

Prevalence of Malaria Parasiteamia among Antenatal Pregnant Women Attending Selected Clinics in Hospitals within Abakiliki

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Abstract

Prevalence of malaria parasiteamia among pregnant women (age range 20-50years) that attended mile four maternity hospital and Federal Teaching Hospital Abakiliki was analysed using standard laboratory procedure. The subjects were grouped based on age bracket, place of residence (rural, urban, and semi), occupation and prophylactic antimalaria drugs used. Thick film and giemsa staining was used for the malaria parasite identification and malaria parasite density calculation. Out of the 98 antenatal pregnant women blood sample analysed, 22(22%) of the blood film was positive for malaria parasite. Highest prevalence was seen in age group 20-25years of age range 5(5.1%) followed by 26-30years of age range 9(9.2%) and 31-40years of age range 5(5.1%). with the least prevalence in 41-50years of age range 3(3.1%). At 95% confidence interval. $X: \text{cal } 1.48 < X_{2\text{tab}} 7.815$. $P = 0.6869$. By conventional criteria, the difference is considered not to be statistically significant. Parasite density count was done in all positive samples, which is compared and categorized according to settlement ranged from 01 to 400 parasite/ul. The highest parasite density was recorded among rural dwellers 3(01-100) parasite/ul. 2(101-200) parasite/ul 3(201-300) parasite/ul, 2(301-400) parasite/ul. this is followed by urban dwellers 1(01-100) parasite/ul. 1(101-200) parasite/ul 4(201-300) parasite/ul. 1(301-400) parasite/ul, with least occurrence among semi urban dwellers 1(01-100) parasite/ul, 2(101-200) parasite/ul and 3(301-400) parasite/ul respectively. Prevalence of malaria parasite based on socio demographic profiles, analysis of occupational based prevalence showed highest prevalence among farmers 7(30.4%). followed by unskilled labourer 8(25.8%). then civil servants 4(23.5%) with least occurrence among skilled labourers. Malaria parasite prevalence based on settlement indicated highest occurrence among rural dwellers 11(27.5%), followed by urban dwellers 5(20.8%) with least occurrence among semi urban dwellers 6(17.6%). Analysis of prophylaxis based parameter indicated a prevalence of 14(25.0%) (Those who are not on prophylaxis) compared to a prevalence of 6(19.0%) among those not on prophylaxis.

Keywords: Prevalence, Malaria Parasiteamia, Antenatal Pregnant Women.

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INTRODUCTION

Malaria is a major threat to public health and socioeconomic development in sub-Saharan Africa. Pregnant women and children are most affected, resulting in significant maternal, perinatal and fetal morbidity and mortality. About one to three million children die each year, while about 24 million pregnancies are threatened in Africa as a result of malaria [1]. The impact of malaria in pregnancy is most dramatic in populations, where pregnant women have little or no pre-existing immunity. However, in areas of high and stable malaria transmission, which predominate in sub-Saharan Africa, the effects of ill health are particularly apparent in first and second malaria-exposed pregnancies. In multigravidae, maternal morbidity due solely to malaria is uncommon,

and the major detrimental effects of the infection are low birth weight and maternal anaemia [2].

Nigeria is a malaria holoendemic country, and pregnant women are especially vulnerable to malaria, which can adversely affect the outcome of pregnancy. Malaria endemicity and parity are two of the factors that can influence the effects of malaria on a mother and her baby. In malaria-endemic regions, even the babies of asymptomatic pregnant women may show intrauterine fetal growth retardation and low birth weight [3].

Malaria can be diagnosed parasitologically, using microscopy or rapid diagnostic tests (RDTs) to rule out other causes of fever-like symptoms, particularly in areas of high prevalence of HIV where

HIV-infected patients have a high incidence of febrile illness. More sophisticated tests like PCR and enzyme linked immuno-sorbent assays (ELISAs) are generally restricted to research studies or high income countries. One of the challenges in using peripheral blood tests such as RDTs or microscopy is that they will not detect sequestered parasites in the placenta. The range of antimalarial drugs available for treating malaria in pregnancy is more restricted than for non-pregnant adults as these drugs must first be proven to be safe and efficacious for both the mother and fetus, and yet pregnant women are systematically excluded from clinical trials. This is primarily due to the risks, costs and complexities of undertaking clinical trials in pregnant women. The gold standard for the clinical evaluation of the efficacy of an antimalarial drug in pregnancy is the WHO 42- to 63-day follow-up protocol, whereby women are followed throughout pregnancy and at delivery, and, ideally, the infant is followed throughout the first year of life, to fully evaluate safety and clinical outcomes in both mother and infant. Nigeria has the highest malaria burden in the world, accounting for about one quarter of deaths due to the disease in Africa. Almost everyone is at risk of malaria but pregnant women and children under five years of age are particularly vulnerable to progression to severe disease [4].

Aim

This study therefore, was designed to evaluate the prevalence of malaria parasites and parasite density in antenatal pregnant women among hospitals in Abakaliki.

$$N = \frac{X^2 \times N \times (1 - P)}{(ME^2 \times (N - 1) + (X^2 \times P) \times (1 - P))}$$

Where:

N= sample size

X^2 = chi square for the specified confidence interval level at 1 degree of freedom

N = population size

ME= desired margin of error

Ethical Approval

Before the commencement of this study, ethical approval was obtained from the ethical committee of the various hospitals and also, informed consent from the subjects was appropriately sought for.

Principle and procedure Principle

A drop of blood is placed on the centre of a slide and rotated anticlockwise and clockwise to form a ring, the blood is not fixed and the diluted Giemsa stain used to stain the film contain water which causes rupture/lysis of red blood cells, allowing the parasites to be exposed and white blood cells to be seen [5].

Objectives

The specific objectives of this Research include:

- To evaluate the prevalence of malaria parasite among pregnant women.
- To determine the parasite density of the positive case and categorized based on urbanization.

MATERIALS AND METHOD

Study area

This cross-sectional study was carried out among two selected government hospitals in Abakaliki, Ebonyi State capital.

METHOD

Subjects Used

The subjects chosen were antenatal pregnant women attending Mile 4 and Federal teaching hospital (1) in Abakaliki.

Sampling/Sample Size

5mls of blood samples was obtained by venepuncture using sterile needle and syringe. It was placed into ethylene diamine tetra acetic acid (EDTA) container, thoroughly mixed by gentle inversion and taken to the laboratory for examination. A total of 98 blood samples from antenatal pregnant women among hospitals in Abakaliki were used for this study. Sample size of 98 was constructed using 95% confidence interval with a margin of almost 13%. The formula used for this calculation was

Procedure

Thick Film Examination

The method for thick blood films for detection of malaria parasite as described by Ochie and Kolhatkar [6] and Cheesbrough [7] was employed. Briefly, the procedure is as outlined.

- The EDTA anticoagulated blood was mixed adequately
- A drop of blood was placed on a clean grease free slide using a Pasteur pipette
- With the aid of a test tube bulb, the drop of blood was mixed round into a circle to avoid the red cells from forming marked Rouleaux which can cause the blood to be easily washed from the slide during staining.
- The blood was allowed to air-dry for 2 hours, with the slide placed in a horizontal position.
- The stock Giemsa to be used was diluted in 1:10 in 7.2 pH buffered water.
- The slide was covered with the diluted Giemsa stain, with the slide placed on the staining rack.
- It was allowed to stay for 30 minutes.

- The stain was then washed from the slide with clean water.
- The back of the slide was wiped clean and allowed to air-dry.
- When the thick film was completely dried, a drop of immersion oil was placed on the film.
- The slide was mounted on the microscope stage and focused with x10 objectives.

Using x100 objectives, malaria parasites and pigments were examined. Malaria diagnosis was based

on identification of asexual stages of *Plasmodium* on the thick blood smears. Film was reported as "malaria parasite not seen" (i.e., negative) after examining about 100 fields. Parasite density was measured by the number of parasites per microlitre of blood (thick film). The number of asexual parasitic forms (trophozoites and schizonts) present in as many microscopic fields as possible necessary to count 200 leucocytes was recorded. The standard value of 8.000 WBC/ μ l was assumed as a multiplier in the parasitaemia expression below:

$$\text{Parasite}/\mu\text{l of blood (parasite density)} = \frac{N \times \text{total WBC counts}/\mu\text{l (8000)}}{\text{leucocyte count (200)}}$$

Where N = the number of asexual parasitic forms present in as many microscopic fields as possible to count 200 leucocytes.

Data Analysis

The data generated from this study was analyzed using Chi-square with the aid of a statistical package known as Statistical Package for Social Sciences (SPSS). Results were presented in Tables and a confidence interval of $P < 0.05$ was considered significant [8].

RESULT

Of the 98 blood samples that was assayed for the presence of malaria parasites in antenatal pregnant women among various hospitals in abakaliki within the age range 20 -50 years, 22(22.%) of the blood film were positive for malaria parasite. Analysis of age related prevalence showed highest parasitaemia in the 26 - 30 years of age range 9(9.2%), followed by the 20 -25years of age range 5(5.1%) and the 31 - 40years of age range 5(5.1 %), with least prevalence in the 41 -50years of age range 3(3.1%). At 95% confidence interval, $X^2_{cal} 1.48 < X^2_{tab} 7.815$, $P = 0.6869$. By conventional criteria, the difference is considered not to be statistically significant (Table-1).

Parasite density categorized according to settlement ranged from 01 to 400 parasite/ μ l. The highest parasite density was recorded among rural dwellers 3(01 - 100) parasite/ μ l, 2(101-200) parasite/ μ l, 3(201-300) parasite/ μ l, 2(301-400) parasite/ μ l. This is followed by urban dwellers 1(01-100) parasite/ μ l, 1(101-200) parasite/ μ l, 4(201-300) parasite/ μ l, 1(301-400) parasite/ μ l. With least occurrence among semi urban dwellers 1 (01-100) parasite/ μ l, 2(101-200) parasite/ μ l and 3(301-400) parasite/ μ l respectively (Table-2).

Prevalence of malaria parasite based on socio demographic profile is presented in Table-3. Result obtained based on occupation among the antenatal pregnant women showed highest prevalence among farmers 7(30.4%), followed by unskilled labourers 8(25.8%), then civil servants 4(23.5%) with least occurrence among skilled labourers. Malaria parasite prevalence based on settlement indicated highest occurrence among rural dwellers 11(27.5%), followed by urban dwellers 5(20.8%) with least occurrence among semi urban dwellers 6(17.6%). Analysis of prophylaxis based parameter indicated a prevalence of 14(25.0%) (those who are not on prophylaxis) compared to a prevalence of 6(19.0%) among those not on prophylaxis.

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

| Age (years) | Malaria parasite not seen (%) | Parasitaemia (%) | Total (%) | X^2 | P- value |
|-------------|-------------------------------|------------------|-----------|-------|----------|
| 20-25 | 17(17.3) | 5(5.1) | 22(22) A | | |
| 26-30 | 23(23.5) | 9(9.2) | 32(32.7) | | |
| 31-40 | 27(27.6) | 5(5.1) | 32(32.7) | | |
| 41 -50 | 9(9.2) | 3(3.1) ' | 12(12.2) | | |
| Total | 76(77.6) | 22(22.4) | 98(100) | 1.48 | 0.6869 |

$X^2_{cal} = 1.48$, $X^2_{tab} = 7.815$, degree of freedom (d.f) = 3, P - value = 0.689

Table-1 shows analysis of age related prevalence showed highest parasitaemia in the 26 -30 years of age range 9(9.2%), followed by the 20 -25years of age range 5(5.1%) and the 31 - 40years of age range 5(5.1%), with least prevalence in the 41 - 50years of

age range 3(3.1%). At 95% confidence interval, $X^2_{cal} 1.48 < X^2_{tab} 7.815$, $P = 0.6869$. By conventional criteria, the difference is considered not to be statistically significant.

Table-2: Parasite density level by settlement among antenatal pregnant women

| Settlement | Malaria | Malaria Parasite density (parasite/ul) | | | | |
|------------|-------------------|--|--------|---------|---------|---------|
| | parasite not seen | parasite seen | U1-10U | 101-200 | 2U1-3UU | 3U1-40U |
| Rural | 29(29.6) | 11(11.2) | 3 | 3 | 3 | 2 |
| Urban | 19(19.4) | 5(5.1) | 114 | 1 | | |
| Semi urban | 28(28.6) | 6(6.1) | 1 | 2 | - | 3 |
| Total | 76(77.6) | 22(22.4) | 557 | 6 | | |

Table-2 shows Parasite density categorized according to settlement ranged from 01 to 400 parasite/ul. The highest parasite density was recorded among rural dwellers 3(01-100) parasite/ul. 2(101-200) parasite/ul. 3(201-300) parasite/ul. 2(301-400) parasite/ul. this is followed by urban dwellers 1(01-100) parasite/ul. 1(101-200) parasite/ul. 4(201-300) parasite/ul. 1(301 - 400) parasite/ul. With least

occurrence among semi urban dwellers 1(01-100) parasite/ul. 2(101-200) parasite/ul and 3(301-400) parasite/ul respectively. The settlement categorization was based on the census bureau's entertainment for classifying areas (www.census/main/www/pdf.htm accessed 18th November 2015).

Table-3: Prevalence of malaria parasites in antenatal pregnant women using socio demographic profile

| Age (years) | Number examined | Number infected | Prevalence |
|------------------|-----------------|-----------------|------------|
| 20-25 | 22 | 5 | 22.7 |
| 26-30 | 32 | 9 | 28.1 |
| 31-40 | 32 | 5 | 15.6 |
| 41 -50 | 12 | 3 | 25.0 |
| Occupation | | | |
| Farmers | 23 | 7 | 30.4 |
| Civil servants | 17 | 4 | 23.5 |
| Skilled labour | 29 | 4 | 10.3 |
| Unskilled labour | 31 | 8 | 25.8 |
| Settlement | | | |
| Rural | 40 | 11 | 27.5 |
| Urban | 24 | 5 | 20.8 |
| Semi urban | 34 | 6 | 17.6 |
| Prophylaxis | | | |
| Yes | 42 | 8 | 19.0 |
| No | 56 | 14 | 25.0 |

Prevalence of malaria parasite based on socio demographic profile is presented in Table-3. Result obtained based on occupation among the antenatal pregnant women showed highest prevalence among farmers 7(30.4%). followed by unskilled labourer 8(25.8%). then civil servants 4(23.5%) with least occurrence among skilled labourers. Malaria parasite prevalence based on settlement indicated highest occurrence among rural dwellers 11(27.5%), followed by urban dwellers 5(20.8%) with least occurrence among semi urban dwellers 6(17.6%). Analysis of prophylaxis based parameter indicated a prevalence of 14(25.0%) (Those who are not on prophylaxis) compared to a prevalence of 6(19.0%) among those not on prophylaxis.

DISCUSSION

This study examined the prevalence of malaria parasites in antenatal pregnant women among hospitals in abakaliki. Overall prevalence of 22.4% was recorded in this study. Of the 98 blood samples that was assayed for the presence of malaria parasites in antenatal pregnant women among various hospitals in Abakaliki within the age range 20 -50 years, 22(22.%) of the blood film were positive for malaria parasite. Analysis of age related prevalence showed highest parasitaemia

in the 26 - 30 years of age range 9(9.2%). followed by the 20-25years of age range 5(5.1 %) and the 31 - 40years of age range 5(5.1 %). with least prevalence in the 41 - 50years of age range 3(3.1 %). At 95% confidence interval. $X^2_{cal} 1.48 < X^2_{tab} 7.815$. $P=0.6869$. By conventional criteria, the difference is considered not to be statistically significant.

This however disagree with the report of Singh *et al.*, [9] who reported prevalence of peripheral parasitaemia was low: 1.3% (35/2696) among women at ANCs and 1.9% at DUs (19/1025). The higher prevalence of malaria and its sequelae in pregnancy in this study therefore may be due to associated low health literacy, lack of access to vector control methods, or limited access to antimalarial drugs, or it may represent some local ecology unable to be identified in this study.

Parasite density categorized according to settlement ranged from 01 to 400 parasite/ul. The highest parasite density was recorded among rural dwellers 3(01-100) parasite/ul, 2(101-200) parasite/ul 3(201-300) parasite/ul. 2(301-400) parasite/ul, this is followed by urban dwellers 1(01-100) parasite/ul. 1(101-200) parasite/ul 4(201-300) parasite/ul. 1(301-400) parasite/ul, with least occurrence among semi

urban dwellers 1(01-100) parasite/ul, 2(101-200) parasite/ul and 3(301-400) parasite/ul respectively. Result obtained based on occupation among the antenatal pregnant women showed highest prevalence among farmers 7(30.4%). followed by unskilled labourer 8(25.8%). then civil servants 4(23.5%) with least occurrence among skilled labourers.

The age of the subjects in the study was between 20 - 50 years which is similar to earlier finding in Kano, Nigeria [10]. The prevalence of malaria parasitaemia is usually higher in the rural areas where mosquito breeding and transmission is intense. The fact that majority of the study population do not have tertiary education may have contributed to the high parasitaemia in this study. High standard of education usually affect health awareness and therefore has a positive impact on health [11]. This may also have contributed to the high level of parasitaemia obtained in this study since they were probably not better informed about vector control such as the use of insecticide treated nets [11].

Malaria parasite prevalence based on settlement indicated highest occurrence among rural dwellers 11(27.5%). followed by urban dwellers 5(20.8%) with least occurrence among semi urban dwellers 6(17.6%). Analysis of prophylaxis based parameter indicated a prevalence of 14(25.0%) (those who are not on prophylaxis) compared to a prevalence of 6(19.0%) among those not on prophylaxis. In Enugu South eastern Nigeria reported positive influence among pregnant women attending antenatal care have been reported. However, it is contrary to finding by Arnolu *et al.*, [5] who reported that previous use of antimalarial drug before booking had no significant effect on the prevalence of malaria parasitaemia.

In a study conducted in Lagos of formal education on the use of maternity services. Some of the women took antimalarial since they were learned and knew some of the antimalarial available over the counter in Nigeria. This may explain why this group of women had lower parasitaemia as noted in this study. This is corroborated by the finding by Gajida *et al.*, [10] who reported that self-treatment of malaria led to a reduction in prevalence of parasitaemia.

CONCLUSION

Given the overall high prevalence of malaria, a strategy of enhanced anti-vector measures coupled with intermittent screening and targeted treatment during pregnancy should be considered for preventing malaria-associated morbidity in central India.

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