

Short Report

Malaria among antenatal clients attending primary health care facilities in Kano state, Nigeria

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Abstract

Background: Malaria in pregnancy remains a major public health problem especially in sub-Saharan Africa. However, the prevalence of clinical and asymptomatic infection among antenatal client (ANC) attendees is largely unknown, especially at primary health care (PHC) level in northern Nigeria. This study assessed the prevalence of fever, malarial parasitemia and anemia among pregnant women attending PHC facilities in Kano, northern Nigeria.

Methods: A cross-sectional descriptive study was conducted among 360 ANCs attending PHC facilities in two Local Government Areas (LGAs) in Kano state. Data were collected using a pre-tested semi-structured interviewer administered questionnaire. Blood samples were also obtained for thin blood smear for malaria parasite using Giemsa staining technique. Hemoglobin was estimated from the Packed Cell Volume (PCV) determined using hematocrit.

Results: Age of the subjects ranged from 15 to 42 years with a mean \pm SD of 24.0 ± 6.0 . Up to 39.2% (n = 141) (95% Confidence Interval = 34.1–44.4%) of the subjects were found to have malarial parasitemia. Exactly 36.2% (n = 51) of those with parasitemia had fever (temperature ≥ 37.5 oC) while 63.8% (n = 90) of them were asymptomatic. Anemia, (hemoglobin of ≤ 11 g/dl) was found in 48.1% (n = 173) of the respondents. A higher proportion of primigravid and secondigravid clients (61% vs. 39%) and younger pregnant women (54.6% vs. 45.4%) had malarial parasitemia compared to multigravid and older women, respectively. Similarly, a significantly higher proportion (67.6%) of anemic ANC clients had malarial parasitemia. ($\chi^2 = 113.25$, df = 1, $P < 0.05$).

Conclusion: Malarial infection is common among the ANC clients attending PHC facilities in Kano state and the infection is commonly associated with anemia. Intermittent Preventive Treatment (IPT) should be provided especially among primigravid, secondigravid and younger mothers at PHC centres.

Keywords: Antenatal clients, malaria, primary health care facilities

Résumé

Arrière-plan : Le paludisme de grossesse reste un problème majeur de santé en particulier en Afrique subsaharienne. Cependant, la prévalence de l'infection clinique et asymptomatique parmi les participants prénatals client (ANC) est en grande partie inconnue, notamment au niveau des soins de santé primaires (HCP) dans le Nord du Nigéria. Cette étude a évalué la prévalence de la peste, malarienne parasitemia et l'anémie chez les femmes enceintes qui fréquentent les installations HCP dans Kano, Nord du Nigéria.

Méthodes : Une étude descriptive transversale a été menée entre 360 ANCs qui fréquentent les installations HCP dans deux locaux zone d'administration (LGAs) dans l'Etat de Kano. Données ont été recueillies à l'aide d'un pré-testées semi-structuré questionnaire de l'interviewer administré. Les échantillons de sang ont été obtenus également pour les frottis sanguin mince pour le paludisme parasite à l'aide de Giemsa coloration technique. Hémoglobine a été estimée de la paniers cellules volume (PCV) déterminé en utilisant hématocrite.

Résultats : Âge des sujets allant de 15 à 42 ans, avec une moyenne \pm SD de $\pm 24,0 6.0$. Jusqu'à 39.2 % (n = 141) (95 % Témoignage a Confi intervalle = 34.1–44.4 %) des sujets ont eu parasitemia malarienne. Exactement 36.2 % (n = 51) de ceux avec parasitemia avaient la peste (température $\geq 37 .5$ oC) tandis que 63.8 % (n = 90) d'entre eux ont été asymptomatiques. Anémie, (hémoglobine de ≤ 11 g/dl) a été trouvé dans 48,1 % (n = 173) des répondants. Une proportion plus élevée de primigravid et secondigravid clients (61 % VS 39 %) et les jeunes femmes enceintes (54,6 %

VS 45,4 %) avaient parasitemia malarienne comparativement aux femmes multigravid et anciennes, respectivement. De même, une importante considérablement plus grande proportion (67,6 %) d'anémie Les clients ANC avaient parasitemia malarienne. ($t = 113.25$, $df = 1$, $P < 0,05$).

Conclusion : Malarienne infection est fréquent chez les clients ANC qui fréquentent les installations HCP dans l'Etat de Kano et la infection est généralement associée à l'anémie. Traitement préventif intermittent (IPT) doivent être fournis en particulier Parmi les primigravid, secondigravid et jeunes mères dans les centres HCP.

Mots-clés : Clients prénatals, le paludisme, les établissements de soins de santé primaires

Introduction

Malaria has a worldwide distribution, affecting people of all ages, with an enormous burden amounting to 300–500 million clinical cases per year, 80% of which occur in Africa.^[1] Globally, 10 new cases of malaria occur every second. Malaria is a major public health problem in the tropics where about 40% of the world population lives and is responsible for more than a million deaths each year, 90% of which occur in sub-Saharan Africa.^[2] At least 3000 people die from malaria every day. The disease also accounts for 40% of public health expenditure, 50% of out-patient visits and 30–50% of in-patient admissions in areas of high transmission.^[2-4]

Pregnant women are particularly vulnerable to malaria because pregnancy reduces a woman's relative immunity to malaria, thus making her more susceptible to the infection and increasing the risk of illness, severe anemia, and even death. This immunosuppression during pregnancy is more marked during the first 24 weeks of gestation than in the third trimester. Malaria is therefore common during pregnancy and many pregnant women may have two to three attacks during a particular pregnancy.^[5] Women are four times likely to get sick from malaria if they are pregnant and twice likely to die from the disease.^[5]

Malaria during pregnancy poses substantial risk to the mother, fetus, and the neonate. It increases the risk of spontaneous abortion, still birth, premature delivery and low birth weight.^[3,5] In Africa alone, 30 million women living in malaria endemic areas become pregnant each year. For these women, malaria is a threat both to themselves and to their babies with up to 200,000 new born deaths occurring each year as a result of malaria in pregnancy.^[5] In areas of Africa with stable malaria transmission, *Plasmodium falciparum* infection during pregnancy is estimated to cause as many as 10,000 maternal deaths each year.^[6]

In Nigeria, 70.5% of pregnant women interviewed reported symptoms and signs suggestive of malaria, while a country-based survey showed

that 23.7% of women in pregnancy were found to have malaria parasites in their blood.^[7] Researchers from different parts of the country have reported a varying prevalence of malaria among pregnant women ranging from 31% in Abuja^[8] to 60% in Lagos.^[9] Similarly, another study among antenatal clients (ANCs) from a peri urban community in Lagos reported a 44.2% prevalence of asymptomatic malaria at booking among primigravidae attending a primary health care (PHC) facility, which was significantly lower than 33.6% prevalence found among multigravidae.^[10] In both the groups, parasitemia was highest in the second trimester compared with the two other trimesters. In another study from Ile-Ife, southwestern Nigeria, a higher incidence of malarial parasitemia, anemia and fever episodes were reported among pregnant adolescent girls as compared to the nonpregnant girls.^[11] In another study from Abeokuta, researchers have found that at the time of the first antenatal visit, 35.6% of the women were already parasitemic, with a high frequency observed among primigravidae.^[12]

Most studies in northern Nigeria were conducted in tertiary or secondary health facilities where health care professionals are more vigilant in preventing and treating malaria among pregnant women. Same cannot be said of the PHC centers where majority of women attend for ANC. This study was therefore aimed at assessing the prevalence of malarial parasitemia, fever and anemia among ANCs in two PHC centers in Kano state. The outcome of the study may be used by health care providers and policy makers and programmers in preventing the burden of malaria among pregnant women.

Materials and Methods

The study was conducted in two Local Government Areas (LGAs) in Kano state, namely, Kumbotso (Metropolitan) and Dawakin Tofa (Rural), randomly selected from the 44 LGAs of the state. There are 55 PHC facilities in these LGAs (22 in Kumbotso and 33 in Dawakin Tofa) of which only 5 and 7 offer a full range of maternal health services, respectively. A cross-sectional descriptive study design was used in this study to collect data from 360

ANC clients attending the selected PHC facilities. The subjects were proportionately selected from the PHC facilities based on their average monthly ANC attendance. Ethical clearance was obtained from the Aminu Kano Teaching Hospital ethical committee and informed consent was obtained from the participants before recruitment into this study. The data were collected using a pre-tested semi-structured interviewer administered questionnaire. A 2 ml blood sample of the ANC clients was also taken after administering the questionnaire which was designed to elicit information on the personal characteristics of the clients, preventive use of antimalarial drugs, and clinical and laboratory findings such as presence of fever, axillary temperature, hemoglobin level and malaria parasite. The thin blood smear of the subjects was stained using Giemsa staining technique^[13] while the hemoglobin was estimated from the Packed Cell Volume (PCV) determined using hematocrit.^[14] Data were analyzed using Epi info version 6^[15] statistical software. Chi-square test was used to determine statistical association between categorical variables while student *t*-test was used to determine significant differences between means. A *P* value of 0.05 or less was considered significant.

Results

Sociodemographic characteristics

Three hundred and sixty consenting ANCs, 180 each from both LGAs were recruited for the study. Their age ranged from 15 to 42 years with a mean of 24.0 ± 6.0 . Out of these women, 333 (92.5%) were aged 15–34 years while the remaining 27 (7.5%) were above 35 years. Majority of the ANCs [197 (54.7%)] had only Qur'anic education while 101 (28.1%) had primary education. Similarly, 52 (14.4%) were educated up to secondary level, while 10 (2.8%) had no form of education at all. Majority of the ANCs [221 (61.4%)] were Hausa by tribe. Fulani formed 19.2% while Yoruba and Igbo constituted 7.8 and 5.3%, respectively. Most of them [315 (87.5%)] were Muslims. One hundred and twenty four (34.4%) of the respondents were gravidae 1 and 2 while 149 (41.4%) were gravidae 5 and above. Use of bed nets was uncommon among the ANCs as only 39 (10.8%) reported use of bed nets most of which 22 (56.4%) were not insecticide treated as shown in Table 1.

Prevalence of fever, malarial parasitemia and anemia

Up to 141 (39.2%) (95% Confidence Interval = 34.1–44.4%) of the ANCs were found to have malarial parasitemia. However, only 51 (36.2%) of those with parasitemia had fever (temperature $\geq 37.5^\circ\text{C}$) while 63.8% ($n = 90$) of them were

Table 1: Demographic characteristics of the ANCs ($n = 360$)

Characteristics	Frequency	
	No.	%
Age (years)		
15–19	87	24.2
20–24	97	26.9
25–29	91	25.3
30–34	58	16.1
35–39	16	4.4
40–44	11	3.1
Parity		
0–2	194	53.9
3–4	91	25.3
5 and above	75	20.8
Educational status		
Qur'anic	197	54.7
Primary	101	28.1
Secondary	52	14.4
None	10	2.8
Tribe		
Hausa	221	61.4
Fulani	69	19.2
Yoruba	28	7.8
Igbo	19	5.3
Others*	23	6.4
Gravidity		
≤ 2	124	34.4
3 and 4	87	24.2
≥ 5	149	41.4

*Kanuri, Igbira, Nupe, Igala

asymptomatic. The hemoglobin level of the ANCs ranged from 6.4 to 14.1 g/dl with a mean \pm standard deviation of 11.5 ± 2.0 . One hundred and seventy three (48.1%) (95% Confidence Interval = 42.8–53.4%) of the respondents were found to be anemic (hemoglobin of ≤ 11 g/dl) as shown in Table 2. Gravidity and age were found to be significantly associated with malarial parasitemia among the ANC clients. A higher proportion of primigravid and secundigravid clients (61% vs. 39%) ($\chi^2 = 72.35$, $df = 1$, $P < 0.05$) had malarial parasitemia than the multigravidae had. Similarly, younger pregnant women aged less than 18 years (54.6% vs. 45.4%) ($\chi^2 = 10.82$, $df = 1$, $P < 0.05$) had malarial parasitemia compared to older pregnant women as depicted in Tables 3 and 4. Similarly, a significant association was found between malarial parasitemia and anemia among the ANCs, with anemia found to be more common among those with parasitemia than those without (67.6% vs. 32.4%) [$\chi^2 = 113.25$, $df = 1$, $P < 0.05$] as shown in Table 5.

Discussion

Fever is one of the common complaints among pregnant women, especially in the first trimester. Eighty (22.2%) of the ANCs clients had fever at the time of the study. Although fever may not

Table 2: Prevalence of fever, malarial parasitemia and anemia among the ANC clients (n = 360)

Feature	Frequency (%)
Fever	
Present	80 (22.2)
Absent	280 (77.8)
Malarial parasitemia	
Present	141 (39.2)
Absent	219 (60.8)
Anemia	
Present	173 (48.1)
Absent	187 (51.9)

Table 3: Relationship between gravidity and malarial parasitemia

Gravidity	Malarial parasitemia		Total
	Present	Absent	
≤2	86	38	124
≥3	55	181	236
Total	141	219	360

$\chi^2 = 72.35$, $df = 1$, $P < 0.05$ (significant)

Table 4: Relationship between age and malarial parasitemia

Age (years)	Malarial parasitemia		Total
	Present	Absent	
<18	77	81	158
≥18	64	138	202
Total	141	219	360

$\chi^2 = 10.82$, $df = 1$, $P < 0.05$ (significant)

Table 5: Relationship between malarial parasitemia and anemia

Malarial parasitemia	Anemia		Total
	Present	Absent	
Present	117	24	141
Absent	56	163	219
Total	173	187	360

$\chi^2 = 113.25$, $df = 1$, $P < 0.05$ (significant)

necessarily imply malarial infection, this finding is far less than what was reported by a previous study in Nigeria, where as high as 70.5% of pregnant women interviewed reported signs and symptoms suggestive of malaria.^[7] Just as the presence of fever does not necessarily mean malarial infection, its absence equally does not exclude malaria, as many infected pregnant women are often symptomless.^[16]

The result of this study showed that malaria parasite was found in the blood samples of 39.2% of the ANCs. Among these parasitemic women, majority (63.8%) were asymptomatic. This finding was similar to what was reported by researchers from Malawi.^[17-19] The prevalence of asymptomatic malaria in the present study is, however, slightly higher than what was found by Akum and co-

workers in south-western Cameroon, where they found a prevalence of 32.8%.^[20] Although this finding is lower than those reported by other researchers from southern part of Nigeria,^[21-23] it is higher than that reported by Agboghoroma and colleagues (31.0%) from the National Hospital Abuja.^[24]

From the result of this study, it is evident that asymptomatic parasitemia is common among the ANCs. This finding is also in agreement with those reported by other researchers from different parts of Nigeria^[16,21,22,24,25] and other African countries.^[26-28] The result also revealed a significant association between malarial parasitemia and gravidity of the ANCs, implying that primigravidae and secundigravidae were more susceptible to malarial infection than those with higher gravidity, a finding similar to what was found by several researchers across the African continent.^[17-19,29] Several Nigerian studies have also reported higher malaria prevalence among primigravidae and secundigravidae.^[10,22,30] This association is attributed to the immunosuppression resulting from changes in pregnancy, which is most marked among primigravidae and secundigravidae, especially in the first 24 weeks of gestation.^[22]

Apart from the reduced immunity which is marked in the first pregnancy, the most important influence of the infection on maternal health is indirect, by causing anemia.^[27] Almost half of the study participants [48.1%] were anemic by World Health Organization (WHO) standards (hemoglobin level of 10 g/dl or less).^[27] A higher proportion of those with malarial parasitemia were anemic compared with those without malarial parasitemia. The association between malarial parasitemia and anemia was also reported by several other researchers in Nigeria,^[16,31-35] a finding similar to those of other researchers from other malaria endemic countries in the world.^[17,26-28,36,37] Findings by researchers suggest that immunologic factors play an important role in the etiology of anemia associated with malaria in pregnancy,^[31] and that the reduction in red blood cell life span persists for several weeks after the acute infection, as explained long ago by Fleming and colleagues,^[38] where they observed that parasitemia becomes denser and more frequent, hemolysis follows and leads to anemia, which is normochromic and normocytic accompanied by reticulocytosis. Hemolysis exceeds red cell destruction from rupture by malarial parasites. Other effects of malaria in pregnancy include abortion, premature labor, intrauterine fetal death, puerperal pyrexia and low birth weight, among others.

This study has some limitations. Only two LGAs

with established antenatal clinics were involved in this study. The attendance of ANCs is affected by educational, cultural, economic and service availability factors; hence our study participants were self-selected based on these factors. Therefore, our findings may not be generalized to all pregnant women in Kano state. In addition, we did not follow up these patients to examine the effects of malaria in pregnancy, on the prevalence of low birth weight and congenital malaria. These issues are areas for further study.

From this study, it can be concluded that malaria in pregnancy is still a common and serious public health problem in our environment, especially because a large proportion of the parasitemic pregnant women are asymptomatic. Malarial infection during pregnancy affects more primigravidae and secundigravidae as well as teenage mothers than those with higher gravidity and older. Anemia, also a serious problem among pregnant women, is more common among those with malarial parasitemia although the study did explore the possibility of confounders such as helminthiasis, nutritional status, etc. These research findings underscore the need for more concerted efforts at treating and preventing malaria among pregnant women, especially those in their first and second pregnancies. The intermittent preventive treatment of malaria during pregnancy, insecticide treated bed nets and effective case management are the main control strategies. Widespread implementation of effective programs remains a considerable challenge. Many women in developing countries, particularly those living in remote areas, have limited access to health care. Delivery of cost-effective malaria prevention to pregnant women will require strengthened antenatal care, integration of malaria control with other health programs targeted at pregnant women and increased community awareness, especially in hyperendemic areas such as this study area.

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