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Malaria and anaemia in pregnancy in Enugu, South East Nigeria

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Summary

Malaria and anaemia contribute tremendously to maternal and prenatal morbidity and mortality. This study was carried out to document the magnitude of the problem in pregnancy with a view to identifying areas of intervention. The subjects were 108 consecutive pregnant women aged 18 to 44 years recruited from the antenatal clinics. 23 (21.3%) had malaria, 35 (32.4%) had anaemia while 20 (18.5%) had both malaria and anaemia. The highest incidence of malaria occurred in the second trimester, while anaemia was most prevalent in the third trimester (62.86%) and among primigravidae (37.14%). All the cases of malaria were due to *plasmodium falciparum*. Six out of the 20 women with both anemia and malaria were admitted and treated. Two low birth weight babies were delivered among the malaria and anaemia group. The incidence rates of malaria and anaemia were 215 and 327 per 1000 pregnant women respectively while the incidence rate of anaemia due to malaria was 571 per 1000 infected pregnant women. There is a need for a more effective intervention to reduce the incidence of both malaria and anaemia in pregnancy.

Keyword: *Malaria, pregnancy and anaemia.*

Résumé

La malaria et l'anémie contribuent grandement à la morbidité et la mortalité maternelle et prénatale. Cette étude était faite pour documenter le magnitude du problème durant la grossesse et identifier les lieux d'interventions. Cent huit femmes grosse consécutivement recrutés en clinique prénatale étaient ages de 18-44 ans. 23 (21.3%) avaient la malaria, 35 (72.4%) l'anémie et 20 (18.5%) le combine malaria et anémie. L'incidence le plus élevée du malaria était enregistré au deuxième semestre, alors que l'anémie était plus prévalant au troisième trimestre (62.86%), parmi lesquelles 37.4% des primigravide. Tous les cas de la malaria étaient causés par le *plasmodium falciparum*. Six sur 20 femmes ayant le combinée malaria et anémie étaient admise à l'hôpital et traitées. Deux nouveaux-nés de poids baisse étaient accouchés dans le groupes des femmes ayant le combiné malaria et anémie. L'incidence du malaria et l'anémie étaient de 215 et 327 par 1000 cas respectivement, alors que l'incidence de l'anémie du par la malaria était de 571 par 1000 femmes enceintes infectées. Le besoin d'une intervention effective est nécessaire pour réduire l'incidence de la malaria et l'anémie parmi les femmes enceintes.

need for a more effective intervention to reduce the incidence of both malaria and anaemia in pregnancy.

Introduction

Pregnancy is a time when complex physiological changes and adaptation occur in order to accommodate the needs of a rapidly growing baby. This adaptation includes a certain degree of immune suppression which leads to an increased susceptibility to a number of pathologies in which immunoregulation plays an important role.

This immune depression that occurs in pregnancy is both specific (to prevent rejection of the fetus) and non-specific which leads to an increased risk of infection [1,2]. Parasitic infections, especially malaria, is frequent and severity increased during pregnancy. It has been documented that pregnant women are twice as likely to be susceptible to malaria and that this susceptibility to malaria extends into the early post partum period [3,4].

Several studies have documented the deleterious effects of malaria and anaemia in pregnancy and childbirth [5-7]. These include intrauterine growth retardation, preterm labour, intrauterine death, and low birth weight among others. Menendez [8] had estimated that 1 billion people are exposed to the risk of malaria when pregnant. The risk of malaria and anaemia is more in primigravidae especially teenagers reducing progressively with increasing parity [9,10] and the anaemia commonly develops between 16 and 28 weeks of gestation [11].

Against this background, all pregnant women in this study were given 25mg of pyrimethamine weekly from booking to delivery. This study was conducted to document the magnitude of the problem of malaria and anaemia in pregnancy with a view to seeking preventive strategies.

Materials and methods

This study is a cross-sectional prospective study. The ethical committee of the hospital gave their approval. The subjects for the study were consecutive pregnant women attending the antenatal clinics of the University of Nigeria Teaching Hospital, Enugu. Each patient was interviewed to obtain biodata and other necessary information. At the interview, consent was obtained.

A general examination was carried out on each patient. Specific examination was also carried out to determine symphysiofundal height, lie, presentation, position of the baby as well as the presence and regularity of the foetal heart rate.

Using vacuum venoject syringe and applying standard procedure, 3ml of blood was drawn from each patient into a properly labelled EDTA bottle. The blood samples were used to make thick and thin films. The thick films were stained with freshly prepared 10% Giemsa for ten minutes and washed in buffered water (PH 7.2) for three minutes. The thin films were flooded with Leishman stain. After two minutes, the stain was diluted with an equal volume of water, stained further for seven minutes, then washed in a stream of buffer (PH 7.3) until they acquired salmon pink tinge. Each slide was examined using oil immersion ($\times 100$) objective lens. Haemoglobin estimation was also carried out using cyanmethaemoglobin method.

Results

One hundred and eight pregnant patients were studied. Table 1 shows the age distribution of the subjects. The peak age range was 27 to 32 years group accounting for 44.4% of the patients. The mean age distribution was 29.5 years with a standard deviation of 2.28. Table 2 shows that 23 (21.3%) patients had malaria while 35 (32.4%) had anaemia while 20 (18.5%) had both malaria and anaemia.

Table 1: Age distribution of pregnant women

Age Range (Years)	Number	Percentage
15-20	4	3.70
21-26	29	26.85
27-32	48	44.44
33-38	19	17.60
39-44	8	7.41
Total	108	100

Table 2: Distribution of malaria and anaemia among pregnant women

Parameters	Number of women	Percentage
Malaria only	23	21.3
Anaemia only	35	32.4
Both malaria and anaemia	20	18.5

The incidence of malaria and anaemia were highest in the primigravidae accounting for 47.8 and 37.1 percent respectively. The incidence of malaria decreased as parity increased (Table 3). All cases of malaria were due to *plasmodium falciparum*. Most cases of malaria and anaemia, 60.9 and 62.9 percent respectively, occurred in the 3rd trimester. Six of those with malaria and anaemia were admit-

ted and transfused. Two had intrauterine growth restriction.

Table 3: Distribution of malaria and anaemia in relation to parity

Parity	Malaria alone		Anaemia		Anaemia and malaria	
	No.	%	No.	%	No	%
0	11	47.8	13	37.1	9	45.0
1-4	11	47.8	18	51.4	10	50.0
5-7	1	4.3	4	11.4	1	5.0
Total	23	100	35	100	20	100

Discussion

Malaria and anaemia remain leading causes of mortality and morbidity among pregnant women in the tropics and the incidence remains high in many centres [5,13-15]. In Mozambique 15.5% of deaths in pregnant women were directly attributable to malaria [16].

The incidence of malaria and anaemia among pregnant women in our study was 21.3% and 32.4% respectively comparing closely with the high incidence of malaria in the tropics. It is also noteworthy that most patients with malaria had anaemia while more than 50% of those with anaemia were as a result of malaria infestation. A previous study in our centre showed malaria as the principal cause of anaemia especially in *primigravidae* and this developed between 16 and 28 weeks of gestation [10].

Prophylaxis for malaria in pregnancy is widespread in the tropics and is carried out routinely in our centre. This practice has been shown to significantly reduce the incidence of malaria and subsequently anaemia [17,18].

Our study shows that the highest incidence of malaria and anaemia is found in *primigravidae*. This is in keeping with findings from other studies [11,17,19] and this is usually severe in the teenage *primigravidae* [10]. Generalized immunosuppression of cell mediated immune responses which tend to be more marked in first pregnancies has been incriminated and is associated with high cortisol levels [2,20]. Most of the cases of malaria and anaemia were found in the third trimester contrary to results from an earlier study in this centre [10]. Another significant finding is that all the cases of malaria were due to *plasmodium falciparum*. This is in keeping with the situation in Africa. In other areas of the Tropics outside Africa such as Equatorial Guinea, *plasmodium vivax* play an important role.

It is important to highlight that focus is shifting to submicroscopic malaria which causes significant reduction in haemoglobin levels and intrauterine growth restriction [21,22]. In one study, whereas microscopic malaria rate was 32%, the submicroscopic rate as detected by poly-

merase chain reaction was 63% [22]. This underscores the need for antimalarial treatment at booking as is done in some centres.

We suggest that antimalarial treatment, sulfadoxine/pyrimethamine, be given at the beginning of each trimester. This will go a long way in reducing the incidence of clinical malaria, anaemia and intrauterine growth restriction.

In conclusion, the incidence of malaria and anaemia in pregnancy in our environment is still high especially in *primigravidae* and this contributes to the high maternal and perinatal morbidity and mortality. There is the need to define a more effective prophylaxis than currently applied. The issue of submicroscopic malaria needs also to be addressed to further improve the health of our women in pregnancy.

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References

1. Brabin B.J. Epidemiology of infection in pregnancy. *Reviews of infectious diseases* 1985; 7: 599-603.
2. Weinberg F.D. Pregnancy associated depression of cell mediated immunity Review of reflection's Diseases 1984; 6: 814-831.
3. Lindsay S, Ansell J., Selmán C *et al.* Effect of pregnancy on exposure to malaria mosquitoes. *Lancet* 2000; 355 (9219) 1972.
4. Diagne N, Rogier C., Sokhna C S *et al.* Increased susceptibility to malaria during the post partum period. *N Engl Journal Med.* 2000; 343 (9): 598-603.
5. Egwuyenga O.A., Ajayi J.A. and Duhlińska - Popova D.D. Transplacental passage of *Plasmodium falciparum* and seroevaluation of newborns in Northern Nigeria - South East Asian Journal Trop Med. Public Health 1997; 28 (4): 741-745.
6. Brabin B and Piper C. Anaemia and malaria attributable to low birthweight in two populations in Papua New Guinea. *Ann Human Biol* 1997; 24 (6): 547-555.
7. Verhoeff F.A., Brabin B.J., Van Buuren S. *et al.* An analysis of intrauterine growth retardation in rural Malawi. *Eur Journal Clin Nutr.* 2001; 55 (8) 682-689.
8. Menendez C. *et al.* Malaria Chemoprophylaxis. Infection of the placenta and birthweight in Gambian primigravidae. *Journal of Tropical medicine and hygiene* 1994; 97: 244-248.
9. Mnyika S.K., Mbaruku G *et al.* Randomized trials of alternative malaria chemoprophylaxis strategies among pregnant women in Kigoma, Tanzania: II Results from baseline studies. *East Afr. Med. Journal* 2000; 77 (2): 105-10.
10. Anidi A.I. Protean manifestations of malaria. *Orient Journal of Medicine* 1990; 2 (1): 24-29.
11. Massaive S.N., Urassa E.N., Nystrom L. and Lind Mark C. Effectiveness of Primary level antenatal care in decreasing anaemia at term in Tanzania. *Acta Obstet Gynaecol Scand.* 1999; 78 (7): 573-579.
12. Kilbride J., Baker T.G., Parapia L.A. *et al.* Anaemia during pregnancy as a risk factor for iron deficiency anaemia in infancy: a case control study in Jordan. *Int Journal of Epid* 1999; 28 (3): 461-8.
13. Thompson J. Anaemia in pregnant women in eastern Caprivi, Namibia. *S. Afr. Med. Journal* 1997; (11) 1544-1547.
14. Granja A.C., Machungo F., Gomes A. *et al.* Malaria related maternal mortality in urban Mozambique. *Ann Trop Med. Parasitol* 1998; 92 (3): 257-263.
15. Verhoeff F.H., Brabin B.J., Chumsuku L. *et al.* An evaluation of the effect of intermittent sulfadoxine-pyrimethamine treatment in pregnancy on parasite. Clearance and risk of low birthweight in rural Malaria. *Ann Trop Med. Parasitol* 1998; 92 (2): 141-150.
16. Salihu H. M., Nalk E.G., Tchuinguem G. *et al.* Weekly chloroquine prophylaxis and the effect on maternal haemoglobin status at delivery. *Trop - Med. Int. Health* 2002; 7 (1): 29-34.
17. Singh N., Shukla M.M. and Sharma V.P. Epidemiology of malaria in pregnancy in Central India. *Bull-world. Health Organ* 1999; 77 (7): 567-572.
18. Vteugels M.P.H. *et al.* Cortisol and loss of malaria immunity in human pregnancy. *Brit Journal of Obs. Gynae* 1987; 94: 758-764.
19. Saute F., Menendez C., Mayor A. *et al.* Malaria in pregnancy in rural Mozambique. The role of parity, submicroscopic and multiple *Plasmodium falciparum* infections. *Trop. Med. Int. Health* 2002; 7 (1): 19-28.
20. Mockenhaupt F.P., Rong B., Till H. *et al.* Submicroscopic *Plasmodium falciparum* infections in pregnancy in Ghana. *Trop. Med. Int. Health* 2000; 5 (3): 167-173.

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