ORIGINAL ARTICLE

Knowledge and utilization of malaria preventive measures among pregnant women at a tertiary hospital in Nigeria's federal capital territory

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Abstract

Objective: To determine the knowledge and utilization of malaria preventive measures as well as barriers to the utilization of these measures by pregnant women.

Materials and Methods: The study was a prospective cross-sectional survey involving pregnant women at the booking clinic of the University of Abuja Teaching Hospital between May and August 2010. Close-ended pre-tested structured questionnaires were administered by interviewer method to 403 consecutive consenting women.

Results: The knowledge of malaria and its preventive measures in pregnancy was 71.5%. There was a statistically significant association between knowledge of malaria and educational status (X^2 = 16.053, *P* = 0.035). Intermittent preventive treatment was used by 15.9% of the respondents. Insecticide-treated net ownership was 42.6%; however, its use declined from 28.5% before pregnancy to 24.6% during pregnancy.

Conclusion: There is adequate knowledge about malaria and its preventive measures in pregnancy, but the utilization of these measures is poor. There is need for concerted efforts at addressing the barriers to utilization of these effective interventions.

Key words: Knowledge, malaria in pregnancy, Nigeria, prevention

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Introduction

Malaria infection during pregnancy is a major public health problem in tropical and subtropical regions throughout the world.[1] It poses substantial risks to the mother, her fetus and the neonate.[2] In Nigeria, malaria during pregnancy is responsible for 11% of maternal mortality.[3] The resultant impairment of fetal nutrition contributes to low birth weight, which is a leading cause of poor infant survival and development in Africa.[4-6]

The World Health Organization's (WHO) strategic framework for malaria prevention and control during pregnancy in areas of stable malaria transmission recommends three interventions: intermittent preventive treatment (IPT), insecticide-treated nets (ITN), and case management of malaria illness and anemia.[1,2,7]

The malaria preventive health behaviors among pregnant women as well as the knowledge about malaria and the treatment-seeking behaviors in the rural communities have been found to be generally poor across the six geo-political zones.[8,9] These were also noted by the National Malaria Control Programme annual report of 2006 as some of the major challenges in Roll Back Malaria implementation in Nigeria.[8] Furthermore, the symptoms of uncomplicated malaria are easily missed in pregnancy

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at the home and community level, and this leads to a lot of poor outcomes of pregnancy.[4-6,9]

This study is designed to determine the knowledge about malaria and its prevention, use of malaria preventive measures and barriers to the use of these measures among pregnant women in Nigeria's federal capital territory, which is an endemic zone for malaria transmission. With the Abuja target for 2005 having elapsed and attainment of the 2010 time set by the World Health Assembly in 2005 for 80% realization of coverage targets, a closer assessment of the factors that are pivotal to the realization of the targets of Roll Back Malaria is extremely important.

Materials and Methods

Study design

The study was a cross-sectional survey involving pregnant women presenting for booking at the antenatal clinic of University of Abuja Teaching Hospital, Gwagwalada, between the months of May and August 2010.

Study location

The study was conducted at the antenatal clinic of University of Abuja Teaching Hospital, Gwagwalada. The hospital is a 350-bed federal government-owned tertiary institution situated in Gwagwalada, a high population density area in Abuja, Nigeria's federal capital territory. It provides health care services to the inhabitants of Abuja and neighboring states, including Niger, Kaduna, Kogi and Nasarawa. Abuja is a holoendemic area for malaria.[10]

Study population

The study population was composed of pregnant women presenting at the booking clinic during the study period. It was a mixture of rural and urban dwellers.

Sample size determination

The sample size was calculated using the formula: $n = Z^2pq/d^2$ where,

n = minimum sample size, Z = standard normal deviation at 1.96

p = prevalence of malaria in pregnancy (48%, *i.e.*, national prevalence of malaria in pregnancy by federal ministry of health),[9] q = 1-p, d = precision at 0.05

Then,

$$n = \frac{1.96 \times 1.96 \times 0.48 \times 0.52}{0.05 \times 0.05} \times 100$$

n = 384

Thus, the minimum sample size for this study was 384. Also adding a 5% attrition or non-response rate, the minimum sample size of 403 was used.

Data collection method

A close-ended pre-tested structured questionnaire was administered consecutively to 403 consenting women by interviewer method at the booking clinics before the health talk by the medical staff. The questionnaire comprised four sections: Socio-demographic data, knowledge about malaria and preventive measures, use of IPT for malaria, and ownership and use of insecticide-treated bed nets.

Data analysis

Statistical analysis was done using SPSS for Windows version 15. Statistical significance was set at P value < 0.05.

Determination of knowledge on malaria and its preventive measures

The respondent's knowledge on malaria and its preventive measures were calculated by dividing the number of correct answers by the total number of options in the second section of the questionnaire, which contained questions that tested the knowledge of the participants on malaria in pregnancy and multiplying by 100 to convert the score to percentage.

$$\% \text{ knowledge score} = \frac{\text{Total number of correct responses}}{\text{Total number of available options (27)}} \times 100$$

The percentage knowledge scores were rated as follows:
Excellent Knowledge (A) = 70% and above
Good Knowledge (B) = 60-69%
Average Knowledge (C) = 50-59%
Fair Knowledge (D and E) = 40-49%
Poor Knowledge (F) = 39% and below

Results

During the study period, a total of 403 out of 447 who were counseled about the study consented and participated, a participation rate of 90.2%.

The mean age of the participants was 28.82 years (SD 4.74). A total of 194 women (48.1%) had completed tertiary education, 166 (41.2%) had secondary education, 34 (8.4%) had primary education, while 9 (2.2%) women did not have any form of education. A total of 144 (35.7%) women were primigravidae, while primipara, multipara and grand multipara accounted for 26.8%, 33.7% and 3.7% of the study population, respectively. The mean gestational age of women at the antenatal care booking clinic was 21.98 weeks (SD 6.83; Table 1).

A total of 373 (92.6%) clients correctly attributed the cause of malaria to mosquito bites while sixty-five (16.1%) clients wrongly noted the cause of malaria to be from drinking infected water. Erroneous beliefs such as witchcraft, working hard under the sun and eating palm oil were reported to be the cause of malaria by 13.6%, 7.2% and 2.7% of the clients, respectively.

Hot body (fever) and headache were the predominant symptoms mentioned, accounting for 79.2% and 65.5%, respectively. A total of 382 (94.8%) clients accepted that malaria was harmful in pregnancy while only 25 (5.2%) disagreed.

Most of the clients knew that malaria was a preventable disease (95.5%). The use of ITN was the most common malaria preventive measure known to the clients (74.9%). A total of 267 respondents (66.3%) agreed to keeping the environment tidy, while 214 (53.1%) acknowledged the use of drugs as a malaria preventive measure.

Three hundred and forty women (84.4%) were aware of IPT against malaria, while 63 (15.6%) were not.

The summary of the status of knowledge on malaria is shown in Table 2. Total 173 respondents (43.7%) had an excellent knowledge of malaria and its preventive measures in pregnancy, 52 (12.9%) had good knowledge, 60 (14.9%) had average knowledge, 56 (13.9%) had fair knowledge, while 59 (14.6%) had poor knowledge.

There was no statistically significant association between knowledge of malaria and parity ($X^2 = 6.072$, $P = 0.639$). However, there was a statistically significant association between knowledge of malaria and educational level ($X^2 = 16.053$, $P = 0.035$).

A total of 146 (56.4%) out of 259 non-primigravidae in this study used anti-malarial drugs in their last pregnancy toward preventing malaria in pregnancy. IPT with sulphadoxine-pyrimethamine was used by 65 (25.1%) women in this group.

The choice of medication used for malaria prevention by the clients in the index pregnancy is shown in Table 3. A total of 109 clients (27%) used malaria preventive drugs. IPT with sulphadoxine-pyrimethamine was used by 64 (15.9%) women, which is 58.7% of the total population of women who used malaria preventive drugs. Among the users of sulphadoxine-pyrimethamine, only 31.6% of these were by direct observed therapy. No statistically significant association was found when relationship between the utilization of malaria preventive drugs in index pregnancy was compared with the parity of the clients ($X^2 = 0.330$, $P = 0.848$). There was also no statistically significant association between knowledge of malaria and use of

Table 1: Socio-demographic characteristics of participants

	Number	%	Mean
Age range (years)			
16-20	14	3.5	28.82 (SD ± 4.74)
21-25	95	23.6	
26-30	159	39.5	
31-35	98	24.3	
36-40	35	8.7	
41-45	2	0.4	
Total	403	100.0	
Educational level			
None	9	2.2	
Primary	34	8.4	
Secondary	166	41.2	
Tertiary	194	48.1	
Total	403	100.0	
Parity			
Primigravida	144	35.7	
Primipara	108	26.8	
Multipara	136	33.7	
Grand multipara	15	3.8	
Total	403	100.0	
Gestational age (weeks)			
5-15	68	17.0	21.98 (SD 6.83)
16-25	220	54.5	
26-35	102	25.3	
36-40	13	3.2	
Total	403	100.0	

Table 2: Status of knowledge on malaria in pregnancy

Rating	Number	Percent
Excellent	176	43.7
Good	52	12.9
Average	60	14.9
Fair	56	13.9
Poor	59	14.6
Total	403	100.0

Table 3: Choice of medication for malaria prevention and ownership of mosquito nets in index pregnancy

Drug	Number (%)	Type of Mosquito Net	Number (%)
Daraprim	13 (3.2)	Ordinary nets	35 (8.7)
Sulphadoxine-pyrimethamine	64 (15.9)	Re-treatable nets	86 (21.3)
Chloroquine	10 (2.5)	Long-lasting ITN	86 (21.3)
Artemisinin combination therapy	8 (2.0)	None	196 (48.7)
Don't know the name	14 (3.4)		
Subtotal	109 (27.0)		
Didn't take drugs	294 (73.0)		
Total	403 (100.0)	Total	403 (100.0)

malaria preventive drugs in pregnancy ($X^2 = 3.347$, $P = 0.501$).

The ownership of mosquito nets is also shown in Table 3. Two hundred and seven respondents (51.3%) owned at least a mosquito net while 196 (48.7%) did not have any. Among those who had mosquito nets, 172 (42.6%) had insecticide-treated bed nets (re-treatable and long-lasting ITN) while the remaining 35 (8.7%) had ordinary nets. The use of ITN declined from 28.5% before pregnancy to 24.6% and 18.6%, respectively during pregnancy and the night before the booking. This implies that 81.4% of the study population did not sleep under an ITN the night before the interview.

There was a statistically significant association between ownership of ITN and its usage the night before the interview ($X^2 = 64.972$, $P = 0.000$). The association between knowledge of malaria and the use of ITN the night before the interview was not statistically significant ($X^2 = 3.487$, $P = 0.480$).

There was a statistically significant association between parity of the clients and their use of ITN before and also during pregnancy ($P = 0.035$ and $P = 0.021$, respectively). However, there was no statistically significant association between parity and the use of ITN the night before the interview.

The major reason for not using malaria preventive drugs was because the women were not sick. A total of 135 (33.5%) participants gave reasons for not using the ITN. The majority of them, 102 out of 135 women (75.6%) noted that sleeping under insecticide-treated bed nets was not comfortable especially due to heat and fear of suffocation, 15 (11.1%) said that the size does not fit to their beds, while 12 (8.9%) claimed that it was not acceptable to their husbands. Six (4.4%) of these respondents felt it was not effective at preventing malaria (Table 4).

Table 4: Barriers to the use of malaria preventive measures among pregnant women

	Frequency	Percent
Barriers to the use of insecticide-treated nets		
Barriers		
Not effective	6	1.49
Not acceptable to husband	12	2.98
Not comfortable	102	25.31
Size doesn't fit to bed	15	3.72
Subtotal	135	33.50
Non-response	268	66.50
Total	403	100.0
Barriers to the use of intermittent preventive treatment		
Barrier	Frequency	Percent
Not sick during pregnancy	66	16.38
Fear of loss of pregnancy	10	2.48
Cultural reasons	1	0.25
Other reasons	17	4.22
Subtotal	94	23.33
Non-response	309	76.67
Total	403	100.0

Discussion

More than a decade ago, the heads of states from across Africa signed a declaration in Abuja, Nigeria, to halve the malaria mortality for Africa by 2010.[11] The knowledge and use of malaria preventive measures among pregnant women at antenatal care booking clinic are very important factors, which are pivotal to the realization of the targets of the Roll Back Malaria program.

The mean age of 28.8 years found among the participants is similar to findings in other studies.[12-15]

Most of the participants in this study were literate with 89.3% of them having had secondary or tertiary education (41.2% and 48.1%, respectively). This is similar to the findings in a study in Benin, Nigeria.[15] However, the literacy level of the women in this study was much higher than the findings from the 2008 Nigeria Demographic Health Survey where only 45% of the women attended secondary and tertiary institutions.[16]

The high literacy level seen in this study may be related to the location of the study area in Nigeria's federal capital territory with high population of civil servants and educated people. The high literacy rate had a significant correlation with the knowledge of malaria and its prevention measures.

The mean gestational age at booking found in this study is similar to what was found in studies on gestational age at booking in other parts of the country and collaborates the fact that our pregnant women book late for antenatal clinic.[12,15,17-19] Late booking prevents women from getting the maximum benefits of antenatal care, including improving their knowledge on malaria and its preventive measures as well as the utilization of these measures in pregnancy and after child birth.[19] The percentage of primigravidae in this study population is comparable to the findings in another study in the country.[15]

The knowledge of the cause of malaria was excellent as 93% of the women correctly attributed it to mosquito bites. This is similar to the findings of 89% in a study in the mid-western part of Nigeria.[20] This finding is also consistent with findings in community surveys in southwestern Nigeria and northern Ethiopia.[21,22] This excellent knowledge of the cause of malaria among pregnant women confirms malaria as a common infection in Nigeria. Despite this good knowledge about the cause, some participants still had some erroneous convictions that malaria could be caused by drinking

infected water, working hard under the sun, eating palm oil and witchcraft. These wrong beliefs no doubt will have negative implications on malaria control programs as energy and resources would be channeled wrongly toward control and prevention of malaria by these individuals. They may also be unwilling to embrace malaria preventive practices.

One of the key interventions of the Nigeria strategic plan 2009-2013 of the National Malaria Control Programme is prompt treatment of clinical malaria episode with drugs or drug combinations adequate for the stage of the pregnancy.[10] The good knowledge of the symptoms of malaria exhibited in this study is central to early treatment of pregnant women and their children toward reducing maternal and infant morbidity and mortality from malaria. Most of the clients accepted that malaria was harmful in pregnancy. This is consistent with the findings of a previous study,[20] but unfortunately, the knowledge of the harmful nature of malaria in pregnancy did not translate to an outstanding increased use of malaria preventive measures by the clients.

About 96 percent of the study population knew that malaria was a preventable disease and ITN was the most common preventive measure known. This is high compared with findings in another study in northern Nigeria of 36%.[23] The difference in knowledge is likely due to the high educational level of the clients in Abuja compared with Kano state.

Awareness of the clients about IPT was higher than that found in another study of pregnant women at antenatal booking.[24] The latter study was on rural women at primary health centers.

Overall, the status of knowledge of malaria and its preventive measures in this study was high. This is similar to the findings at an antenatal clinic in Kenya where 86.9% had adequate knowledge.[25]

There was no association between parity and knowledge of malaria and its preventive measures; however, there appeared to be a significant relationship between the level of education and knowledge of malaria. This is similar to findings in Kenya and southeastern Nigeria.[25,26]

IPT consists of administration of curative dose of an efficacious anti-malarial drug at least twice during the second and third trimesters of pregnancy during routinely scheduled antenatal clinic visits regardless of whether the woman is infected or not.[24] In this study, the percentage of women who had delivered before using IPT in their last pregnancy is less than the findings of a study among mothers delivering in a hospital in Ibadan, Nigeria.[13] The use of intermittent preventive therapy in the index pregnancy by the clients is also less than 51.4% noted in another study conducted at the booking clinic.[27] In the latter study, the high literacy level and awareness translated to utilization of IPT even before booking at the teaching hospital unlike in this study where the adequate knowledge of malaria and its prevention did not show a corresponding increase in utilization of IPT before booking. The reasons for the variation may be due to the fact that majority of the respondents in this study felt that they needed to be sick before taking anti-malarial prophylaxis and also felt that the drug should be prescribed at the antenatal clinic.

Since the findings of this study are at the booking clinic, one may be tempted to justify the result since it was their first attendance at the hospital. Be that as it may, it is still grossly lower than the expected WHO target of reaching at least 80% of pregnant women with IPT by the end of 2010.[28] Sulphadoxine-pyrimethamine is the drug of choice recommended for IPT strategy.[4,29] It is worrisome to note that some of the women still used the already abandoned weekly pyrimethamine (Daraprim) and Chloroquine for anti-malarial prophylaxis in pregnancy. Some of the women did not know the name of the drugs they took, which brings to the fore the need for increased awareness on IPT among pregnant women.

Surprisingly, there was no statistically significant association between parity and use of IPT as noticed in another study.[24] Also, the knowledge of malaria did not translate to increased use of IPT in pregnancy. The low rate of the use of IPT in this study may be attributed to the late booking observed. Barriers to the non use of IPT included the lack of knowledge of the fact that the women didn't need to be sick before taking the drugs and fear of loss of pregnancy. Sulphadoxine-pyrimethamine has been found to have a good safety profile.[24] Women of reproductive age should be educated on the meaning of IPT and the safety of the drug of choice in pregnancy.

Ownership of insecticide-treated bed nets by 42.6% of women is encouraging and better than results from the recent Nigeria Demographic Health Survey, which showed a household ownership of 8% and 7% nationally and in the north central zone, respectively.[16]

Decline in the use of ITN was observed during pregnancy compared to the pre-pregnant period among owners of ITN as only 18% of the women slept under an ITN the night before the interview. Similar studies showed a high level of awareness and ownership but a low level of utilization.[30] The findings of this study suggest the need for more efforts toward reaching the National Strategic Plan 2009-2013 of the National Malaria Control Programme ensuring that at least 80% of the pregnant women sleep under ITN by 2010 and sustain coverage until 2013.[10] Although, ITN provides a simple but effective means of malaria prevention, barriers to its use still exists. These include uncomfortability especially due

to heat and reduced ventilation, size not fitting to their beds, non-acceptability by husbands and conviction of non-effectiveness of ITN. These findings are not very different from findings in a study in northern Ethiopia where the belief was that malaria was not a major problem with lack of encouragement particularly by husbands being major determinants of not using ITN in pregnancy. [22] Other studies have also collaborated this finding.[30] There is need for involvement of men toward ensuring the utilization of ITN in their homes.

The study showed a statistically significant association between parity and use of ITN before and during pregnancy. Usage before and during pregnancy was related to increasing parity. This can be based on the fact that this group of women may have better awareness concerning the benefits of ITN use, having possibly attended antenatal clinics in their previous pregnancies and immunization clinics after delivery. The antenatal clinics and immunization clinics provide opportunities for ownership and increased awareness on ITN use.

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