PREVALENCE OF MALARIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT THE GENERAL HOSPITAL, MINNA, NIGERIA.

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Abstract

Malaria in pregnancy constitutes a serious threat to the successful management of pregnancy and has been shown to be associated with undesirable pregnancy outcome such as pre-term labour and poor intra-uterine development of foetus. In this study, blood samples from 300 pregnant women were screened for plasmodium faciparum, blood group antigen and packed cell volume (PCV) using thick and thin blood film microscopy, slide method and micro Hematocrit technique respectively. Out of the 300 samples analyzed, 220 (73.3%) were positive for malaria parasite. The age group (10-20) had the highest level of infection compared to the other age groups. Women within the second trimester had a significantly higher prevalence rate (88.6%) followed by women in the third trimester (61.9%) and then the first trimester (17.9%). Majority of the pregnant women screened had < Normal (20-29%) percentage Red Blood Cells in circulating blood. Higher prevalence (96.0%) of malaria infection was observed in women with blood group A while the least prevalence (56.5%) was recorded in pregnant women with blood group O compared to other blood groups. Though, malaria was found to be significantly unconnected to PCV (p<0.05), the high level of malaria infection seen in the study highlights the need for a comprehensive malaria control programme in the study area.

Keywords: pregnancy, parasitemia, Hematocrit technique, malaria and pregnant women.

Introduction

Malaria is an important parasitic disease estimated to affect 198 million people globally with about 3.3 billion people at the risk of infection. Human malaria is caused by Plasmodium vivax, P. ovale, P. malariae and P. falciparum (Adefioye, 2007). Of these, the latter is the most frequent cause of severe malaria, including cerebral malaria (Adefioye, 2007). Malaria is regarded as the most common and potentially the most serious infection occurring in pregnancy in many Sub-Saharan African countries (world Health Organization (WHO), 2012). Children under the age of five and pregnant women are more susceptible than the general population to malaria and they are more likely to suffer recurrence or develop severe complications and die from the disease. Malaria contributes very significantly to maternal and foetal mortality with at least 10,000 dealth annually in sub Saharan Africa (Toolkit, 2010).

The World Malaria Report, which indicated that Nigeria accounts for more than a quarter of all the 128 million malaria cases in the 45 malaria-endemic countries in Africa, clearly showed the challenge of malaria in Nigeria (WHO, 2014). In Nigeria, 11% of maternal deaths are attributed to malaria (Federal Ministry of Health, 2000).

Malaria is particularly dangerous during pregnancy because of the implication for the health of both the mother and the developing baby (McGready et al., 2007; Grenwood et al., 2007).

Most cases are usually asymptomatic as a result of the immunity acquired following previous exposure and even this has a significant consequence for maternal and infant health. The asymptomatic manifestations insidiously cause unapparent disease resulting in maternal anaemia and foetal intrauterine growth retardation. Malaria causes anaemia through haemolysis and increased splenic clearance of both infected and uninfected red blood cells and cytokine induced dyserythropoiesis (Crawley, 2004). It has been reported that about 1224% of newborns in Nigeria are low birth weight (LBW) babies as a result of intrauterine growth retardation (Falade et al., 2007).

While there are reports of up to 50% reduction in malaria episodes and deaths in some African countries between 2000 and 2013 (WHO, 2014), reports from Nigeria has not shown significant reduction, especially with regards to malaria in pregnancy. The reasons adduced for the change in malaria prevalence in other countries are good surveillance and high intervention coverage (WHO, 2014).

There appears to be a paucity of information on the prevalence of malaria in pregnant women in Niger State, Nigeria. This report represents our observations on the prevalence of malaria in pregnant women attending ante-natal clinics at General Hospital Minna, Niger State.

Materials and Method Study population
A total number of 300 women attending antenatal clinic (ANC) at the General Hospital, Minna, Nigeria participated in this study.

Sample Collection and Handling
Blood samples were collected as described by (NCCLS, 2000), through venipuncture of postcubital veins of the patients using 2ml syringe. The samples were withdrawn into clean EDTAcontaining bottles and rocked gently for 60 seconds. Blood samples collected from the subject were screened for presence of P. faciparum parasite, blood group antigen as well as the Packed Cell Volume (PCV). This study was conducted during the rainy season.

Thin Film Preparation and Microscopy
One drop of blood sample was placed on a clean, grease free slide. The blood was air dried and stained using Leishman stain for 2 minutes. The smear was allowed to dry and then fixed by dipping the slide into methanol for 5 seconds. The fixed slides were washed off with clean water, dried and then examined microscopically using the 100x objective (NCCLS, 2000).

Thick Film Preparation and Microscopy
Two drops of blood sample were placed on a clean grease free slide. The blood was swirled around with the use of an applicator stick to make a uniform thick layer film. The smears were allowed to air dry followed by staining with Giemsa stain for 5-8 minutes, allowed to dry and examined microscopically using the 100X objective (NCCLS, 2000).

Pack Cell Volume (PCV) Determination
PCV determination was done using capillary tube method according to Strumia et al. (1954). Blood sample was allowed to enter a heparinized capillary tube until the tube was three quarter filled after which it was sealed at the upper end. It was then spun in a centrifuge (NCCLS, 2000) at

10,000 rpm for 5 minutes to completely pack the red blood cells. The tube was immediately removed and made to stand upright with the characteristic three layered appearance. The PCV value for each sample was thereafter obtained directly from a microhematocrit reader.

Determination of ABO blood group
Capillary blood was collected by finger-pricking, using 70% isopropanol and sterile, disposable lancets and cotton wool. The ABO blood grouping was performed using the slide method. A drop of blood from each subject was placed on a clean slide in four concentric zones. A drop of each of the antisera, anti-A, anti-B, anti-AB was added and mixed with each blood sample with the aid of a sterile stick. Blood groups were determined on the basis of agglutination (NCCLS, 2000).

Data Analysis
Data obtained from the study were analysed using statistical analysis software (SAS) version 9.4. Chi-square analysis was used to determine the relationship between the rate of infection and the risk factors at 95% ($p < 0.05$) confidence interval.

Result
Out of 300 subjects screened, 220 (73.3%) were positive for malaria. 20-29 age group had the highest prevalence of malaria followed by 10-19 years and the least (32.0%) (Table 1).

Table 1. Distribution of Infection among Subjects on the Basis of Age

Age (years)	Total samples	Positive samples	% prevalence	P-alue
19-10	123	80	65	
20-29	152	132	86.8	<0.0001
31-39	25	8	32	
Total	300	220		

parasitemia was significantly higher in women within the age group 20-29 years ($P < 0.05$) than in other age groups

The distribution of infection on the basis of the trimester of pregnancy revealed that women in their second trimester had the highest prevalence (88.6%) followed by those in third trimester (61.9%) while those in their first trimester had 17.9% prevalence (Table 2).

Table 2. Distribution of Infection among Subjects on the basis of Gestational Age

Trimester of pregnancy	Total number of subjects	Number infected	% Infection	P-value
First trimester	28	5	17.9	
Second trimester	175	155	88.6	<0.0001
Third trimester	97	60	61.9	
Total	**30**	**220**		

Malaria infection was significantly higher in women within the second trimester ($P < 0.05$) than in other gestational periods

The distribution of infection on the basis of the value of the packed cell volume of the subjects is presented in Table 3 below. One hundred and fifty (83.3%) out of the 180 subjects with PCV value less than the normal (20-29%) had malaria while 70 (58.3%) out of the 120 with normal PCV had malaria.

Table 3. Distribution of infection based on the packed cell volume (PCV) value of subjects

Packed cell volume(PCV)	No examined	No infected	% prevalence	P-value
< Normal (20-29%)	180	150	83.3	
Normal (30-38%)	120	70	58.3	< 0.0001
	300	220		

P < 0.05 shows that parasitemia was significantly high in pregnant women with <Normal (2029%).

The blood group antigen screening revealed that 75 (25.0%) subjects had blood group antigen A while 53 (17.7) subjects had blood group antigen B. forty-eight (16.0%) and 124 (41.3%) subjects had blood group antigens AB and O respectively (Table 4).

Table 4. Distribution of parasitemia on the basis of blood groups of subjects

Blood Groups	Total Number of Subjects	Number Infected	Number Infected	P-value
A	75	72	96	
B	53	41	77.4	
AB	48	37	77.1	<0.0001
O	124	70	56.5	
Total	300	220		

P < 0.05 shows that malaria infection was a significantly high in pregnant women with blood group "A".

Discussion

In this study, 220 (73.3%) out of the 300 pregnant women screened for presence of P. falciparum in blood were positive indicating the presence of malaria. This is similar to 68.3% reported by Amuta et al. (2014) however, higher than 58.2% reported by Ejima et al. (2013) in Minna metropolis. Ejima et al. (2013) reported that the high prevalence of malaria as observed in both study may be due to seasonal variation in the epidemiology of malaria. This study was conducted

during the rainy season when the prevalence of malaria is usually high as inadequate drainage/sewage disposal systems promote flooding and stagnant water sites thereby creating breeding sites for malaria vectors.

The present study revealed that pregnant women within the age group 20-29 years recorded significantly higher prevalence rate (86.8%) of malaria compared to the other age groups (Table 1). It has long been observed that repeated or consistent exposures to mosquito bites during pregnancies lead to the development of immunity against the parasite during subsequent exposure. It is not surprising therefore that women within the 20-29 age group who were mostly becoming pregnant for the first time had a higher prevalence of malaria than older women who had been exposed to the disease during previous pregnancies and may have developed some level of resistance. This finding is in agreement with the earlier findings of Dicko et al. (2003) and Wogu et al. (2013). Generally, increasing age has been associated with lower susceptibility to malaria, and in the event of infection, lower parasite density, which in most cases do not lead to easily detectable infection or severe clinical outcome.

On the basis of the age of pregnancy, the highest rates of malaria were observed among pregnant women in the third trimester of pregnancy, which differs from the earlier reports of Amuta et al. (2014) in Makurdi, Nigeria and Hile et al. (2013) in Garoua, Cameroon that malaria usually reach the peak during the second trimester of pregnancy and declines towards the third trimester and also the report of Raimi et al. (2010) who found the highest malaria rate in the first trimester. This observed difference may be as a result of any or a combination of factors like the degree of exposure to mosquito bites and/or residence in stable or non-stable malaria transmission areas.

Majority of the pregnant Women screened had < Normal (20-29%) Packed Cell Volume (Table 3). This may be associated with the fact that parasite in blood often leads to the destruction and subsequent loss of red blood cell. Similar findings have earlier been reported by Isah et al. (2010) in a teaching hospital in Nigeria.

The highest prevalence rate (96.0%) of infection among blood group "A" subject and the least prevalence rate (56.5%) among blood group "O" subjects compared to subjects with blood groups "B" and "AB" was observed in this study. The "A" and "B" trisaccharide antigen have been reported to play a role in the cytoadherence of parasitized erythrocytes to the endothelium as well as rosette formation which are key processes in the pathogenesis and complication of malaria (Fischer and Boone, 1998; Zerihun et al., 2011; Afoakwah et al., 2016). The presence of either one or both of these factors is believed to hasten and perhaps sustain the process of pathogenesis following an individual's exposure to the parasite hence the preponderance of infection among the A, B, and AB groups compared to the O group.

Conclusion
The finding of this study clearly illustrates a high prevalence of malaria amongst the subjects. Preventive interventions such as increased awareness, chemoprophylaxis and the distribution of insecticide treated bed nets in the area are therefore strongly recommended.

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