Prevalence of Malaria among Pregnant Women Attending Antenatal Clinic at Ishaka Adventist Hospital, Uganda

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ABSTRACT

In the sub-Saharan Africa, malaria affects an estimated 24 million pregnant women and the region records the greatest severity of malaria accounting for 90% of all the deaths. Thus, this study aimed at determining the prevalence of malaria among pregnant women attending ANC at Ishaka Adventist Hospital. This was a cross sectional study carried out among 185 pregnant women after informed consent was obtained. Data on demographic factors and prevalence of malaria was collected using a pretested questionnaire. Collected data was entered and analyzed using the IBM SPSS, 25 of the total 185 pregnant women in the study, 19.5% were infected with malaria parasites. Malaria prevalence was high due to not using ITNs and IPT as preventive measures. Increasing awareness about malaria preventive measures will help to reduce malaria infection.
Keywords: Malaria prevalence, Pregnant Women and Antenatal Clinic

INTRODUCTION

Malaria is caused by a parasite of *Plasmodium*-species, of which most common is *Plasmodium falciparum*. According to World Health Organization (WHO), approximately 216 million cases of malaria occurred worldwide in 2016, an increase of 5% over 2015 [1; 2; 3]. Malaria related deaths have declined by 29 % between 2010 and 2015. Majority of malaria cases and deaths related to malaria occur in Africa [4; 5; 6; 7; 8; 9; 10; 11; 12]. However, malaria still creates a remarkable worldwide burden, even though morbidity and mortality caused by malaria has reduced within past decade, especially among pregnant women and children under five years old [13; 14; 15; 16].

In areas with stable malaria transmission, due to protracted exposure to infectious bites, partial protective immunity to clinical malaria is gradually acquired with increasing age [17;18;19;20]. Severe *P. falciparum* malaria is thus predominantly a childhood disease. There is however one exception to this general rule: pregnancy-associated malaria (PAM) [21;22;23;24]. Despite their semi-immune status, women become more susceptible to malaria upon pregnancy. In endemic areas, approximately 25 million pregnancies are at risk of *P. falciparum* infection every year, and 25% of these women have evidence of placental infection at the time of delivery [9; 10; 11; 12; 13; 25;26;27;28].

Clinical features of infection during pregnancy vary with the degree of preexisting immunity and thus the epidemiological setting. In high-transmission areas, maternal anaemia and low birth weight (LBW), as a result of prematurity and/or intrauterine growth restriction (IUGR), are the main adverse outcomes of placental infection and tend to be more severe in first pregnancies and in younger mothers [14; 15; 16; 17;29;30;31]. These effects are less marked by gravidity in low-transmission areas [18; 19; 20]. Moreover, LBW babies are in general at increased risk of death during infancy. Each year between 100 000 to 300 000 infant deaths may be attributable to maternal malaria in Africa [21; 22; 23; 32; 33; 34; 35].

The pathophysiological processes preceding adverse outcomes in PAM are initiated by the accumulation of *P. falciparum*- infected red blood cells (pRBCs) in placental intervillous spaces,

causing inflammatory responses and deposition of fibrinoid material [36;37;38;39;40]. Adhesive interactions between parasite encoded erythrocyte surface antigens and intervillous host receptors such as chondroitin sulphate A (CSA), hyaluronic acid (HA), and no immune immunoglobulins (Igs) are believed to be involved in the sequestration process [24; 25; 26; 41;42;43;44]. The exact details of how sequestration causes LBW are unknown. Local inflammatory immune responses in the infected placenta may induce early labour [27; 28; 29]. IUGR appears to be related to reduced nutrient transport to the foetus due to high parasite and inflammatory cell density [4]. Maternal anaemia may also independently contribute to IUGR, most likely via a reduction in oxygen transport to the foetus [30; 31; 32].

Uganda is the second highest malaria prevalent country in the subregion after Mozambique and in 2016, Uganda accounted for 17% of the 395 million estimated cases in East and Southern Africa [1]. The overall burden of malaria is high and its adverse outcomes to the infected mother and the unborn child are widespread [33]. There is growing awareness that pregnancy-associated malaria is also of importance in areas of low and seasonal transmission worldwide. Although Uganda is regarded as being a malaria-endemic region, the transmission level varies considerably across the country [34]. Similar to studies from other countries, data on malaria burden are mainly available from areas of high transmission. In light of this, the researcher sought to conduct this study to assess the prevalence of malaria and associated risk factors among pregnant women attending antenatal clinic (ANC) at Ishaka Adventist hospital.

Aim of the study
This study explored the prevalence of malaria among pregnant women attending ANC at Ishaka Adventist hospital.

Specific objective
1. To find out the proportion of malaria among pregnant women attending ANC at Ishaka Adventist hospital.

Research question
1. What is the proportion of malaria among pregnant women attending ANC at Ishaka Adventist hospital?

MATERIALS AND METHODS

Study area
The study was conducted in Ishaka Adventist Hospital and more specifically MCH clinic. The Ishaka Adventist Hospital which was founded in 1950, is a community hospital in the town of Ishaka, Bushenyi District, Western Uganda. The hospital is a mission facility administrated by the seventh Day Adventist church and it caters for the local population, who are mainly subsistence farmers. The hospital is located 77kilometers west of mbarara, which is the largest town in the subregion. The hospital also maintains a training school for nurses and there is large nursing cohort on the staff. The hospital specialises in maternity care and infectious diseases.

Funding status NGO/charity. It has 110 bed numbers. The hospital has a catchment area of about 28000 people and is affiliated with the American Loma Linda University, which is located in Loma Linda, California. The hospital has both inpatient and outpatients and outpatient department works from Monday to Friday.

Study design
The study was retrospective cross sectional and utilized quantitative method of data collection.

Study population
Study population included all women attending ANC at Ishaka Adventist hospital.

Inclusion criteria: records of pregnant women who attended ANC at Ishaka Adventist Hospital for the last 6 months (from February 2018-July 2018) and tested for malaria

Exclusion criteria: pregnant women who did not test for malaria. And those that attended ANC before February or after July 2018.

Sample size determination
The sample size required for the study was calculated based on the formula by

Kish and Leslie to estimate a single population proportion [12].

$$N = \frac{Z^2\, p(1-p)}{\delta^2}$$

Where:

N = estimated sample size

P = anticipated proportion of pregnant women with malaria. Similar study at Mulago hospital found only prevalence of 14%, so P was taken to be 0.14

Z = standard normal variation ant 95% confidence (1.96)

δ = margin of error (5%)

The calculated sample size was, $\frac{1.96^2 \, x \, 0.14(1-0.14)}{0.05^2}$ = 185 sample was taken.

Sampling procedure and techniques
Convenient sampling was employed to get list of women who attended ANC and tested for malaria from the register. Then systematic sampling was used to get the sample required. The list was created and numbered from number '1' up wards. Only names with even numbers was selected for the study until the required number 185 was reached.

Data collection procedures
Data collection instruments
Data was collected by reviewing records from antenatal register, using structured pretested checklist.

Demographic characteristics of pregnant women in the study
Characteristics of the 185 participants in this study are summarized in Table 1. The age of participants ranged from 18-38 with mean age of 26.6 ± 4.6 years

Variables
Dependent variables
Prevalence of malaria in pregnancy.

Independent variables
Socio demographic: - age, sex, religion, educational background, marital status, employment status, gravidity, IPT use, ITN use and area of residence.

Data processing and analysis
The checklist was checked for completeness, missed values and then manually cleaned up on such indications before living the study area. Data was coded and entered in to IBM SPSS version 25. Data was cross checked for consistency and accuracy, after data clearing, data was analyzed and presented in tables and charts.

Ethical Consideration
Ethical clearance was obtained from faculty of clinical medicine and dentistry in form of introduction letter. The copy of introduction letter was taken to the Ishaka Adventist hospital administrator to seek permission to collect the data.

Dissemination of results
The finding of this study was disseminated to the faculty of clinical medicine and dentistry and Ishaka Adventist Hospital administrator.

RESULTS

standard deviation. Majority (86.5%) had education of primary or below, 90.3% were married however only 4.9% were employed. 25.0%, 21.6%, and 17.3% had primary, secondary and tertiary education, respectively.

Table 1: Demographic characteristics of the participants (N=185)

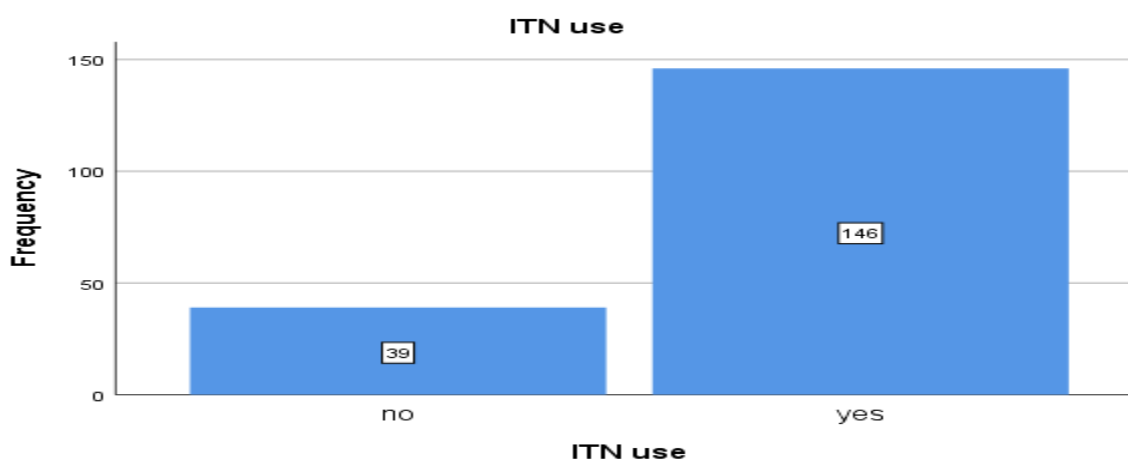| Characteristics of participants		Frequency	Percent
Age group	18-23	51	27.6
	24-29	92	49.7
	30-35	32	17.3
	36-41	10	5.4
Education level	primary and below	160	86.5
	Secondary	18	9.7
	Tertiary	7	3.8
Marital status	Married	167	90.3
	Single	7	3.8
	Others	11	5.9
Occupation	Peasant	144	77.8
	Employed	9	4.9
	Business	32	17.3
Area of residence	Rural	145	78.4
	Urban	40	21.6

Figure 1: ITN use among pregnant mothers (N=185)

Figure 1 above shows that 146 participants (78.9%) were using ITN. However, 39 participants (21.1%) were not using the ITN.

Prevalence of malaria among pregnant mothers attending Ishaka Adventist Hospital

Figure 2 below shows that prevalence of malaria among participants was 19.5%.
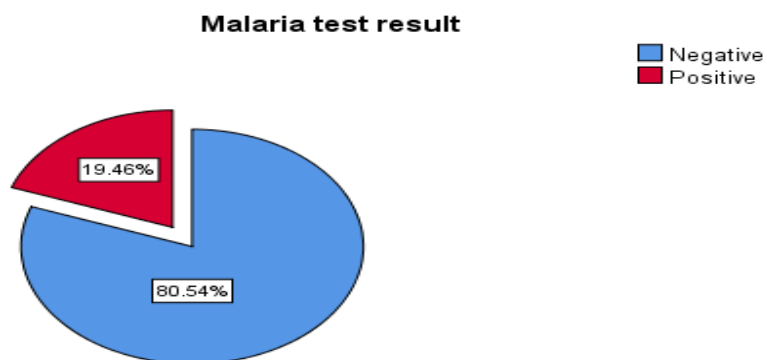
Figure 2: Prevalence of malaria among pregnant mothers (N=185)

Chi-square test for prevalence of malaria and participants' characteristics
The results show that gravidity (X^2: 6.23, p<0.013); ITN use (X^2: 123.53, p=<0.001); and IPT (X^2: 70.27, p<0.001) were significantly associated with malaria in pregnancy.

Table 2: Chi-square test for prevalence of malaria and participants' characteristics

Characteristics		Malaria test result		Chi-square (X^2)	P-value
		Negative	Positive		
Age group				6.79	0.079
	18-23	40	11		
	24-29	80	12		
	30-35	23	9		
	36-41	6	4		
Marital status				2.54	0.281
	Married	136	31		
	Single	4	3		
	Others	9	2		
Education level				1.35	0.510
	primary and below	131	29		
	Secondary	13	5		
	Tertiary	5	2		
Occupation				4.11	0.128
	peasant	119	25		
	employed	5	4		
	business	25	7		
Gravidity				6.23	**0.013***
	primigravida	17	10		
	multigravida	132	26		

Area of residence				2.11	0.147
	rural	120	25		
	urban	29	11		
ITN use				123.53	<0.001*
	no	7	32		
	yes	142	4		
IPT taken				70.27	<0.001*
	no	13	26		
	yes	136	10		

*Significant value

DISCUSSION

In this study, the prevalence of malaria infection among pregnant women in the study area was found to be 19.5%. This finding is higher than in Mulago hospital where a prevalence of 9% was reported among pregnant women [9]. It also contrasts with findings in South Sudan, where a prevalence rate of 9.9% among pregnant women was reported [35]. However, prevalence in this study is similar to the one reported in Malawi, where a total prevalence of 25% was recorded [36].

The difference in prevalence may be due to difference in time of study and study setting. The low prevalence reported may also be due a general decline in malaria among the general population due to robust measures put by government in prevention of malaria.

CONCLUSION

Malaria is still a major public health problem among pregnant women in Africa. This study found a high prevalence of malaria in pregnancy (19.5%). The control measures available in the area should be reviewed and emphasis should be placed on adequate sensitization on usage of ITNs and IPT should be taken from the health facility to ensure high coverage. Awareness on malaria prevention measures during pregnancy should target young women even before marriage preferably at schools, and social and religious gatherings.

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