table 1 showed that multigravidae were the most represented accounting for 193 (50.3%) individuals out of the total number of the participants, followed by secondigravidae 109(28.4%) and finally primigravidae which amounted to 82 (21.4%) individuals. Primigravidae have the higher malaria prevalence (87.8%) followed by secondigravidae (79.8%) while multigravidae recorded the lowest malaria prevalence (73.6%). Pregnant women in their third trimester were the most represented amounting to 191 (49.7%) followed by those in their second trimester [174 (45.3%)] then those in their first trimester [19(4.9%)]. The most affected categories were the second trimester individuals [142 (81.6%)] followed by third trimester individuals [146 (76.4%)]. The first trimester individuals had the least malaria prevalence (68.4%) with only 13 individuals that tested positive out of the 19 individuals examined. The age of the study participants ranged from 17-40 years, this was categorized into three different mutually exclusive categories. The lowest category is 17-20 years consisting of 121 (31.5%) study participants, followed by the middle category 21-25 years represented by 139 (36.2%) the last category, 26 years and above, comprises of 124 (32.3%). Table 1 revealed that 17-20 years age category had the highest malaria prevalence (88.4%) which was found to be statistically significant ($p<0.05$) when compared with the other two groups. The lowest prevalence recorded was from 26 years and above category (67.7%). The result of this study demonstrated 78.4% malaria prevalence among the pregnant women in the study area. This prevalence is higher than the 52.7% malaria prevalence reported (Amadi and Nwankwo, 2012) in Abia. The malaria prevalence is lower than 99% prevalence reported in Enugu (Gunn *et al.*, 2015). It is also lower than the 89 % affected in Ibadan (Falade *et al.*, 2008) but similar to 78.9% reported (Oladeinde *et al.*, 2012) in Benin and 72% documented (Adefioye *et al.*, 2007) in south west.

However the malaria prevalence obtained in this study could be considered high knowing that malaria prevalence is higher in the southern part of the country than their northern counterparts (FMoH, 2010) and all the prevalences used in the comparison above are from the Southern Region. The high malaria prevalence could be attributed to the environmental conditions (especially during the rainy season which corresponded to the period the study was carried out) inherent in the study area creating conducive atmosphere for the breeding of mosquitoe vectors.

Table 1. Prevalence of Malaria Infection and Parasitaemia In relation to Parity, Gestational Period and Age of participants

		Number examined	Number positive (%)	Mild (%)	Moderate (%)	Severe (%)
*[a] **Parity**	Primigravida	82	72 (87.8)	64 (69.6)	7(9.7)	1 (1.3)
	Secungravida	109	87 (79.8)	78 (75.7)	9 (10.3)	0 (0.0)
	Multigravida	193	142 (73.6)	130 (70.2)	9 (6.3)	3 (2.1)
*[b] **Gestational Period**	First trimester	19	13 (68.4)	11 (57.9)	2 (15.4)	0 (0.0)
	Second trimester	174	142 (81.6)	127 (73.0)	13 (9.2)	2 (1.4)
	Third trimester	191	146 (76.4)	134 (71.5)	10 (6.8)	2 (1.4)
*[c] Age (years)	17-20	121	107 (88.4)	93 (68.9)	12 (11.2)	2 (1.9)
	21-25	139	110 (79.1)	102 (81.6)	6 (5.5)	2 (1.8)
	26-40	124	84 (67.7)	77 (65.0)	7 (8.3)	0 (1.0)
TOTAL		**384**	**301 (78.4)**	**272 (90.4)**	**25 (8.3)**	**4 (1.3)**

[a] Malaria (X^2Cal=6.2, X^2tab=5.99, df =2, p= P>0.05) Not significant. PARASITAEMIA (X^2Cal=6.53, X^2tab=12.59, df = 6, p= P>0.05) Not significant
[b] Malaria (X^2Cal=2.32, X^2tab=5.99, df =2, p= P>0.05) Not significant. PARASITAEMIA (X^2Cal=4.25, X^2tab=12.59, df = 6, p= P>0.05) Not significant
[c] Malaria (X^2Cal=13.19, X^2tab=5.99, df = 2, P<0.05) significant. PARASITAEMIA (X^2Cal=18.65, X^2tab=12.59, df = 6, P<0.05) significant

*Malaria Prevalence in Relation to parity Gestational period and Age***:** The finding that primigravida had the higher prevalence than the multigravida have earlier been documented (Singh *et al* 1999; Tayo *et al*., 2009; Amali, *et al*, 2011) showed that malaria is more common in primigravida than in multigravida. This is because in a place where transmission is high and acquired pregnancy immunity is expected to be significant, primigravida are the most vulnerable group. On the other hand, the result is in contrast to the findings (Simon-Oke *et al*, 2015) where multigravidae had higher prevalence than primigravida. Pregnant women in second and third trimesters had higher levels of parasitaemia. This is in line with the previous findings (Menendez *et al*., 1995) but in conflict with the work Brabin, (1999) who reported that pregnant women were at higher risk during the first trimester of pregnancy. Younger pregnant women were more affected by the malaria than the older ones in this study. This was in conformity with the earlier findings (Odoula *et al*., 1992; Bouyou-Akotet *et al*., 2003: Rogerson *et al*., 2008). They showed that higher prevalence of malaria at lower age group and lower prevalence at higher age groups might be due to the existence of natural immunity to infectious diseases (malaria inclusive) which the pregnant women acquired as their ages increased. Falade *et al*., (2008) however reported no significant difference between malaria infection and maternal age. Malaria prevalence was found to be higher in pregnant women who were less than 20 years old and were in their second trimester of pregnancy and are primigravidae. There was no statistically significant association ($p<0.05$) between parity and gestational period on one hand and malaria infection on the other hand, while significant association between age and malaria infection was established. It is therefore pertinent to note that the pregnant women who are less than 20 years old, are vulnerable age group and should be cautious of their exposures to mosquitoes' bites so as to reduce the pressure on the already overstretched health facilities.

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