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Full Length Research Paper

Early detection as a veritable step in preventing the consequences of malaria infection in pregnancy

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We studied 270 patients attending the booking antenatal clinic recruited for three months in the Lagos State University Teaching Hospital (LASUTH), Nigeria. Each patient was screened for malaria parasites using Giemsa's stain of thick and thin blood films on 2 ml venous blood. Parameters on the age, parity, gestation at booking, booking weight, haemoglobin status among others were obtained. Most of the booked patients are primigravida (55%) with 58.4% of the cases between 14 - 26 weeks gestation. 48 and 65% of patients were of blood group O positive and genotype AA. The prevalence rate for malarial parasitaemia was 34% and mostly *Plasmodium falciparum* were isolated. However, a negative correlation exist between malaria parasitaemia and age of patient (r = - 0.02), parity (r = - 0.02) and gestation at booking (r = -0.08). Malarial parasite load was high especially in primigravida and in second trimester of pregnancies. Since most of the fetal losses associated with malarial parasitaemia in pregnancies occurred during this period, greater attention be paid to this vulnerable group.

Key words: Booking weight, gestational age, LASUTH, malarial parasite, parity.

INTRODUCTION

In Malaria endemic areas such as the Sub-saharean Region of Africa, malaria infection during pregnancy has been identified as a contributory factor to low birth weight (LBW) (Jellife, 1968; Mc Gregor et al., 1983; Kramer, 1987). In pregnancy, women are said to experience a higher frequency and density of parasitaemia (Brabin, 1983; Mc Gregor, 1984). However, susceptibility to infection and severity of the clinical manifestation of malaria are determined by the level of pre-pregnancy immunity, which has important consequences which in turn depends largely on the intensity and stability of malaria transmission (Muttabingwa, 1994). For the pregnant woman herself, malaria infection is hazardous as 80% of death due to malaria in Africa occurs in women and children below the age of 5 years (WHO, 2000). The effects of malaria on mother and fetus are less severe in highly endemic areas such as sub-Saharan Africa than in places of low or unstable transmission though malaria still has important consequences for pregnancy, especially primigravidae (Brabin, 1983). Such consequence includes cerebral malaria, maternal anaemia, abortions, intrauterine growth restriction (IUGR), intrauterine fetal death (IUFD), low birth weight (LBW) and neonatal death (Sigh et al., 1995). Some authors have found that malaria infection accounts

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for 20% maternal mortality in Nigeria (Salako et al., 1990).

The chief source of malaria transmission and infection is by the bite of infected female Anopheles mosquitoes (Shidrawi, 1982). However, it has been established that transmission by the sharing of hypodermic needles, transfusion of blood from malaria-infected donor and by congenital route is possible (Salako et al., 1990).

To this end, early detection in pregnancy will enable the obstetrician to take steps in preventing the known consequences of malaria infection in pregnancy.

MATERIALS AND METHODS

Patients

All the patients coming for booking at the Antenatal Clinics of the Department of Obstetrics, Lagos State University Teaching Hospital (LASUTH), Ikeja from January-March 2006 were included in the study. 270 patients recruited were screened after informed consent was obtained. The questionnaires administered request for demographic information on age, parity, gestational age and history of febrile illness in the preceding 3 months. The gestational age was calculated from the last menstrual period and confirmed by ultrasound scan. Patients who had used any antimalarial drug in the preceding 3 months were excluded form the study.

Blood collection and malaria parasite screening

Two milliliters of venous blood was collected from each patient. Thick and thin blood films were made on grease-free slides, stained with Giemsa`s stain and microscopically examined for the presence or absence of malaria parasites in particular *Plasmodium falciparum* using x100 objective. Two slides of blood films were prepared for each sample collected and observed by same Laboratory Scientist.

Ethical consideration

Approval was obtained from the Lagos State University Teaching Hospital ethics and research committee before commencement of the study and all patients recruited gave their consent for the study.

Statistical analysis

Computerized analysis of the generated data was carried out using SPSS 12 for window (SPSS Inc Illinois Chicago, USA). Data were expressed in Mean ± SEM. Pearson's correlation matrices and student t-test of data were generated and $P < 0.05$ was considered statistically significant.

RESULT

Results were compared for parity, age of patient, gestational age of pregnancy, booking weight, blood group and genotype, and haemoglobin status. In this study, the mean age was found to be 30.2 years ± 4.5 while, the mean Hb was 10.9 gm/dl ± 0.10. However, the prevalence of malaria was found to be 34.2% as shown in Table 1. Analysis also revealed that 30% of the patients had haemoglobin <10 g/dl, 16.6% had haemoglobin of 10.0 - 10.9 g/dl while 43.4% had haemoglobin of >11 g/dl. Also, about 55% of the booked patients were primigravida, 39% multigravida and 6% grandmulti-gravida, showing a preponderance of primigravidae as seen in Table 2. We noted in this study that majority of the patients (58.4%) booked at 14 - 26 weeks gestation as shown in Table 3. As expected, most of the booked patients were O positive (54%) and of genotype AA (65%) as shown in Table 4.

Age has a strong significant correlation with parity and booking weight of the patients. However parity is significantly correlated with gestation at booking and booking weight while gestation at booking is only significantly correlated with booking weight as reflected in table 5 in this study. In this study, whilst malaria parasitaemia has a negative correlation with the gestation at booking, it has a positive correlation with the booking weight and haemoglobin status as reflected in Table 5.

Table 1. Shows the prevalence of malaria in the study group.

Parameter	Frequency	Percentage (%)
Presence	92	34.2
Absence	177	65.8
Total	269	100.0

Table 2. Parity distribution of the study group.

Parameter	Frequency	Percentage (%)
Primip	147	54.9
Multip (2-4)	106	39.6
Grand-multip (>5)	15	5.6
Total	268	100.0

55% of the booked patients were primigravida, 39% multigravida and 6% grandmultigravida.

Table 3. Shows the booking gestational age of the study group.

Parameter	Frequency	Percentage (%)
6-13 wks	27	10.0
14-26 wks	157	58.4
26-35 wks	73	27.1
36-40 wks	12	4.5
Total	269	100.0

Majority of the patients booked at 14 - 26 weeks gestation (58.4%).

DISCUSSION

This study confirmed that malaria parasitaemia is a major

Table 4a. Showing blood group distribution of the study group.

Parameter	Frequency	Percentage (%)
A negative	3	1.1
A positive	52	19.3
AB positive	10	3.7
B positive	52	19.3
O negative	7	2.7
O positive	145	53.9
Total	269	100

Table 4b. Showing the genotype distribution of the study group.

Genotype	Frequency	Percentage (%)
A	1	0.4
AA	174	64.7
AC	8	3
AS	65	24.2
SC	1	0.4
SS	2	0.7
Total	269	100.0

Table 5. Showing the correlation matrix of the risk factors in the study group.

Parameter	Age	Parity	Gestation at booking	Booking weight	Malarial parasites	Hb
Age	1.00	0.48**	0.04	0.19**	- 0.02	0.05
Parity		1.00	0.16*	0.23**	- 0.02	0.08
Gestation at booking			1.00	0.15*	-0.08	- 0.09
Booking weight				1.00	0.04	- 0.04
Malarial parasites					1.00	0.11
Hb						1.00

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

problem amongst pregnant women in Lagos, the commercial nerve centre of Nigeria. The aim of the study was to determine the prevalence of malaria infection in booking patients at LASUTH, a new teaching hospital in Lagos and to evaluate the relationship between malaria infection and parity, age of patient, gestation at booking, booking weight, blood group and genotype and haemoglobin status.

In this study, malaria prevalence was found to be 34%, similar to the findings obtained in Gabon and Kenya within the same geographical area of Tropical Rain Forest (Shulman et al., 1999; Maricelle et al., 2003).

We also found out as others did that primigravidas and to a lesser extent secundigravidas are more likely than multigravidas to become parasitaemic during pregnancy (Brabin, 1983; Linda et al., 1994; Shulman et al., 1999; Maricelle et al., 2003). However, this has been attributed to the fact that antiadhesion antibodies are usually developed against chondroitin sulphate A-binding parasites over successive pregnancies and may account for the susceptibility of primigravidas to infection (Duffy and Fried, 1999).

Similar to the studies carried out in Gabon and Kenya, we found that malaria parasitaemia is commoner in the younger age group than older ones as seen in Table 5 (Shulman et al., 1999; Maricelle et al., 2003).

There is a negative correlation ($r = - 0.08$, $p > 0.05$) between malaria parasitaemia and gestation at booking, showing that malaria parasitaemia was higher in patients at earlier gestation than those at late gestation as obtained in other similar studies (Nair and Nair, 1993; Shulman et al., 1999; Maricelle et al., 2003). The reasons could be related to the gravidity status and the fact that most (58%) of our patients were booked around the second

trimester (Marielle et al., 2003).

Also, negative correlation (P > 0.05) relationship was observed between gestation at booking and haemoglobin status, because physiologically we know that Hb level increase exponentially as pregnancy increases and then plateau in the third trimester.

When the blood group and the genotype of patients were considered, there was no correlation observed. However, majority of the patients were of O positive blood group (54%) and genotype AA (65%).

The booking weights of our patients were found to be highly significant ($p < 0.05$) with age ($r = 0.19$), parity ($r = 0.03$) and gestation at booking ($r = 0.15$) . Although, it was found to be negatively correlated ($r = - 0.04$) with the haemoglobin status, it was positively correlated with malarial parasitaemia ($r = 0.04$) (Table 5). This finding is what usually obtained especially in our holoendemic environment where malarial infestation is high.

Though we are in a holoendemic area for malaria, only 25% of the study group has haemoglobin level of less than 10mg/dl: mean haemoglobin level was (10.9 gm/dl ± 0.1). When malaria parasitaemia and haemoglobin status were considered in isolation as shown in Table 5, they have a positive correlation, $r = 0.11$, which may be adduced to the fact that 75% of the patients have Hb > 10 g/dl according to WHO criteria (2000).

Conclusion

It is obvious from this study that malarial parasitaemia prevalence rate is high especially in primigravida and in second trimesters of pregnancies and since most of the fetal losses associated with malarial parasitaemia in pregnancies occurred during this period, greater attention should be paid to this vulnerable group.

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