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Malaria prevalence and risk factors associated with anemia among pregnant women attending ante-natal clinic at a tertiary health care Centre in Owerri, Southeastern Nigeria

Raymond Ikechukwu Nnadozie [1], Nicholas Chinedu Ewelike [2, *], Etienne Chukwumaeze Chinakwe [2], MacAnthony Nnanyereugo Echendu [2], Joseph Uchechukwu Ozor [3], Godfrey Ikechukwu Eberendu [4] and Samuel Okechukwu Njoku [5]

[1] *Department of Biology, Federal University of Technology, P.M.B 1526, Owerri, Nigeria.*
[2] *Department of Microbiology, Federal University of Technology, P.M.B 1526, Owerri, Nigeria.*
[3] *Department of Animal and Environmental Biology, Imo State University, P.M.B 2000, Owerri, Imo State, Nigeria.*
[4] *Department of Pediatrics, Imo State University Teaching Hospital, P. M.B 08, Orlu, Imo State, Nigeria.*
[5] *Department of Microbiology, Madonna University, Imo State, Nigeria.*

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Abstract

Malaria and anemia are significant public health threats to pregnant women in Nigeria. This study assesses malaria prevalence and risk factors associated with anemia among randomly selected 150 pregnant women attending antenatal clinic at the Federal Medical Center, Owerri, Imo State, Nigeria, over a four-month period. Well structured, interviewer administered questionnaire was used to collect data on socio-demographic characteristics. Hospital records provided information on their hematological and parasitological parameters including history of anemia, malaria cases, hookworm infection and nutritional deficiency tests for iron and vitamins. The data were collected and subjected to statistical analysis. Classification of anemia was based on World Health Organization criteria on hemoglobin concentration. The result showed that the overall prevalence of malaria among the women was 78 (52.0%). Out of this value, majority of the women, 61(40.7%) were mildly anemic, while 15(10.0%) were moderately anemic. Only 2 (1.3%) of the women were severely anemic. The risk factors associated with the anemia among the women included iron deficiency 27(34.6%), malaria 23(29.5%), foliate deficiency 13(16.7%), vitamin B_{12} deficiency 10 (12.8%) and hookworm infection 5(6.4%). The outcome of this study suggests the need for the concerned antenatal clinics to step up screening program on Hb-levels, iron, folic acid and vitamin B_{12} deficiencies tests for all pregnant women. Adopting iron and vitamin supplements in diet for pregnant women, use of insecticide treated nets, elimination of breeding sites for mosquitoes and proper waste disposal also are strongly advocated.

Keywords: Ante-natal: Pregnant women: Malaria prevalence: Anemia: Risk factors

1. Introduction

Malaria is one of the killer diseases affecting millions of people globally. Approximately 90 % of the malaria deaths occur in the Sub-Saharan Africa and this continued to rise due to increased insecticide resistance, environmental change and anti-malaria drug resistance [1]. Nigeria is one of the countries where malaria is endemic**.** Pregnant women constitute the main adult risk group for 80% of deaths due to malaria in Africa. Malaria contributes very significantly to maternal and foetal mortality [2].

* Corresponding author: Nicholas Chinedu Ewelike
Department of Microbiology, Federal University of Technology, P.M.B 1526, Owerri, Nigeria.

One of the common hematologic conditions associated with malaria is anemia. It is marked by an abnormal reduction in the number of red blood cells and constitutes a global health threat especially in Sub-Saharan Africa including Nigeria [3]. Women often become anemic during pregnancy because the demand for iron, folic acid and vitamins increase due to physiological burden of pregnancy and the inability to meet the required level for these substances either as a result of deficiencies or infection gives rise to anemia [1]. Anemia has significant impact on the health of the foetus as well as that of the mother during pregnancy. Foetuses are at the risk of preterm deliveries, low birth weights, morbidities and prenatal mortality due to insufficient oxygen supply to placenta [4- 6].

Despite the efforts made by health workers to reduce the incidence of maternal and child mortality from malaria related anemia, the scourge is still on the rise. Although some studies have been carried out on malaria and anemia in pregnancy but not much has been done and documented on malaria prevalence with facts associated with anemia among pregnant women in Owerri, Southeastern Nigeria. The aim of this present study is to assess the malaria prevalence and risk factors associated with anemia among pregnant women attending antenatal clinic at a tertiary health care Center in Owerri, Imo State, Nigeria.

2. Material and methods

The study was carried out at the Federal Medical Center Owerri, Imo State, Nigeria between the months of August and November. One hundred and fifty (150) pregnant women were selected for the study. Only pregnant women who came for antenatal care within the period and had their antenatal care records were included in the study.

2.1. Sampling method

Systematic random sampling technique was used to select the participants. They were selected on consultation at the pediatric out patient's wards and antenatal clinic. The women selected were notified for interview on their visiting days.

2.2. Ethical consideration

Informed consent was obtained from the management and records department of the hospital before embarking on the project. The purpose of the study was explained to the selected women and their approval gotten before they were interviewed.

2.3. Data collection

2.3.1. Use of questionnaire

Well structured, interviewer-administered questionnaires were used to source data on the socio-demographic characteristics of the women such as their age, marital status, educational level, ethnicity, religion, occupation, socio-economic status, place of residence, trimesters (stages of pregnancy), parity (number of children) and gravidity (number of pregnancies) etc. The questionnaires were distributed to the women with the help of nurses and other health workers after interpreting the contents for them. Correctly filled questionnaires were retrieved from the women for analysis.

2.3.2. Use of hospital records

Hematological and parasitological data of the women were obtained from the hospital records. The antenatal record files or registers of the women were received from the records department for review. Data of all the participating women booked for antenatal care and had cases of malaria and anemia were obtained. The World Health Organization (WHO) criteria was used to ascertain anemia among the pregnant women by classifying and analyzing their hemoglobin concentrations in the records. Their malaria status, hookworm infection and nutritional deficiency test for iron and vitamins in the records also were reviewed and collected for analysis.

2.4. Data analysis

All the accumulated data were subjected to statistical analysis using Micro-software of Statistical Package for Social Science (SPSS version 16.0). Analysis was done using simple descriptive statistic of tables, frequencies and percentages. Values were compared with chi-square test and statistical significance was only considered at $p < 0.05$.

3. Results and discussion

3.1. Prevalence of malaria among the pregnant women

Table 1 shows the prevalence of malaria among the women by age group. The age group, 18 – 22 years had the highest (20.0%) prevalence of malaria among the women, followed by the age group, 23-27 years (19.3%). The prevalence rate was lowest (7.1%) among the age group, 48-52 years. The overall prevalence of malaria among the women was 15.3%. This observation is in line with the reports of previous researchers [7]. Table 2 shows that the prevalence of malaria among the women was highest (17.6%) in the second trimester followed by women in their first trimester. Those in the third trimester recorded the least prevalence (11.5%). The highest prevalence of malaria recorded in the second trimester is in consonance with the report of Marielle *et al* [8] on plasmodium infection in pregnant women in Gabon. The cause of high prevalence of malaria in the second trimester might be due to general impaired immunity plus a diminution of acquired immunity to malaria in endemic areas [9, 10]. In table 3, the highest prevalence (22.2%) of malaria was recorded among the primigravidae while the multiparous women (multigravidae) recorded the least prevalence (13.8%). Anti-adhesion antibody against Chondroitin Sulfate A binding parasites are associated with protection from maternal malaria, but these antibodies develop only over successive pregnancies accounting for the susceptibility of primigravidae to infection [11]. Indeed, women in the first and second pregnancies are the most affected with both gravidity and premonition influencing susceptibility to malaria [12]. As with peripheral parasitemia, placental infection with plasmodium is also most frequent and heaviest in primigravidae [8].

Table 1 Prevalence of malaria in relation to age among pregnant women attending antenatal Clinic at a tertiary health care Center in Owerri.

Age group	Frequency	Number of women positive for malaria	Percentage (%)
18-22	30	6	20.0
23-27	27	5	18.5
28-32	24	4	16.7
33-37	19	3	15.8
38-42	18	2	11.1
43-47	18	2	11.1
48-52	14	1	7.1
Total	150	23	15.3

Table 2 Prevalence of malaria in relation to trimester of pregnancy among women attending antenatal clinic at a tertiary health care Center in Owerri.

Trimester	Frequency	Number of women positive for malaria	Percentage
1st	50	7	14.4
2nd	74	13	17.6
3rd	26	3	11.5
Total	150	23	15.3

The socio-demographic characteristics presented in Table 4 revealed that most of the respondents fall within the ages of 18-27 which corresponds with the active reproductive age group of women [13]. The majority (88.0%) of them were married which is in line with 87.0% observed by Musiban *et al* [14]. Most of the respondents, 96.7% and 92.0% were Christians and Igbo respectively. This was so as the study was carried out in Southeastern Nigeria and Imo State in particular which is predominantly the heartland of the Igbos and Christendom.

Table 3 Prevalence of malaria in relation to gravidity (number of pregnancies) among pregnant women attending antenatal clinic at a tertiary health care in Owerri

Gravidity	Frequency	Number of women infected with malaria	Percentage
Primigravidae	18	4	22.2
Secundigravidae	16	3	18.8
Multigravidae	116	16	13.8
Total	150	23	15.3

Table 4 Socio-demographic characteristics of pregnant women attending antenatal clinic in a tertiary health Center in Owerri

Variables	Frequency	Response (n=150) percentage %
Age group (yrs.)		
18-22	30	20.0
23-27	27	18.0
28-32	24	16.0
33-37	19	12.7
38-42	18	12.0
43-47	14	9.3
48-52	14	9.3
Marital Status		
Unmarried	5	3.3
Divorced	132	88.0
Widowed	6	4.7
Religion		
Christianity	145	96.0
Muslim	3	2.0
Others	2	1.3
Level of education		
Primary	99	66.0
Secondary	31	20.7
Tertiary	18	12.0
None	2	1.3
Place of residence		
Rural	39	26.0
Urban	111	74.7
Occupational group		
Farmer	100	66.7

Trader	17	11.3
Civil servant	28	18.7
House wife	4	2.7
Others	1	0.7
Socio-economic status		
Low	86	57.3
Middle	47	31.3
High	17	11.3
Trimesters		
1st	50	33.3
2nd	74	49.3
3rd	26	17.3
Parity (number of children)		
1-3	35	32.3
4-6	80	53.3
7-9	27	18.0
10-above	8	5.3
Gravidity (number of pregnancies)		
Primigravidae	18	12.0
Secundigravidae	16	10.7
Multigravidae	116	77.3
Ethnicity	138	92.0
Igbo	9	6.0
Hausa		
Yoruba	2	1.3
Others	1	0.7

Table 5 Hemoglobin concentration of pregnant women attending antenatal clinic at a tertiary health care Center in Owerri

Haemoglobin (Hb) conc. (g/dl)	No. of pregnant women	Health condition	Percentage
Less than 7	2	Severely anaemic	1.3
7- 9.7	51	Mildly anaemic	40.7
10 – 10.9	15	Moderately anaemic	10.0
11 – above	72	Normal	48.0

Table 5 shows that 61(40.7%) of the pregnant women were mildly anemic, 15(10.0%) were moderately anemic, 2(1.3%) were severely anemic while 72(48.0%) of them were non-anemic. The occurrence of anemia among pregnant women as observed in this study also agrees with the reports of previous researchers [15-18] as documented in scientific literature. The risk factors associated with prevalence of anemia among pregnant women are shown in Table

6. The women were disposed to anemia probably because they were affected by malaria (29.5%), hookworm (6.4%), iron deficiency (34.6%), folate deficiency (16.7%), and vitamin B_{12} deficiency (12.8%).

Table 6 Risk factors associated with prevalence of anemia among pregnant women attending antenatal clinic in a health care Center in Owerri

Risk factor	Number of predisposed women	Number of anaemic women	Percentage (%)
Malaria	23	23	29.5
Hookworm infection	5	5	6.4
Iron deficiency	27	27	34.6
Folate deficiency	13	13	16.7
Vitamin B_{12} deficiency	10	10	12.8

4. Conclusion

The prevalence of malaria among pregnant women in this study was relatively low but statistically significant ($p < 0.05$). Malaria still needs to be given adequate attention in the study area because of its negative impacts on pregnant women and their unborn children. Moreover, the outcome of this study suggests the need for the concerned antenatal clinics to step-up screening program on Hb-levels, iron, folic and vitamin B_{12} deficiencies tests for all pregnant women. Adopting iron and vitamin supplements in diet for pregnant women, use of insecticide treated bed nets, elimination of mosquitoes' breeding sites and proper waste disposal are also strongly recommended.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that no competing interest exists.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] World Health Organization. Guideline for the treatment of malaria. 2nd Edn. Geneva, Switzerland, WHO. 2010.

[2] Nosten F, McGroady R, Murabingwa T. Case management of malaria in pregnancy. Lancet Infect. Dis. 2007; 7(2): 118-125.

[3] Idowu OA, Mafiaha CF, Dapo S. Anemia in pregnancy: a survey of pregnant women in Abeokuta, Nigeria. African Health Sciences. 2006; 5(4): 295-299.

[4] Janz TA, Johnsons RL, Rubbensterin SD. Anemia in emergency department: evaluation and treatment. Medicine Practices. 2013; 159(11): 1-15.

[5] Haider BA, Olofin I, Wang M. Anemia, prenatal iron use and risk of adverse pregnancy outcomes, a systematic review and meta-analysis. BMJ Clinical Research. 2013; 346: f3443.

[6] Lamina MA, Sorunmu TO. Prevalence of anemia in pregnant women attending the antenatal clinic in a Nigerian university teaching hospital. The Nigerian Medical Practitioner. 2003; 44(2): 39-42.

[7] Yalewayker T, Daniel A, Sintayehu A, Setegn E, Ayenew A, Ayalew J Z. The prevalence of malaria among pregnant women in Ethiopia; a systematic review and Meta - analysis. Journal of Parasitology Research. 2019; 1-2: 1-9.

[8] Marielle KB, Denisa EI, Modeste M, Erik K, Elie M, Maryvonne K. Prevalence of plasmodium infection in pregnant women in Gabon. Malaria Journal. 2003; 2(1): 18.

[9] Desai M, Oter K, Nosten F, McGready R, Asamoa K, Brabin B, Newman RD. Epidemiology and burden of malaria in pregnancy. Lancet Infect. Dis. 2007; 7(2): 93-104.

[10] Brabin BH, Brabin LR, Sapau J, Alpers MP. A longitudinal study of splenomegaly in pregnancy in a malaria endemic area in Papua, New Guinea. Transactions of the Royal Society of Tropical medicine and Hygiene. 1988; 82(5): 677-681.

[11] Duff PE, Fried M. Malaria during pregnancy: parasites, antibodies and chondroitin sulphate A. Biochem Soc Trans. 1999; 27(4): 478-482

[12] Ogbusu FL, Nwoke BEB, Njoku AJ, Anosike JC, Uwaezoke JC. Prevalence of malaria among pregnant women in Owerri municipality, Imo state, Nigeria. African Journal of Applied Zoology and Environmental Biology. 2004; 6; 31-35.

[13] Enato EFO, Okhamafe AO, Okpere EE, Oseji FI. Prevalence of malaria during pregnancy and antimalarial intervention in an urban secondary health care facility in Southern Nigeria. Med. Princ Pract. 2007; 16: 240-243.

[14] Musiban AT, Evangeline AO, Oyedunni SA. Malaria prevention practices among pregnant women resident in two Nigerian army barracks, Ibadan, Southwestern Nigeria. Journal of Public Health and Epidemiology. 2017; 9(4): 92-98.

[15] Amadi ANO, Kamanu CI, Njoku CC, Aluka C. Study on the association between maternal malaria infection and anemia. Journal of Med. Invest Pract. 2000; 1: 23-25.

[16] Aluka C, Amadi AN, Kamanu CI, Feyiwabosi PA. Anemia in pregnancy in Abia State University Teaching Hospital, Aba. Journal of Med. Invest Pract. 2001; 2: 58-61.

[17] Chidi OE, Okechukwu BA, Robinson CO, Uchechi CS, Okechukwu SN, Odidika UJ. The prevalence of anemia in pregnancy at booking in Abakaliki, Nigeria. Tropical Journal of Obstetrics and Gynaecology. 2016; 33(3): 332-336.

[18] Owolabi MO, Olaolorun DA, Owolabi AO. Socio-demographic factors in anemia in pregnancy in Southwestern Nigeria. Clinical Journal of the South African Academy of Family practice. 2014; 54: 222-227.