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RESEARCH ARTICLE

Prevalence of malaria among registered pregnant women attending ante natal centre at Federal Medical Centre Yenagoa, South South Nigeria

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Abstract

Venule blood samples were collected from 216 pregnant women in different trimesters and age groups receiving ante natal care at Federal medical centre Yenagoa, Bayelsa State and were put in EDTA bottles for analysis. Standard thick and thin smears were made and rapid antigen tests were also used to examine the blood samples. 155(71.8%) were infected with *P.falciparum* out of 216 pregnant women while 61(28.2%) were not infected. Highest prevalence was observed in the first trimester 98(85.2%) and the third trimester 42(53.3%) had the lowest prevalence. Women within age groups 11-15 were the most infected (100%). Pregnant women with less than 9.1g/dl haemoglobin had the highest prevalence (91.7%) than others with higher levels, while those with low packed cell volume had higher prevalence of malaria parasite (79.1%) than those with normal PCV(66.9%). The study demonstrated high prevalence of malaria and there is urgent need to introduce appropriate intervention strategies geared towards the eradication of the vectors so as to reduce the incidence of malaria to the barest minimum. Most importantly, pregnant women who are the risk population should be properly educated on precautionary measures to take to avoid malaria like the consistent use of Long lasting insecticide treated nets(LLIN) and prompt registration in hospitals for ante natal care.

INTRODUCTION

Malaria is a preventable and treatable infectious disease, which is transmitted through the bites of infected female *Anopheles* mosquitoes. Malaria is a major public health problem in developing countries causing considerable morbidity and mortality especially in sub Saharan Africa and is caused by a protozoan parasite of the genus *Plasmodium.* Four species namely, *P. vivax, P. ovale, P. malariae* and *P. falciparum* are responsible for human malaria (Ekanem *et al.,* 1999). The most serious forms of the disease are caused by *P. falciparum* and this accounts for about 80% morbidity and 90% mortality (Carter *et al,* 2005; Ekanem *et al.,* 1999). Malaria kills more than one million people every year, most of them in sub-Saharan Africa, where malaria is a leading cause of death for children under five years and pregnant women (WHO,2008). During pregnancy, a woman's risk of having infection increases due to changes in her hormone levels and immune system (Ribera, 2007). In all endemic areas, it has been observed that the frequency and severity of malaria increases with pregnancy (Gilles et al., 1984). A woman experiencing her first pregnancy (Primigravida) is especially vulnerable (Brabin, 1999). Symptoms like anaemia, fever, enlargement of the spleen, diarrhea and in some cases, convulsion (Arpita, 2011) are attributed to pregnancy

(WHO 2004). Also in areas of high transmission, primigravidae are more susceptible to infection than multiparous women (Okoko et al., 2003).Malaria in pregnancy holds severe consequences which range from anaemia to severe complications such as cerebral malaria, pulmonary oedema and renal failure in the mother (Bouyou - Akotet et al., 2003; Saute et al., 2002; Steketee et al., 2001), increased stillbirth, intra - uterine growth retardation and low birth weights in the foetus (Verhoeff et al., 2001; Steketee et al., 2001; Kasumba et al., 2000). Nigeria is a malaria endemic country with undesirable consequences on the pregnant population. This is an impediment to the achievement of the millennium development goals, especially in the South-South zone of Nigeria. With the interest of government of Nigeria in Roll Back malaria programme, this study was undertaken to provide part of the much needed baseline data for effective planning and control of Malaria especially the pregnant women who are the risk population.

MATERIALS AND METHODS

STUDY AREA

The study was conducted at Federal Medical Centre Yenagoa, Bayelsa State. It is located in Yenagoa, capital city of Bayelsa State, South-South Nigeria. The area is characterized by mangrove forest. It is bounded by Delta State on the North, Rivers State on the east and Atlantic ocean on the Western and Southern parts. The State experiences a high rainfall and monthly temperature range of 25-31^{o}C. It is geographically located within latitude 4^{o}15' North 5 ^{o} 23' South and longitude 5 ^{o} 22' West and 6 ^{o}45'east.

STUDY SAMPLE: The study sample of 216 pregnant women was selected systematically from women attending antenatal clinics in Federal Medical Centre, Yenagoa Bayelsa State.

ETHICAL CLEARANCE

The study was approved by the Ethical Committee of the Federal Medical Centre, Yenagoa.

SAMPLE COLLECTION

One ml of whole blood was collected through Vein puncture from each participant under sterile condition and placed into EDTA bottle for malaria parasite examination.

DETERMINATION OF MALARIA INFECTION

Thick and Thin Blood Smear for Microscopic Detection of *P. falciparum*

A small drop of blood was placed at the center of each slide to make a thick film. Using another slide the small drop of blood placed at the center of the slide was spread out to cover an area four times its original area to get a satisfactory thin film. The films were allowed to air dry thoroughly for 30 minutes at room temperature and then stained with Giemsa stain freshly diluted with buffered water of PH 6.8 (1:10 Dilution).The films were allowed to stain for 45 mins and then washed with clean distilled or buffered water and allowed to air dry in a draining trough. The blood films were then examined microscopically using the oil immersion objective.

Interpretation: Malaria parasites, pigments and species were identified as ring forms using standard charts and reported as +, + +, + + +.

DETERMINATION OF MALARIA INFECTION

P. falciparum Antigen Rapid Test Device

The principle of *P.falciparum* antigen detection is based on a rapid chromatographic immunoassay for the qualitative detection of circulating *P. falciparum* antigen in the whole blood. This method utilizes Gold conjugate to selectively detect Plasmodium antigen.

About 10µl of whole blood sample was added into appropriately labeled specimen cassettes containing sample wells. Subsequently, 3 drops of buffer supplied by the manufacturer was added into the sample wells. After 15mins the results were read.

Interpretation: The test device has inherent quality control that validates the result. The presence of two pink lines at the region of the control and test sample signifies presence of *P. falciparum* malaria infection while the presence of only 1 pink line in the control region signifies absence of *P. falciparum* malaria infection.

STATISTICAL ANALYSIS

The data were analyzed using descriptive statistics. Descriptive statistics was used to calculate the frequencies and proportions.

RESULTS

TABLE 1: PREVALENCE OF MALARIA IN RELATION TO AGE OF PREGNANT WOMEN

Age group (years)	Number examined	Number infected	Percentage infection (%)
11-15	2	2	100
16-20	32	26	81.3
21-25	49	30	61.2
26-30	80	62	77.5
31-35	35	22	62.9
36-40	17	13	76.5
41-45	1	0	0
Total	216	155	71.8

Table 1 shows that pregnant women within the age group (11-15) years had the highest rate of infection of 100%, followed by those of ages (16-20).

TABLE 2: PREVALENCE OF MALARIA IN RELATION TO PARITY OF PREGNANT WOMEN

Parity	Number examined	Number infected	Percentage infection (%)
Primigravidae	146	110	75.3
Multigravidae	70	45	64.3
Total	216	155	71.8

Table 2 shows that pregnant women in their primigravidae had the highest prevalence rate of (75.3%), while multigravidae women had the least (64.3%). This shows that majority of the pregnant women were primigravidae.

TABLE 3: PREVALENCE OF MALARIA IN DIFFERENT TRIMESTERS

Trimesters	Number examined	Number infected	Percentage Infection (%)
First Trimester	115	98	85.2
Second Trimester	25	15	60
Third Trimester	76	42	55.3
Total	216	155	71.8

Table 3 shows that pregnant women in their first trimester had the highest prevalence of (85.2%), while those in their third trimester had the least (55.3%).

TABLE 4: PREVALENCE OF MALARIA IN RELATION TO HAEMOGLOBIN OF THE PREGNANT WOMEN.

Haemoglobin (g/dl)	Number examined	Number infected	Percentage infection (%)
<9.0 g/dl	60	55	91.7
9.1-12.0g/dl	130	87	66.9
Above 12.0g/dl	26	13	50
Total	216	155	71.8

Normal value for Hemoglobin: (10.5 – 14g/dl).
< (10.5 g/dl) is anemic
Pregnant women with less than 9.0 g/dl haemoglobin had the highest prevalence of (91.7%), followed by women of haemoglobin from 9.1-12.0 g/dl (66.9%), while pregnant women with haemogolbin level of 12.0 g/dl and above had the least.

TABLE 5: PREVALENCE OF MALARIA IN RELATION TO PACKED CELL VOLUME (PCV).

Packed cell volume (PCV)	Number examined	Number infected	Percentage infection (%)
<(20-29%)	86	68	79.1
Normal (30-40%)	130	87	66.9
Total	216	155	71.8

Table 5 shows prevalence of malaria in relation to packed cell volume (PCV) of the pregnant women. It revealed that women with less than 20-29% packed cell volume had higher prevalence of (79.1%), than those with 30-40% normal packed cell volume of (66.9%).

DISCUSSION

This study showed a high prevalence of malaria of 71.8% among the pregnant women examined. Results showed that the prevalence of malaria varied considerably between ages, gravidity, trimester of pregnant women, haemoglobin content and packed cell volume.This finding (71.8%) is greatly higher than those of Kisumu 95(51.1%) of the 186 pregnant women screened and 62(40.5%) of the 153 pregnant women screened in Mombasa, Kenya (Praise *et al*, 2003). The prevalence recorded in this study (71.8%) is higher than the 67% recorded in Central India (Praise *et al*, 2003) and 60% recorded in Lagos, Nigeria (Okwa *et al*., 2006). It was still much higher than the 36.2% recorded in another study conducted in Jos, Bauchi and Eku regions of Nigeria (Egwunyenga *et al*., 2001).The differences in the prevalence of malaria in these areas could be as a result of climatic differences in these localities.This is higher than the study reported in Onitsha where 47.5% prevalence was recorded (Nwokedi, 1992) and in Awka, Anambra State where 64% prevalence was recorded (Aribodor *et al*, 2009). However, this correlates with 72% prevalence obtained in a similar study carried out during the rainy season from April to June in Oshogbo which was attributed to the rainy season.The reason for the high outcome recorded in this study may be attributed to poor level of sanitation of these women, littering of the environment with cans and empty containers that tend to provide breeding sites for mosquitoes. The environment is surrounded by water and vegetation which are also natural breeding sites for mosquitoes. Rainfall during the wet season of the year also provides water in pot holes, gutters, drainage systems, footprints and small ponds in which mosquitoes can breed. The prevalence obtained within the first and second trimesters agreed with those of Nair and Nair (1993), Bernard (1991), Zhou et al. (2002), Rayanal (1998) and Anosike et al. (2004) who observed peak prevalence in weeks 10-20 of pregnancy. This may be attributed to the expression of adherent proteins on the surface of infected red blood cells (IRBCs), enabling the IRBCs to adhere to micro vascular capillaries of vital organs causing severe pathological conditions (Miller et al. 2002;Menendez, 1995).Also parity played a role in the prevalence rates. Primigravidae and multigravidae accounted for 75.3% and 64.3% respectively. These results were similar to the 65% reported in Senegal (Diagne et al., 1997) and Malawi (Mattelli et al., 1994), 64 % in Gabon (Bouyou - Akotet et al., 2003) and 62 % in Tanzania (Wakibara et al., 1997). The results were greatly higher than 26.2 % observed among the Primigravidae in Malawi (Rogerson et al., 2003) but disagrees with Saute et al. (2002) in Mozambique that observed no significance in prevalence levels with parity. Okoko et al. 2003 had suggested that the early onset of efficient antibody response in multigravidae and the delayed production of antibodies in Primigravidae appeared to account for the gravity dependent and differential prevalence of Malaria in pregnant women.

CONCLUSION

The high prevalence rate of malaria in this study area gives concern to individuals and the government. This calls for serious intervention strategies against malaria as well as the vectors of the parasite. For this fight against malaria to be achieved, long lasting insecticide treated nets must be provided for the pregnant women and children who are vulnerable. Other strategies may still include environmental sanitation, ante natal surveillance, treatment of episodes of malaria and anti mosquito control measures such as introducing genetically modified mosquitoes that will not be parasite carriers. In California, United States of America, the breeding of genetically modified species of mosquitoes(with new DNA code) that do not transmit malaria has been discovered and will be of immense assistance towards the eradication of malaria. This should be extended to tropical countries where malaria is endemic like Nigeria. This will lead to improvement in the pregnancy outcomes.

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