



Prevalence of Malaria among Pregnant Women attending a Healthcare Facility in Lokoja, North-Central, Nigeria

Mofolorunsho C.K*, Audu H.O, Omatola A.C

Department of Microbiology, Faculty of Natural Sciences, Kogi State University Anyigba, Nigeria.

ARTICLE HISTORY

Received: 02.11.2013

Accepted: 22.12.2013

Available online: 10.02.2014

Keywords:

Malaria, Pregnancy, Anaemia, North-Central Nigeria

*Corresponding author:

Email : ckmofolorunsho@gmail.com

Tel.: +2348034793137

ABSTRACT

Malaria which is a public health problem in endemic countries has serious consequences during pregnancy. It is one of the major cause of maternal and child mortality. This study was conducted to ascertain the prevalence of malaria in pregnancy in Lokoja, North-central Nigeria. A total of 100 pregnant women participated in the study. Thick and thin blood films stained with Giemsa were used for malaria diagnosis using a light microscope. A total of 30 (28.8%) pregnant women were positive for malaria. Maternal age (>24) and gravidity (primigravidae) were among factors identified to increase the risk of malaria infection. Anaemia was observed in 21 (70%) of the 30 pregnant women infected. Our findings suggest that primigravidae had high prevalence of malarial infection while majority of the infected pregnant women were in the third trimester of pregnancy. Strategies for the control and prevention of malaria during pregnancy should therefore be fully implemented particularly in endemic areas.

INTRODUCTION

Malaria, a life threatening parasitic disease, is one of the most important challenges to public health with about 300 to 500 million cases reported annually. More than 1 million people die from the disease, most of them children under the age of 5 years [1,2]. It is widespread in tropical and subtropical regions including much of Sub-Saharan Africa, Asia and the Americas [3].

Malaria remains the single most important infection causing morbidity and mortality in Africa and in the world at large. It is second only to *Mycobacterium tuberculosis* as the single most important infectious agent [4]. It is one of the biggest impediments to progress and the biggest killers in Africa, with 90% of the global malaria deaths occurring in this continent [5]. In Nigeria, malaria is the major cause of morbidity and mortality especially among children below age five. Malaria is a social and economic problem, which consumes about 3.5 million dollars in government funding and 2.3 million dollars from other stakeholders in the form of various control attempts in 2003 [6].

The burden of malaria infection during pregnancy is caused mainly by *Plasmodium falciparum*, the most common malaria species in Africa [7]. Every year at least 3 million pregnancies occur among women in malarious areas of Africa, most of whom reside in areas of relatively stable malaria transmission [8]. Also in areas of high transmission, women in their first pregnancy are

more susceptible to infection than women in subsequent pregnancies [9]. Further more women in their first trimester of pregnancy show higher prevalence and parasite density than those in the second and third trimesters [10]. 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 [11-13], increased stillbirth, intra-uterine growth retardation and low birth weights in the foetus [14,11].

Maternal mortality due to severe malaria is twice in infected pregnant women than among non-pregnant patients [15]. In Nigeria 11% of maternal deaths are attributed to malaria [16]. Researchers have reported high prevalence rates of malaria in pregnancy in different parts of Nigeria, ranging from 19.7% to 72.0% [17-20]. Considering the effects of malaria among pregnant women who are at high risk of the infection, it became imperative for an assessment of the prevalence of malaria and anaemia among pregnant women living in Kogi, North-central Nigeria.

MATERIALS AND METHOD

Study subjects

A total of 100 pregnant women attending the ante-natal clinic Kogi State Specialist hospital Lokoja during the period of June - August were recruited after their consent had been sought. Ethical clearance was also obtained from the hospital used.

Laboratory methods

Venipuncture was done to collect blood samples for malaria diagnosis by microscopy and for haemoglobin estimation. Thick and thin blood films were immediately prepared on clean slides and labelled accordingly. The thin films were fixed with methanol for 1 -2 sec. All blood films were then stained with 3% Giemsa stain solution of pH 7.0 for 30 min. A definitive diagnosis of malaria was made when a reddish chromatin dot with a purple or blue cytoplasm of the parasites are seen together.

Haemoglobin was estimated using Haemiglobincyanide method. Haemoglobin level of >11g/dl was considered normal while low anaemia was 11 -9g/dl, moderated anaemia 8.9 -7g/dl and severe anaemia <7g/dl [13].

Data collection and analysis

Questionnaires were administered requiring information on age, marital status, parity and trimester. Data were analysed using the Statistical Package for Social Science (SPSS) software, version 18.0. Basic statistical analyses consisted of summaries of patients' demographic characteristics. Test of associations was done using chi-square. Statistical significance was set at P value <0.05.

RESULTS

Of the 100 pregnant women who participated in the study, 68 (68%) were multigravidae while those in the first trimester of pregnancy were 42 (42%). The characteristics of the participants are shown in table 1.

Positive malaria slides were recorded in 30 pregnant women thus giving a malaria prevalence rate of 30%. The age group 19 -23 years recorded the highest prevalence rate of 68.0% (Table 2).

Table 3 shows the distribution of malaria parasite according

parity, stage of pregnancy and educational status. Malarial infestation was higher in primigravidae and majority of the patients were in the third trimester of pregnancy. Regarding educational status of the patients, it was observed that educated pregnant women had the least prevalence rate of 22.5%.

Anaemia was observed in 53 of the 100 pregnant women examined giving an overall prevalence of 53%. Out of the 30 infected pregnant women, 21 (70%) were anaemic (Table 4). The association between the proportion of those infected and haemoglobin level was significant ($\chi^2 = 7.457$; $df = 2$; $P = 0.024$).

Table 1: Patient characteristics

Number of Patients	100
Age group	
19 – 23	25 (25%)
24 – 28	49 (49%)
29 – 33	19 (19%)
34 – 39	07 (07%)
Gravidity	
Primigravidae	32 (32%)
Multigravidae	68 (68%)
Trimester	
First	42 (42%)
Second	36 (36%)
Third	22 (22%)

Table 2: Prevalence of malaria parasite in pregnant women according to age

Age group (years)	Number examined	Number infected	% Prevalence
19 – 23	25	17	68.0
24 – 28	49	10	20.4
29 – 33	20	2	10.0
34 – 39	6	1	16.7
Total	100	30	30.0

Table 3: Prevalence of malaria by gravidity, stage of pregnancy and educational status

	Number examined	Number infected	% Prevalence
Gravidity			
Primigravidae	32	15	46.9
Multigravidae	68	15	22.1
Trimester			
First	42	12	28.6
Second	36	10	27.8
Third	22	8	36.4
Educational status			
Educated	49	11	22.5
Semi-educated	51	19	37.3

Table 4: Prevalence of anaemia in pregnant women examined

	Number examined	Number anaemic (%)
Infected	30	21 (70.0)
Un-infected	70	32 (45.7)
Total	100	53 (53.0)

DISCUSSION

Until now, the reports of the prevalence of malaria in pregnancy were variable and high where prevalence rates have been reported to be between 57.5% and 97.2% [13,19,21]. However, this study revealed a malaria prevalence of 30.0% in pregnant woman living in Lokoja, Kogi State which was comparable to the 26.75% reported in Malawi and 23% reported in Mozambique [22,12]. The observed differences in the reported prevalence rates could be attributed to the experience and skill of the laboratory personnel involved in blood film preparation, staining and reading of the slides. Strict adherence to procedures for slide preparation and staining ensured the production of clear, well stained slides, thereby reducing errors due to artefacts [23].

In this study, the highest malaria prevalence was seen in pregnant women <24 years of age (68.0%). This finding is consistent with earlier reports [13,24] where age group <24 years was reported to be at high risk. Our results also showed that malaria prevalence decreased with increase in age. This supports the existing knowledge that high prevalence at lower ages and low prevalence at higher ages is due to the existence of natural immunity to infectious disease including malaria [13] which pregnant women acquire as age increases. This study however, show an increased malaria prevalence in age group >34 years. Marielle *et al.* [25] reported a high prevalence of malaria in pregnant women in Gabon within a similar age group (36 - 39 years).

In a study conducted in Osogbo, Southwest Nigeria, educated pregnant women were observed to show a low prevalence of malaria parasite infection [19] which correlates with our study as well. Educated pregnant women are likely more enlightened on the dangers posed by malaria during pregnancy and as such could implement strategies in infection control and prevention.

Primigravidae have been reported to be at a greater risk of malaria in pregnancy because they lack the specific immunity to placental malaria which is acquired from exposure to malaria parasites during pregnancy [26,27]. Our current results showed that primigravidae (49%) were more often infected than women of multigravidae. This is in accordance with report of Marielle *et al.* [25] in pregnant women in Gabon.

Women in their third trimester of pregnancy had the highest malaria prevalence which is in line with some other studies, although several studies report the second and early third trimesters as the time of peak prevalence [28,10]. The risk of low birth weight is associated with extant of anaemia which usually develops during the second trimester of pregnancy [29,15]. Our study revealed that 53% of the pregnant women who participated in the study and 70% of those positive for malaria were anaemic. This study agrees with the mean percentage for Africa put at 61%. It also agreed with those of Van Den Broek *et al.* [30] in Southern Malawi and Bouyou Akotet *et al.* [13] in Gabon.

CONCLUSION

Malaria has adverse effects on pregnancy outcome increasing the risk of spontaneous abortion in the mother, stillbirths, premature delivery and low birth weight in the foetus. Therefore enlightenment campaigns about the dangers of malaria during pregnancy should be intensified and more efforts be made towards preventive measures among expectant mothers who are at high risk of the disease.

REFERENCES

1. Komolafe JO, Kuti OO and Egbewale BE. Socio-demographic characteristics of anaemia gravidarum at booking; a preliminary study at Ilesha, Western Nigeria. *Nigeria Journal of Medicine*. 2005;14(2):151-154.
2. World Health Organization. *World Malaria Report 2008*. World Health Organization; Switzerland, 2008.p. 99-101.
3. Sutherland CJ, Tanomsing N and Nolder D. 'Two non-recombining sympatric forms of the human malaria parasite *Plasmodium ovale* occur globally'. *J. Infect. Dis.* 2010;201(10):1544-1550.
4. Greenwood BM. The epidemiology of malaria. *Ann. Trop. Med. Parasitol* 1997;(91):763-769.
5. Bulter D. Time to put malaria control on the global agenda. *Nature* 1997;(386):535-541.
6. World Health Organization. *World malaria report*. Geneva, World Health Organization. 2005.
7. World Health Organization. *Implementation of the Global malaria control strategy*. Report of a WHO study group. 1993: General: ISBN 9241208392.
8. Brabin BJ. Failure of chloroquine prophylaxis for *falciparum* malaria in pregnant women in Madang, Papua New Guinea. *Ann. Trop. Med. Parasitol* 1990;46: 176-200.
9. Okoko BJ, Enwere G and Ota MOC. The epidemiology and consequences of maternal malaria: A review of immunological basis. *Acta Tropica* 2003;7:193-205.
10. Menendez C. Malaria during pregnancy: A priority area of malaria research and control. *Review of Parasitology today* 1995;5: 178-183.
11. Steketee RW, Nahlen BL, Parise ME and Menendez C. The burden of malaria in pregnancy in malaria endemic areas. *American Journal of Tropical Medicine and Hygiene* 2001;64 (supplementary): 28-35.
12. Sauté F, Menendez C, Mayor A, Aponte J, Gomez Olive X, Dgedge M *et al.* Malaria in pregnancy in rural Mozambique: The role of parity in submicroscopic and multiple *Plasmodium falciparum* infection. *Tropical Medicine and International Health* 2002;7: 19-28.

13. Bouyou Akotet MK, Ionete Collard DE, Mabika Manfoumbi M, Kendjo E, Matsiegui, PB, Mavoungou E *et al.* Prevalence of *Plasmodium falciparum* in pregnant women in Gabon. *Malar. J* 2003;2: 18.
14. Kasumba IN, Nalunkuma AJ, and Mujuzi G. Low birth weight associated with maternal anaemia and *Plasmodium falciparum* infection during pregnancy in a peri-urban/urban area of low endemicity in Uganda. *Annals of Tropical Medicine and Parasitology* 2000;94: 7-13.
15. Brain BJ. An analysis of malaria in pregnancy in Africa. *Bull. World Health Org.* 1998;61: 1005-1016.
16. Federal Ministry of Health. Malaria situation analysis document. Federal Ministry of Health, Nigeria. 2000.p. 14.
17. Okwa OO. The status of malaria among pregnant women: a study in Lagos, Nigeria. *Afr J Reprod Health.* 2003;7:77-83.
18. Kagu MB, Kawuwa MB, Gadzama GB. Anaemia in pregnancy: a cross-sectional study of pregnant women in a sahelian tertiary hospital in Northeastern Nigeria. *J Obstet. Gynecol.* 2007;27: 676-679.
19. Adefioye OA, Adeyeba OA, Hassan WO, Oyeniran OA. Prevalence of malaria parasite infection among pregnant women in Osogbo, southwest, Nigeria. *American-Eurasian J Sci Res.* 2007;2: 43-45.
20. Uneke CJ. Assessment of malaria in pregnancy using rapid diagnostic tests and its association with HIV infection and haematologic parameters in south-eastern Nigeria. *Haematologia.* 2008;93: 143-144.
21. Meintra N, Joshi M and Hazra M. Maternal manifestations of malaria in pregnancy: a review. *Indian Journal of Maternal and Child Health.* 1993;4(4): 98-101.
22. Rogerson SJ, Mkundika P and Kanjala, MK. Diagnosis of *Plasmodium falciparum* malaria at delivery: comparison of blood film preparation methods and of blood films with histology. *Journal of Clinical Microbiology.* 2003;41: 1370-1374.
23. World Health Organization. Basic laboratory methods in medical parasitology. Geneva, Switzerland. World Health Organization. 1991.p. 114.
24. Tako EA, Zhou A, Lohoue J, Leke R, Taylor DW, Leke RFG. Risk factor for placental malaria and its effect on pregnancy outcome in Yaounde, Cameroon. *Am J Trop Med Hyg.* 2005;72: 236-242.
25. Marielle KBA, Denisa EIC, Modeste MM, Eric K, Pierre BM, Elie M, *et al.* Prevalence of *Plasmodium falciparum* infection in pregnant women in Gabon. *Malar J.* 2003;2: 1-17.
26. Staalsoe T, Shulman CE, Buhner JN, Kawuondo K, Marsh K, Hviid I. Variant surface antigen-specific IgG and production against clinical consequences of pregnancy-associated *Plasmodium falciparum* malaria. *Lancet.* 2004;363: 283-289.
27. Elliott SR, Brennan AK, Beeson JG, Tadesse E, Molyneux ME, Brown GV, Rogerson SJ. Placental malaria induces variant-specific antibodies of the cytophilic subtypes immunoglobulin G1 (IgG1) and IgG3 that correlate with adhesion inhibitory activity. *Infect Immun.* 2005;73: 5903-5907.
28. Nosten F, ter Kuile FO, Maelankirri L, Decludt B, White NJ. Malaria during pregnancy in an area of unstable endemicity. *Trans. Res. Soc. Trop. Med. Hyg.* 1991;85: 424-429.
29. Burrows RF. Haematological problems in pregnancy. *Current opinion in Obstetrics and Gynecology.* 2003;15: 85-90.
30. Van Den Broek NR, Rogerson SJ, Mhango CG, Kambala B, White SA, and Molyneux ME. Anaemia in pregnancy in Southern Malawi: Prevalence and risk factors. *British Journal of Obstetrics and Gynecology.* 2000;107: 445-451.