

Full Length Research Paper

Epidemiology of malaria among pregnant women in Garoua, Northern Cameroon

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Epidemiological studies of malaria in pregnant women who live in Garoua, malaria endemic areas are scarce. The present study was undertaken to investigate the prevalence and distribution of malaria in the area. A total of two hundred and forty (240) pregnant women participated in the survey from January to March, 2007. Out of the 240 pregnant women examined, 97 were found to have malarial infections during the study, with *Plasmodium falciparum*. There was significant difference between prevalence of the infection at different stages of pregnancy ($\chi^2 = 0.088$, $df = 2$, $P < 0.05$). Further investigations showed that 101 (44.44%) of the pregnant women had no bed nets for various reasons. Implication of malaria in pregnancy cannot be over emphasized. The need to vigorously pursue acceptance of control methods like the bed nets are discussed.

Key words: Malaria, prevalence, pregnancy, women.

INTRODUCTION

Malaria is endemic throughout most of the tropics. Of the approximately three billion people living in 108 countries who are exposed, approximately 243 million will develop symptomatic malaria annually World Health organisation (WHO, 2008). Malaria deaths peaked at 182 million in 2004 and fell to 124 million in 2010. Over 80% of the deaths occur in Sub-Saharan Africa (WHO, 2011).

Malaria during pregnancy is a major public health problem; it increases the risk of low birth weight, infant mortality and morbidity during the first year of life by inducing intra-uterine growth retardation, prematurity, and infant anaemia (Nosten et al., 1994). In malaria-endemic countries, placental malaria is associated with a 2-fold higher risk of still birth and is responsible for up to 35% of preventable low birth weight (Van et al., 2004), the prevalence of malaria is higher during pregnancy when compared with the non-pregnant state (Menedez et al.,

1995). Garoua is the capital of the Northern Cameroon; there are very scarce reports and information on the incidence or prevalence of the disease or methods of control in the area. The study of malaria epidemiology in such area cannot be over emphasized.

MATERIALS AND METHODS

Study area and study population

The study was conducted in Garoua, the North region of Cameroon. The region is bounded by the far north region to the north, the Adamawa region to the south, Nigeria to the west, Chad to the east, and Central African Republic to the southeast. The study was conducted from January to March 2007. Before commencement of the study, permission was sought from the government health. Meetings with pregnant women were held in each community (health care centers), to explain the objectives of the study and to obtain their consent. Structured questionnaires were used to collect information on socio demographic data, malaria mode of prevention and control, complaints, scientific knowledge about malaria, and laboratory examination.

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Table 1. Distribution of malaria parasite among pregnant women living in different density in Garoua.

Location	No. examined	No. positive (%)
Low density	13	1 (1.03)
High density	163	77 (79.38)
Intermediate	64	19 (19.58)
Total	240	97

$\chi^2 = 5.99$, $df = 2$, $P < 0.05$.

Table 2. Distribution of malaria parasite among pregnant women using various control and preventive methods.

Preventive method	No. examined	No. positive (%)
None	101	40 (46.5)
Bed net	82	27 (32.9)
Drug	28	8 (28.6)
Insecticide	29	15 (51.7)
Total	240	97 (40.4)

$\chi^2 = 6.65$, $df = 3$, $P < 0.05$.

Table 3. Distribution of malaria among pregnant women using none or more than one methods of prevention and control.

Methods of prevention	No. examined	No. positive (%)
With control		
None	101	40 (43.9)
Bed nets + insecticide	5	0 (0.0)
With drug intake		
Bed nets + drug intake	45	4 (4.3)
Bed nets + insecticide	17	7 (7.6)
Insecticide + drug	72	40 (43.9)
Total	240	91

$\chi^2 = 0.74$ $df = 4$, $P < 0.05$.

Table 4. Distribution of malaria parasite among pregnant women of different occupation.

Occupation	No. examined	No. positive (%)
House wife (complete)	123	53 (54.63)
Trader/Business	76	28 (28.86)
Farmer	34	16 (16.49)
Student	5	0 (0.0)
Civil service	2	0 (0.0)
Total	240	97

$\chi^2 = 0.087$, $df = 4$, $P < 0.05$.

Laboratory investigations

Thick and thin blood films were made on clean slides properly

labelled for each subject. After patient's information has been recorded in the questionnaire, palm upwards, generally the third finger is selected and clean with cotton wool lightly soaked in the alcohol. With a sterile lancet, the ball of the finger is punctured using a quick rolling action. Pressure is applied to express blood about two to three drops on the slide (about 1 cm) for thick smear. The thick film was labelled with a marker at the edge of the slide. Slides were allowed to dry in a protected place from flies, dust and extreme heat in a slide space. Thick films slides were placed face downwards in a shallow tray on the slides and allowed to stain for 10 to 15 min. Afterward, the stain was gently flushed off the slides by adding drops of water, and the slides were placed in the film rack downwards to drain off water and dry (Monica, 1998).

Data collection and analysis

A computer program, Statistics Program of Social Sciences (SPSS) was used for data analysis. Frequency distribution tables, percentage prevalence and intensity of malaria infection were estimated using standard formulae; chi-square test was used as appropriate to test the possible effect of malaria parasite, as socio-demographic behaviour. 5% level of significance was used.

RESULTS

Table 1 describes the prevalence of malaria parasite among pregnant women in relation to population density in Garoua. Malarial infection rate was observed higher among pregnant women, living in high density area 79.38% (77/163). Women of low density area were relatively less infected 1.03% (1/13), especially as compared to pregnant women of intermediate area 19.58% (19/64). There was significant difference found among different density ($\chi^2 = 0.088$; $P < 0.05$). Preventive method against malaria infection was surveyed as shown in Table 2. Pregnant women using insecticide were less infected 16.66% (15/29) than those that were not using preventive method 44.44% (40/101) and bed net 30% (27/82). With regards to the use of prophylactic drugs, among the pregnant women, those that used prophylactic drugs had the lowest number of malarial infection with 8.88% (8/28). There was significant difference between the preventive methods used by pregnant women ($\chi^2 = 0.98$; $p < 0.05$). Table 3 shows the prevalence of malaria among pregnant women using none or more than one method of prevention and control. Malaria infection was found among women using insecticide and drug 40.81% (40/72), while those using bed nets, insecticide and drug together were not infected at all. Pregnant women that were using bed nets and drug intake were relatively less infected 4.08% (4/45) as compared to those with bed nets and insecticide 7.14% (7/17). Pregnant women that were not having preventive method were infected 47.9% (47/101). A significant difference was found between the methods of prevention ($\chi^2 = 0.036$; $P < 0.05$). The prevalence of malaria parasite among pregnant women in relation to their occupation is as shown in Table 4. The results show that farmer were highly infected 16.49% (16/34) than complete house wife 54.63% (53/123) and trader/business

Table 5. Distribution of malaria parasite among pregnant women at different stages of pregnancy.

Period of pregnancy (Months)	No. examined	No. positive (%)
0 – 3	30	13 (13.4)
3 – 6	132	48 (49.48)
6 – 9	78	36 (37.11)
Total	240	97

$\chi^2 = 0.088$, $df = 2$, $P < 0.05$.

28.86% (28/76). Civil servant and student had no infection. Table 5 shows prevalence of malarial infection among different stage of pregnancy. Women at their first trimester had 13.40% (13/30) infected, while those at their third and second trimester recorded 37.11% (36/78) and 49.48% (48/132), respectively. A significant difference was observed between malarial infection and pregnancy period ($\chi^2 = 5.99$; $P < 0.05$).

DISCUSSION

In low density settlement areas, the prevalence of malaria was relatively low among pregnant women. The infection is 1.03% conversely to those living in high density areas where the infection was high to 79.38%. However, given the large at-risk population in this malaria-endemic region of Garoua, low density settlement area is not a guaranty against malaria. High density settlement areas are characterised by the presence of dustbins, grasses, congestion, polluted gutter, stagnant waters, and dirty surroundings covered with weeds in the rivers that are suitable breeding sites for the presence of mosquitoes in the areas. This is consistent with the reports of Shr-jie et al. (2005) in Ouagadougou, Burkina Faso who found that higher prevalence rates of malaria occurred in areas where larvae breeding sites were semi-permanent. The study found that control and preventive methods commonly used were bed nets, drug's intake (sulphadoxine pyrimethamine (sp)), intermittent preventive treatment (IPT) in pregnancy, and insecticide in homes among pregnant women. Those with no prevention and control method (44.44%) were more infected than those that were having bed net (30%) as method of control. This showed that bed net is a good mode of controlling mosquito's bites. This corroborate with Mouhamadou et al. (2006) that found that bed net efficacy help in reducing man-vector contact, malaria morbidity and mortality. The research proved that insecticide treated bed nets are amongst the effective tools at our disposal for reducing pregnant women mortality caused by malarial parasite. At dusk, some family will light flammable insecticide (coiled insecticide) that burns gradually during the night, repelling or killing mosquitoes. However, the smoke produced by such insecticide is sometime unbearable. The efficacy of insecticide has been proved in South

Africa by Hargreaves et al. (2000) where dichlorodiphenyltrichloroethane (DTT) was used for house spraying to restore malaria control. Insecticide treated bed nets in pregnancy were associated with the first four months of pregnancies in Kenya where women receive as many as 45 to 230 infective bites on the average during 40 weeks gestation, and the result showed a significant reduction in parasitaemia during pregnancy, in the risk of low birth weight (D'alessandro and Olaye, 1997). The fact that the infection rate among those using bed nets and those using insecticide is almost equal explain that there may not be proper use of bed nets generally, they use the bed net after they have been exposed to mosquitoes outdoor. Series of trials in Africa have shown that proper use of mosquito net reduced malaria incidence among children from 63 to 14% in Ugandan (Frederick and Arinaitwe, 2003). Further evidence came from a recent study in a highly malarious area of Kenya. During the first four months of pregnancies, women who were protected by insecticide-treated bed nets at night gave birth to 25% fewer premature or small for gestational age babies than women who did not sleep under insecticide-treated bed nets; However, during the past decades, potentially more effective strategies for prevention and control of malaria in pregnancy have been developed and shown to have remarkable impact on the health of the mothers (Kuile et al., 2003). In Cameroon, the government via the public health centre protects pregnant women by giving bed nets to them (Plan Cameroon, 2005) with respect to WHO recommendations. The various reasons why some women were not sleeping under bed nets are: discomfort, sleepless, and difficulty in breathing. These days, antimalarial combination therapy is widely advocated and the use of artemisinin containing regimens is encouraged (WHO, 2000). In Thailand, when other treatments were failing, artesunate + mefloquine combination as first line treatment was successful and remains so many years later. In tropical Africa, WHO have pushed for artemether + lumefantrine and artesunate + amodiaquine combinations. Theoretically, artemisinin containing combinations might not only improve cure rates, but also reduce the speed at which resistance develop (Peter, 2004). In Cameroon, sulphadoxine-pyrimethamine (sp) is given at a therapeutic dose to pregnant women attending prenatal

centre. It is a single antimalarial dose with the best overall effectiveness for prevention of malaria in pregnancy in areas with high transmission and low resistance to sulphadoxine-pyrimethamine (WHO, 2000). The combined preventive methods and prevention in our research showed that people using bed nets and prophylactic drugs or insecticides were less infected than those using just bed nets. The lowest rate of infection was found among pregnant women using drugs as prophylactic treatment. However, 8.88% (8/28) were found infected. Interviews with some women reveal that not all were having their drugs taken. They were flinging away the drugs just after they had left the medical center. Here again, reasons like vomiting, discomfort, and dizziness were given. Though, in recommended dosage, drug should be generally well tolerated. Women are either stubborn or simply ignorant of the risk they are taking. The survey showed that infection was found at the three stages of pregnancy which was rather unfortunate, because of the adverse effect of malaria in pregnancy. Pregnant women at their third trimester were more infected than those at their first trimester. The low infection rate recorded among pregnant women at their first trimester may be explained by the fact that some women are receptive and excited during the first trimester of their pregnancy. It also shows that proper and reinforced information could protect pregnant women in a better way and at different periods of the pregnancy. Women at their third trimester are more infected than others; this may explain the fact that prevention against mosquitoes for many women is temporary and after some time, fail to protect themselves; this is clearly explained by the infection rate recorded by pregnant women at their second trimester, who are gradually neglecting malaria's prevention and increasing with infection rate.

The use of combined methods of control is good, because those that were using three control methods were not as infected as those that used only two prevention methods. This shows that the more the numbers of the combined preventive methods used the more the confidence about freedom from malaria. According to WHO (2001), new regimens should be incorporated into strategies aimed at controlling the spread of the disease, such as insecticides, spraying, and use of impregnated bed nets, sustained chemoprophylaxis and intermittent prophylactic treatment. Since none of these is used routinely in most parts of Africa, effective chemotherapy for malaria has a pivotal role in reducing morbidity and mortality (Schultz et al., 1994). Malaria infection was related to the occupation; civil servants and students were less infected than housewives who were majority Moslems and farmers in partial purdah, most of these pregnant women being illiterates are quite ignorant about malaria transmission and treatment. The considerable number of infections observed among traders/business women could be due to the fact that they are always travelling and do not have enough time to protect themselves against mosquito bites.

Conclusion

A combination of up to three methods of control/prevention is most active against acquisition of disease. Malaria is commonly found in pregnant women though many are asymptomatic, because of earlier contacts and development of immunity.

This study has evidenced the abundance of infection among pregnant women. Pregnant women at their third trimester were more infected than others. Pregnant women living in high density settlement areas were more infected than those of low and intermediate areas. This study has shown that the infections were related to occupations and also to the poor knowledge of malaria mode of transmission. The infection is related to the level of education and the lack of improved continual education. Pregnant women are not participating in the fight against malaria. Bed nets are effective for reducing malaria transmission and mortality. The usage of bed nets, insecticide and therapeutic drugs gave considerable protection and should be promoted. These findings show that determining local endemicity and the rate of clinical malaria cases are urgently required in order to target control activities and avoid over-treatment with antimalarial.

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