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Prevalence of *falciparum* malaria amongst pregnant women in Aba South Local Government Area, Abia State, Nigeria

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Abstract

Malaria during pregnancy poses a substantial risk to mother and foetus especially an infection with *Plasmodium falciparum*. This study was undertaken to assess the prevalence of *falciparum* malaria among pregnant women in Aba South Local Government Area, Abia State, south-east Nigeria. Blood samples from 432 pregnant women who attended Primary Health Care Centre and Abia State University Teaching Hospital (ABSUTH) were examined using Giemsa stained thick and thin films. Structured questionnaires were also administered to the women from whom blood samples were collected. A total of 173 (40.0%) were found to be infected with *P. falciparum*. It was the only type of malaria parasite species encountered. Distribution of infection among age groups was highest 12 (60.0%) among age group 15-20 years and lowest 121 (36.7%) among age group 26 years and above with significant difference ($p<0.05$). Occupational distribution showed that traders had the highest prevalence 88 (63.3%) while students were least infected 21 (17.9%) with significant difference ($p<0.05$). Primigravida had the highest prevalence rate of 99 (50.3%) while multigravida had the lowest rate 38 (27.1%) with significant difference ($p<0.05$). Respondents who were at their first trimester also showed a high prevalence rate 69 (56.6%) while those in their third trimester were least infected 28 (30.1%) with significant difference ($p<0.05$). It is therefore necessary to design an effective public health education programme targeted at this high risk group and also instituting an intermittent preventive treatment in hospitals and health centres in Aba South LGA that is known to have a high malaria prevalence.

Keywords: Prevalence; malaria; pregnant women; trimester; Aba; Nigeria.

Introduction

Malaria is a serious health problem in many developing countries and a major disease for people residing in tropical and sub-tropical areas. It is caused by a single-celled protozoan parasite belonging to the genus *Plasmodium* transmitted from man to man through the bite of an infected female *Anopheles* mosquito during a blood meal [1]. Malaria poses tremendous public health problems across the globe. Current estimates show that about 214 million cases are due to malaria resulting to about 438,000 deaths globally. About 3.2 billion people are at risk of malaria globally, where 97 countries have an on-going malaria transmission with 35% of malaria deaths occurring in Nigeria and Democratic Republic of Congo [2]. Malaria accounts for up to 40% of public health spending in most endemic countries resulting to negative impacts on both social and economic developments [3].

In a malaria-endemic country such as Nigeria, more than 90% of its population is at risk, while about 50% of the population suffers from at least one episode due to this disease each year and this accounts for over 45%

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of all outpatient visits with high morbidity and mortality [3]. Mortality is especially high in people not sufficiently protected by an acquired immunity, such as young children especially those below five years, pregnant women and migrants from region where malaria is not found. Studies have shown that malaria worsen certain pregnancy outcomes especially in areas of high transmission. These includes increased incidence of anaemia and spontaneous abortions, inter-uterine growth restrictions (IUGR), still birth, prematurity, low birth weight, fetal distress and congenital malaria [4-7].

This study was undertaken to assess the prevalence of *falciparum* malaria among pregnant women in Aba South Local Government Area, Abia State, south-east Nigeria. It is expected that data obtained from this study would be used to undertake a holistic health intervention in this area of stable malaria transmission.

Materials and methods

Study area

This investigation was carried out in selected areas of Aba, Aba South Local Government Area of Abia State. Aba is characterized by tropical climate with distinct wet and dry seasons spanning March-October and November-February respectively. It is located between Latitude5^0 7′ N and Longitude 7^0 22′ detailed characteristics of the area have been presented by [8]. The inhabitants are mainly traders, farmers, artisans with a few civil servants. Aba is a city with infrastructural facilities, tertiary institutions one of which is Abia State University Teaching Hospital, a few private clinics and Primary Health Care Centres. The major religion is Christianity. The average humidity is 90% with an average temperature of 27^{o}C and an average rainfall of about 2,400 mm. The major agricultural crops grown include yam, maize, plantain, cassava, oil palm and vegetables. Flooding is widespread in the rainy season creating breeding sites for mosquito vectors and ideal transmission conditions for malaria.

Study population

Four hundred and thirty-two pregnant women between the ages of 15 and 45 years, who came for their antenatal routine checkup at Abia State University Teaching Hospital and Primary Health Care Centre, Aba South Local Government Area, Abia State, between May and September, 2013 were used for this study. They were selected randomly without prior knowledge of their clinical and family history. Structured questionnaires were administered to pregnant women who visited the health facilities to obtain the necessary data. Voluntary informed-consent was obtained after each pregnant woman was given information regarding the research objectives and assurance of confidentiality.

Ethical consideration

The study protocol was approved by the Postgraduate Committee of the Department of Zoology and Environmental Biology, Michael Okpara University of Agriculture, Umudike, before commencing the work. Permission was then taken from the Head, Haematology and Blood Transfusion Department of Abia State University Teaching Hospital as well as from the Head of Departments, Primary Health Care Centre, to work with pregnant women who attended their antenatal routine check-up. The purpose of the study was carefully explained to the subjects after which their consent was sought before sample collection.

Collection of blood sample

Safety procedures were adopted in the collection of finger-prick blood samples by swabbing the area to be sampled with 70% alcohol and allowed to dry before collection using standard procedure [9]. Both thick and thin blood films were made on the same slide and labelled accordingly for the detection of malaria parasite and identification of the *Plasmodium* species present respectively [10]. About 10% Giemsa stain was used to stain the blood films. Prior to that, the thin blood film were fixed using methanol for 2 minutes. The diluted stain was then placed on the slides until it covered the thick and the thin blood films. This was allowed to stand for 30 minutes and then washed off. The back of each slide was cleaned and placed in a draining rack for the preparation to dry. Both blood films were examined microscopically using 100x oil immersion objective lens. The thick blood film was examined first in order to detect the presence of malaria parasite. This was followed by the examination of the thin blood film for identification of the *Plasmodium* species present using standard procedure [9].

Data analysis

The statistical analysis for significant differences was done using chi-square (x^2). Significant level was placed at $p<0.05$.The statistical package used was the SPSS software, version 17.

Results

A total of 432 pregnant women were involved in the study. In the Primary Health Centre (PHC); 217 pregnant women were sampled, while 215 were sampled from Abia State University Teaching Hospital (ABSUTH) and interviewed via a structured questionnaire to ascertain their occupation and level of education before blood samples were taken to check for the presence of *P. falciparum*. Out of the 432 blood sample examined, 173 (40.05%) were found to be positive for malaria parasite in the study-area. In Table 1, pregnant women from

Primary Health Centre showed a significantly higher (x^2 =3.931, *df* = 1, $p<0.05$ prevalence) 97 (44.7%) than those from Abia State University Teaching Hospital, 76 (35.3%). Only *P. falciparum* was encountered in the study-area.

The age prevalence of malaria among the subjects is shown in Table 1. Prevalence of malaria was more, 12 (60.0%) among age-group 15-20 years and least 121 (36.7%) among age-group 26 years and above. The result when subjected to analysis revealed a statistically significant difference (x^2 = 7.4884, *df* = 2, $p<0.05$) indicating an association between the rate of infection and the age-group of the respondents ($p<0.05$).

In Table 2, more than half of the women reported that they had secondary school education 231 (53.4%) and about 150 (34.7%) had attended a tertiary institution. Prevalence of malaria was highest among women who had not no formal education 12 (80.0%), and lowest among women who had a tertiary school education 45 (30.0%). In addition, malaria prevalence in Primary Health Centre was highest among women who had not obtained any formal education and lowest among those who had obtained a tertiary education. The statistical difference when analysed was significant (x^2 = 37.969, *df* = 3, $p<0.05$) indicating association between malaria infection and the level of education of the respondents.

Occupation and distribution of malaria among the respondents in Table 3 revealed that there was a high malaria prevalence 2 (66.9%) and 88 (63.3%) among farmers and traders respectively and a low prevalence of about 21 (17.9%) and 22 (24.2%) among students and civil servants respectively. Statistical analysis showed a significant difference (x^2 = 69.648, *df* = 5, $p<0.05$) indicating an association between the nature of their occupation and the degree of exposure to malaria parasite. Primary Health Centre recorded the highest prevalence among traders 61 (78.2%) while a generally low prevalence between the two facilities was observed among students.

From the result in Table 4, it was observed that primigravida had the highest prevalent rate of about 99 (50.3%) accompanied by the secundgravida 36 (37.9%), multigravida were the least infected 38 (27.1%). Malaria prevalence was found to be highest among women in their first trimester 69 (56.6%) and lowest among women in their third trimester 28 (30.1%).

Table 1. Age prevalence of malaria among the study subjects.

Age (years)	Prevalence of malaria N (%)					
	Total		Primary Health Care Centre		Abia State University Teaching Hospital	
	No. exam.	No. infect.	No. exam.	No. infect.	No. exam.	No. infect.
15-20	20	12 (60.0)	9	5 (55.6)	11	7(63.6)
21-25	82	40 (48.8)	45	22 (48.9)	37	18 (48.6)
≥ 26	330	121(36.7)	163	70 (42.9)	167	51 (30.5)
Total	432	173 (40.0)	217	97 (44.7)	215	76 (35.3)

Table 2. Prevalence of malaria with respect to the level of education.

Level of education	Total		Primary Health Care Centre		Abia State University Teaching Hospital	
	No. exam.	No. infect.	No. exam.	No. infect.	No. exam.	No. infect.
Primary	36	28 (77.8)	19	16 (84.2)	17	12 (70.6)
Secondary	231	88 (38.1)	99	45 (45.4)	132	43 (32.6)
Tertiary	150	45 (30.0)	89	25 (28.1)	61	20 (32.8)
None	15	12 (80.0)	7	5 (71.4)	8	7 (87.5)
Total	432	173 (40.0)	217	97 (44.7)	215	76 (35.3)

Table 3. Prevalence of malaria with respect to occupation.

Occupation	Total		Primary Health Care Centre		Abia State University Teaching Hospital	
	No. exam.	No. infect.	No. exam.	No. infect.	No. exam.	No. infect.
Trading	139	88 (63.3)	78	61 (78.2)	61	27 (44.3)
Farming	3	2 (66.7)	2	1 (50.0)	1	1 (100.0)
Student	117	21 (17.9)	63	11 (17.5)	54	10 (18.5)
Housewife	38	15 (39.4)	20	9 (45.0)	18	6 (33.3)
Civil servant	90	22 (24.4)	38	8 (21.1)	52	14 (26.9)
Others	45	25 (55.5)	16	7 (43.8)	29	18 (62.1)
Total	432	173 (40.0)	217	97 (44.7)	215	76 (35.3)

*Youth-corpers, tailors, hair dressers, etc.

Table 4. Prevalence of malaria with respect to the gravid status and trimesters of the respondents.

	Gravid status			Trimesters		
	Primi-gravidae	Secundi-gravidae	Multi-gravidae	1st trimester	2nd trimester	3rd trimester
No. Sampled	197	95	140	122	217	93
No infected	99	36	38	69	76	28
% prevalence	50.3	37.9	27.1	56.6	35.0	30.1

Discussion

Pregnant women are particularly vulnerable to malaria as pregnancy reduces a woman's immunity to malaria, making her more susceptible to malaria infection and increasing the risk of illness, severe anaemia and death. The prevalence of malaria among pregnant women recorded in the study was 40.1%. This rate was observed to be higher than some earlier reports [11,12] which recorded 20.0% and 11.0% in Anambra and Owerri respectively. It is comparable to the result of [13, 14] who reported a prevalence rate of 41.0%in Uyo and 42.0% in Ghana and lower than the report of [15] who reported 52.6% prevalence rate in Aba. Malaria prevalence rate observed in this study may be due to the sanitation problems (no proper drainage/sewage disposal systems) and flooding (stagnant water bodies are suitable breeding habitats for malaria vectors) which are predominant in the study-area. Only *P. falciparum* was encountered in the study-area. This is in line with the findings of [15] who reported that only the ring trophozoites and gametocytes forms of *P. falciparum* were observed in a study at Aba and Okigwe town. Usip *et al* [16] also reported in a study at Uyo that 54.4% of the subjects had malaria due to *P. falciparum* where malaria showed a higher prevalence in Primary Health Centre than in Abia State University Teaching Hospital. This may be attributed to a much better medical facilities and skilled health workers in teaching hospital than in health centre. Malaria parasitaemia in relation to age showed that older pregnant women had reduced malaria prevalence rates. This finding is similar to that reported by [15, 17]. The different malaria prevalence rates observed among these age-groups could be attributed to the level of acquired immunity that increases with age, which may also be associated with protection from malaria infection [7].

More than half, 52.0%, of the respondents who were infected were traders and farmers. This could be attributed to the nature of their job which exposes them to mosquito bites. Majority of these traders sell their goods along bad roads and over flooded drainage systems usually due to heavy rainfall. The hustle and bustle of these traders and farmers who need to convey their products to the market place might cause fatigue resulting in a deep sleep which favours the uninterrupted blood-sucking tendency of mosquitoes [18]. Malaria prevalence was observed to be higher among the uneducated than their educated counterpart. This showed improved knowledge on effective case management and control of malaria among the educated women. A study in south-east Nigeria found that higher levels of education were associated with improved knowledge and practices in relation to appropriate prevention and treatment strategies [19]. The uneducated respondents may be exposed to malaria parasites due to bad environmental condition and their life styles. Previous studies confirmed the significance of health education in communities highlighting it as major effective way of disseminating health information [20].

Conclusion

A high prevalence of *falciparum* malaria amongst pregnant women in this study is an indication of possible high maternal and child mortality within the study-area. The data from this study shows malaria, especially in pregnancy, has remained a major public health problem in Nigeria despite concerted efforts to provide effective measures for its control and management. Despite the efforts in technological advancement in research, diagnosis, prevention and treatment, malaria is still one of the world's most serious health problems. The burden of malaria-associated maternal anaemia and its effect on the fetus, resulting in low birth weight has been increasingly recognized during the past decade as a major cause of hospital attendance in Nigeria and most people in rural communities suffer due to lack of health care close to their homes.

The need to inculcate positive attitudes like the use of insecticide-treated nets by pregnant women is however advocated.

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