

PREVALENCE OF MALARIAL INFECTION AMONGST PREGNANT WOMEN ATTENDING ANTE-NATAL CLINIC AT GENERAL HOSPITAL, HADEJIA, NIGERIA

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ABSTRACT

T*his study was conducted to determine the prevalence of malaria infection among pregnant women attending antenatal clinic at General Hospital, Hadejia Jigawa State, Nigeria, between June to July, 2019. Five hundred (500) blood samples were collected from the subjects by using venipuncture techniques dispensed in to EDTA blood bottles parked in cold-chained box and transported to laboratory. Thick and*

Introduction:

Malarial infection is a major public health problem and cause of suffering due to illness and premature death in tropical and subtropical countries, in many endemic areas this is becoming increasingly difficult to control because of the resistance of the parasite to anti-

thin blood smear were made and stained with Leshmans' and Giemsa's staining technique as described by Cheesbrough, 2004. Films were examined microscopically with objective lens $\times 10$, $\times 40$ and $\times 100$ oil immersion lenses for the presence or absence of malaria parasites. Result obtained revealed that the overall prevalence of malaria infection among pregnant women was 69.7%. The prevalence of malaria parasite according to gestation age was that out of 500 pregnant women involved, 150 (30%) were in their first trimester, 152 (30.4%) were in their second trimester and 198 (38.4) were found to be in their third trimester. These in first trimester were (150); 104 (69.3) were found to have lower prevalence, while 46 (30.66%) pregnant not followed by those in second trimester were (152); 106 (69.7%) were shown prevalence, while 46 shown no prevalence. Those pregnant women in their third trimester 198; 138 (70.0%) had higher prevalence, while 60 (30.3%) showed no prevalence. There was no significant relationship ($p > 0.05$) between the trimester and prevalence of the infection. There was no significant relationship ($p > 0.05$) between the trimester and prevalence of the infection. Hence pregnant women are advised to attend antenatal clinic for medical check and follow-up for their wellbeing.

Keywords: *General Hospital, Infection Malaria Parasites, Pregnancy, Prevalence.*

malaria drugs and the failure of vector control measure (Akanbi, *et al.*, 2009; Ogbodo, *et al.*, 2009; Udomah, *et al.*, 2015). The major vectors of human malaria are *Anopheles gambiae*, *Anopheles funestus*, *Anopheles crabiensis* and *Anopheles malas*. *A. crabiensis* is most dominant in savannah and cities. *A. gambiae*, are found in highly dense forest areas. *A. funestus* has

uneven distribution while *A. melas* is a salt water species (Federal Ministry of Health, 1990). Anopheles mosquitoes can adopt to urban breeding sites over time e.g. in India *A. stephensi* has developed into an urban species and is found in much higher numbers in many cities in India than in the surrounding country (WHO, 2000, Benneh, *et al.*, 1993).

Malaria is endemic in 91 countries with about 40% of the world population at risk. Each year there are 300 – 500 million clinical cases of malaria (90% of them in Africa) resulting in 1.5 – 2.7 million deaths mostly children under 5 years of age. Epidemics are re-occurring in areas where transmission had been interrupted (Cheesbrough, 2004; Chandler, and Reed, 2000). Urban and peri-urban malaria infection are now substantial problems in certain areas of Asia and Africa, increased population movement caused by war and socio economics with high death rates. Malaria infection is becoming more difficult to manage; particularly in areas of multi drug resistance an inter-regional system has been established by World Health Organization to monitor drug resistance in South East Asia and the western Pacific (Cheesbrough, 2004; Yahaya, *et al.*, 2009; Mordi and Borke, 2013).

In endemic regions of Sub-Saharan Africa, malaria infection during pregnancy (MIP) is a major preventable cause of maternal and infant morbidity and mortality. Endemic regions of Sub-Saharan Africa, malaria infection during pregnancy are a major cause of maternal and infant morbidity and mortality. Malaria infection during pregnancy compounds or provokes anaemia which when severe increases the risk of maternal death (estimated) at around 10,000 deaths annually. Low birth weight (linked to around 100,000 deaths annual infant deaths (Cheesbrough, 2004; Nmadu, *et al.*, 2015; Dogara, *et al.*, 2017). A national survey conducted in Nigeria in year 2000, shows that malaria caused 48.2% of all ailments experienced by pregnant women presenting to medical practitioners. Thus prevention of malaria in

pregnancy is a major public health challenges, an initiative which is encapsulated in the Roll Back Malaria programmed (Daboer, *et al.*, 2010, WHO, 2005 and Agbase, 2007). The symptoms and complication of MIP vary according to malarial transmission intensity in the given geographical areas and the individual level of acquired immunity. Each year 25 – 30 million women become pregnant in malaria endemic area in Africa. Malaria associated maternal illness are mostly the result of *Plasmodium falciparum* infection and occur predominantly in Africa (WHO, 2012, WHO, 2015, Yertey, 2006). Malaria account for all quarter of all malarial cases in the 45 endemic countries in Africa and approximately 150 million people live in area of high malarial transmission (Adeniran, *et al.*, 2010).

Transmission of malaria is intense and stable in Nigeria because the intensity of attack remains constant throughout the years. In Nigeria malaria is holoendemic in rural areas and mesoendemic in the urban areas. In southern part of the country the transmission rate is approximately uniform throughout the year. In the far north there are marked differences between the high transmission rate in the short wet season and low transmission rate in the long dry season. (Lucas and Gilles, 1998). Malaria in pregnancy is a common serious public health problem in Nigeria as large proportion asymptomatic pregnant women have malaria parasitaemia and anaemia. Maternal mortality is twice higher in pregnant women with malaria than among non-pregnant patients with severe malaria. Anaemia is the most common symptoms of MIP and usually develops during second trimester. Cerebral malaria is rare in adult except during pregnancy and is responsible for many maternal deaths. Severe Falciparum malaria may cause deformation in the genital tract to make conception impossible or may present normal implantation and development of the placenta (Oladepo, *et al.*, 2010). Furthermore, malaria increases susceptibility to other infections and retard growth

and development in children. Adult living in malaria endemic region generally have some acquired immunity to malarial infection as a result of immunoglobulin production during prior infection in childhood. This immunity diminished significantly in pregnancy particularly in *prima-gravidae*. (Ofori, *et al.*, 2009). Infant are thought to be protected against malaria during 6 month of life, largely due to transfer of maternal antibodies and the prevalence in fetal haemoglobin. Young infant has received little attention in terms of malaria research and treatment guidelines and this age group has systematically been excluded clinical trials. As a consequence, young infant and children (Alessandro, *et al.*, 2012). The lack of attention to ease management in this age group is a cause of concern and should be addressed when considering the widespread use of atesiminine base combination therapies and ongoing drug development. (ACTs) (Larru, *et al.*, 2009).

Africa current recommended malaria infection in pregnancy prevention and control strategies in areas of stable moderate to high malaria transmission include the administration of intermittent preventive treatment (IPTP) with Sulphadoxine and Pyrimethamine. Distribution of Insecticide Treated Bed Nets (ITNs) and appropriate case management for proper case management the most appropriate treatment depends on the malaria species severity of infection, local pattern of drugs resistance, drugs availability and gestational age (Cheesbrough, 2004; Ogbodo, *et al.*, 2009; Maryam, *et al.*, 2017). Insecticide Treated Nets (ITNs) offer a form of personal protection and have repeatedly been shown to reduce severe disease and mortality due to malaria for both the pregnant women and children in endemic region. Community wide trial in severe African setting, ITNs have been shown to reduce all forms of mortality by about 20% (Larry, *et al.*, 2009). The insecticide Treated Bed Nets kill's mosquitoes and other insects. This insecticide also has repellent

properties that reduced the number of mosquitoes that enter the house attempt to feed by offering protection not only for the person under the net but also for those in the same room with the net owner (Larry, *et al.*, 2009, Corol, *et al.*, 2007). Measures recommended by World Health Organization to curb morbidity and mortality among pregnant women include use of ITNs, Intermittent Preventive Treatment (IPT) and proper diagnosis of infection. Such measures have led to preventive efforts through with the continued rise in the in the cost of malarial treatment in pregnancy to the individual and the nation (Rogerson , *et al.*, 2018, WHO, 2015). IPT in pregnancy reduced maternal episodes, maternal anaemia, placental parasitaemia, low birth weight and neonatal mortality (Sateketee, *et al.*, 2001).

In recent year's malaria research and policy community has increasingly emphasized accurate diagnosis to ensure appropriate treatment of malaria in the absence of diagnostic test kits materials. Malaria commonly over diagnosed because none of the specific symptoms such as headache, fatigue, abnormal pain, muscle and joint aches, fever. Chill, perspiration, vomiting, and malaise. Therefore, as a result of concern about over use of malaria drugs, the 2010 World Health Organization guideline for the treatment of malaria recommended diagnosis by microscopy or rapid diagnostic test (RDT) for all persons suffering from suspected malaria prior to treatment. Moreover, there is an overlap between malaria and woman's other health complaint during pregnancy. Thus diagnostic confirmation of MIP is particularly important for appropriate management and is a key issue for this article. The main aim of this study is to determine the prevalence of malaria parasite infection among pregnant women in the said study area.

Materials and Method

All materials and reagent used in this research study were of standard and analytical grade works was done under good hygienic, clean environment and standard operating procedures were observed and followed.

Study Area

The study was carried out between June and July, 2019 in General Hospital, Hadejia, Jigawa State, Nigeria. The location of Hadejia local government area from Dutse, Jigawa State capital is East-North of about 171 km by road. It is geographically located within Longitude $10^{\circ} 05'$ East and Latitude $12^{\circ} 30'$. The vegetation is Sudan savannah, the climate of the region is tropical wet and dry type. Rainfall spread over the period between June to October with mean annual rainfall of 315mm. Majority of the soil in the study area is sandy in nature except in Fadama area that has clay-loam soil. The temperature of the study area is warm to hot though there is cool period between November and February. The mean annual temperature is 28°C though temporary variations do exist. Hadejia generally consist entirely of low plains of Chad basin sloping to the north-east with mean height of about 400 meter above sea level. (www.goggle.hadejia location). River Hadejia provides water for irrigation and fishing, there is much open drainage that contains stagnant water that provide surface water. Majority of the people in the study area engage in animal rearing, farming (they grow both irrigated, rain fed crops and some are fishermen). The aerial extent as calculated by planners is 305 square kilometres and population of 659, 660 (2006 census) and this makes it the largest town in Jigawa State.

Sample Collection and Sample Size

Permission was first sought from hospital management with regards to collection of blood samples from 500 pregnant women attending

ante-natal clinic. About 2mls of blood sample were collected from each pregnant woman by using venipuncture technique. The blood sample was dispensed in to EDTA bottles which were labeled with information such as name of the patient, investigation required, date, sex, age, laboratory number and hospital number. Were then packed in cold-chain box and then transported to the laboratory.

Parasitological Technique

Staining and microscopy identification of malaria parasite from collected blood samples were carried out as described by (Cheesbrough, 2004).

Preparation of Thin and Thick Blood Smear (Films)

During this research, both thick and thin films smear were prepared. The thin films were flooded with Leishman's stain for 2 minutes, two drops of buffered distilled water of pH 6.8 was added for 10 minutes, the slide was washed thoroughly under tap water. The slides were left to dry and the back of the slide was cleaned with cotton wool drained. The thick films were flooded with 2% Giemsa stain and allowed to stand for 30 minutes. The slides were then washed using clean water and the back of the slides were wiped with cotton wool and placed in a draining rack with cotton wool to air dry (Cheesbrough, 2004) and Nmadu, *et al.*, 2015).

Microscopy Examination

The stained slides were examined for the presence of malaria parasites. The slide films were placed on the stage of electrical microscope and examined under microscope with $\times 10$ and $\times 40$ objective lenses and later with $\times 100$ immersion oil objective lens for the presence of malaria parasite.

Statistical Analysis

Chi Square (X^2) test was used, using INSTA Statistical Software in order to determine association between variables (Prevalence, sex and age) and their degree of significance at $p < 0.05$ level of probability.

Results

Five hundred (500) pregnant women attending, ante-natal clinic in General Hospital, Hadejia were screened for the presence or absence of malaria parasite. The overall prevalence of malaria parasite in the study area was 69.7 % at the time of this research study.

Figure 1 showed the prevalence of malaria parasite according to gestation age. One hundred and fifty in number (30% of total 500 pregnant women involved) women were in their first trimester were examined. Out of this number (150). 104 pregnant women (69.3%) were found to have lower prevalence, while 46 (30.66%) pregnant women were not. Followed by the pregnant women that were in their second trimester were 152 (30.4%) of total 500 pregnant women involved). Out of this number, 106 (69.7%) prevalence was shown, while 46 (30.2%) show no prevalence. Those pregnant women that were in their third trimester were found to be 198 (38.4% of the total pregnant women involved). About this number 138 (69.7%) pregnant women had higher prevalence among them, while 60 (930.3%) showed no prevalence. There was no significant relationship ($p > 0.05$) between the trimester and prevalence of the infection.

Figure 2 showed the prevalence of malaria in relation to parity (gravid). Higher prevalence of malarial infection was observed among secondi-gravidae (women with second birth) with prevalence of 70.3% (83) each and the lowest prevalence of 68.8% (62) was observed among prima-gravidae among (women with single birth).

There was no significant relationship ($p > 0.05$) between the parity and prevalence of the infection.

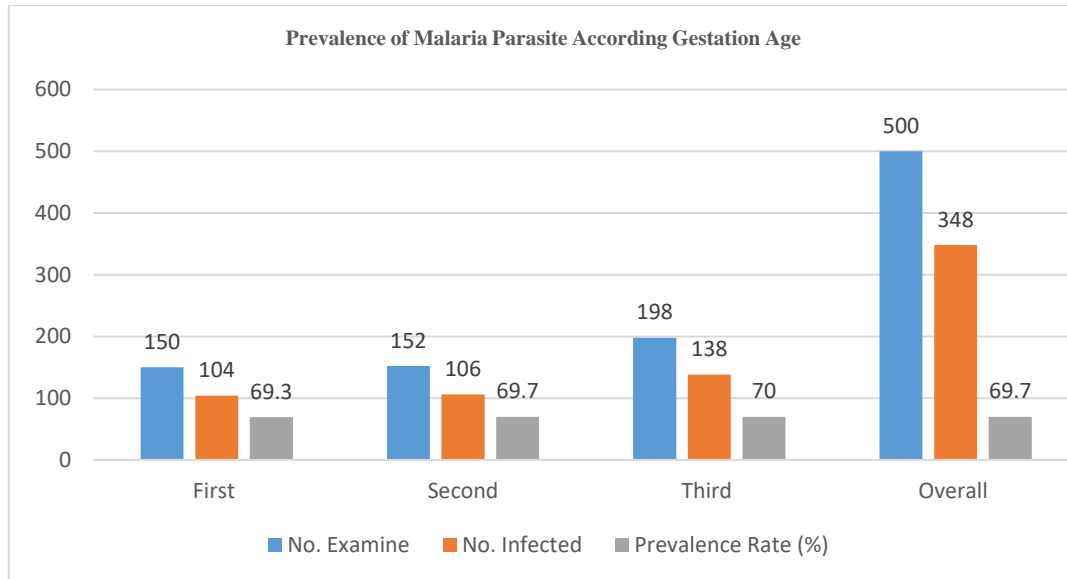


Figure 1. The Prevalence of Malarial Infection among Pregnant Women According to Gestation Age

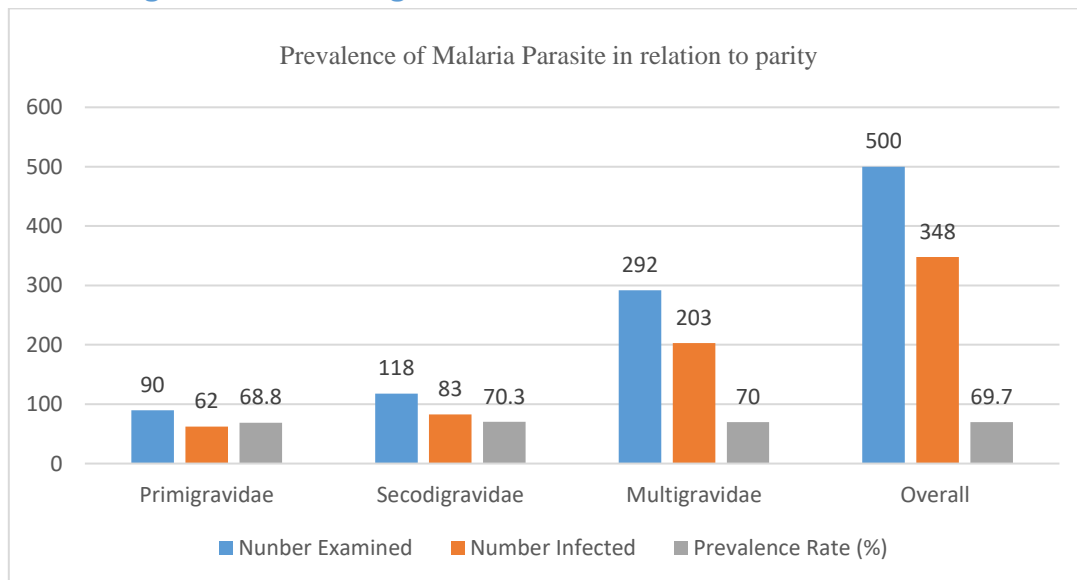


FIGURE 2: The Prevalence of Malarial Infection in Relation to Parity (Gravidae)

Discussion

The study is hospital based assessment amongst pregnant women; the work assessed the distribution of malarial infection (Malaria parasites) in relation to gestation stages (Trimester stages) age and parity (gravidae). The overall prevalence of malaria is 69.7%. The high prevalence of malaria infection in this study might be attributed to severe factors, such as indiscriminate disposal of waste, poor water drainage system, ponds and vegetation which harbour and serve as breeding site for female *Anopheles* mosquitoes (Chandler and Reed, 2001). Also prevalence observed may be due to the fact that the present study was carried out during the rainy season, when surface water and pools are available that facilitate the breeding ground of the disease vectors, and subsequently the spread of disease, The prevalence observed in the present study is slightly higher than the report of (Ogbodo, *et al.*, 2009) who reported 59.9% prevalence among pregnant women in rural community of Eastern Nigeria, the work in the present study is higher than the report of Yahaya *et al.*, (2009) who confirmed 48% prevalence among pregnant women with multiple child birth in Idah and Igalamela Local Government Area, Kogi State of Nigeria. The finding in the present study is much higher than the report of Maryam, *et al* (2017) that reported 22.4% prevalence among pregnant women in Kaduna metropolis. The work of Dogara, *et al.*, (2017) reported prevalence of 16.6% among pregnant women attending antenatal Clinic at General Hospital Dutse, Jigawa State Nigeria. The prevalence report of Dogara is lower than the present finding. The variation in the prevalence of malaria in different part of the country might be attributed to different climatic factors (Mordi and Borki, 2013). The prevalence of malaria parasite was found to be lower among pregnant women in first trimester 69.3% and the prevalence increase with increase of gestation age (in second trimester the prevalence is 69.7% and third trimester the

prevalence is 70.0% respectively). The reason for the present result may depend on high level of transmission of the infection at different gestation age (the higher the transmission, the more the infection irrespective of the gestation age). This result is inconsistency to most of the studies that show higher prevalence of malaria among women in third trimester and second trimester than first trimester (Maryam, *et al.*, 2017).

The prevalence of malaria was found to be higher in secondi-gravidae 70.3% and multi-gravidae 70.0% than prima-gravidae 68.8% this shows that the infection was more common among women with multiple birth as compared with prima-gravidae, this work was in conformity with the work of Akanbi, *et al.*, 2009 and Dogara, *et al.*, 2017). The work in the present study contradict the work of Maryam, *et al.* (2017) who reported prevalence of malaria to be significantly higher in prima-gravidae than multi-gravidae, and disagree with the work of Udomah, *et al.*, (2015) who observed higher malaria parasitaemia in prima-gravidae than secondi-gravidae and multi-gravidae women.

Conclusion

The present study indicate that malaria parasite exist in the study area. The overall prevalence of malaria parasite in the study area was 69.7% at the time of this research study. The prevalence of malaria parasite was found to be lower among woman in first trimester and increase with increase in gestation age. The infection was found to be higher in secondi-gravidae and multi-gravidae than prima-gravidae.

Recommendation

Based on the findings of this research study the authors recommend that there is a need for public health education campaign for mothers by health professional to create awareness that may lead to reduction

of vector of malaria infection and control of the diseases especially in pregnant women and younger children. Continue issuance of Insecticide Treated bed Nets free or at subsidized rate to family, so that infections could be reduced. Invention of new anti-malarial drugs. Regular environmental sanitation to dislodge mosquitoes from breeding places.

Acknowledgement

Thanks to management of General Hospital, Hadejia for giving us permission to conduct the research study. Special thanks to Department of Science Laboratory Technology Binyaminu Usman Polytechnic, Hadejia for supporting us with some of the facilities to work in their laboratory.

Authors Contributions

All authors conducted review of the literature, Data analysis and design of the study and statistical work.

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