Original Research Article

Age-Dependent Prevalence of Malaria Parasitemia among Pregnant Women in Selected Tertiary Hospitals in Rivers State.

ABSTRACT

Studies have shown that pregnant women are vulnerable to malaria parasitemia. Unfortunately, less attention has been paid to the effect of age group on malaria parasitemia among this group of subjects. The aim of this study was to determine the age-dependent prevalence of malaria parasitemia among pregnant women. It was a hospital-based study carried out in two selected health institutions in Rivers State. A simple random sampling technique was used to select the areas of study as well as the 400 participants used for the study. A well-structured questionnaire was used to collect the socio-demographic data of the subjects within the age range of 21–40years. Venous blood samples of the subjects were collected from the subjects and examined for the presence of malaria parasites using standard procedures. The results obtained from the health institution located in urban region of Rivers State (Braithwaite Memorial Specialist Hospital) showed the prevalence rate of 36.4% in the group within the age of 21-25 years, 36.1% among age range of 26-30 years, 22.5% for 31-35 years and 23.1% for the pregnant women within the age of 36-40 years. The results obtained from the health institution located at semi-urban region of the state (General hospital Bori) showed prevalence of 44.2%, 23.0%, 35.7% and 41.7% respectively. The association between the prevalence rate of malaria parasitemia and age among pregnant women was significant at P= 0.0001. This study has shown that age had a noticeable association with prevalence of malaria parasitemia among pregnant women attending BMSH and GHB in Rivers State.

Keywords: *Prevalence, Pregnant, Malaria parasitemia, Age-dependent*

1.0 INTRODUCTION

The effects of malaria infection during pregnancy are of serious public health concern in the tropical and subtropical regions throughout the world (Nosten *et al.*, 1991). Malaria is a serious health burden of developing nations, including Nigeria (Nwokocha, 2007). It is very simple to diagnose and treat, yet it claims more lives than any other infectious disease in the world (Narasimhan & Attaran, 2003). Different risk factors for malaria among pregnant women were

identified by previous studies. These include educational status (Cisse *et al*., 2014), age (Jackle *et al*., 2013), ANC visit, gestational age (Gontie *et al*., 2020), parity (Cisse *et al*., 2014), gravidity, and ITN utilization (Nega *et al*., 2015).

The Roll Back Malaria (RBM) was an initiative of the government that aimed to significantly reduce malaria deaths by 2015. The program became necessary, given the huge burden of malaria (Narasimhan & Attaran, 2003). The key emphases of RBM are early detection and timely treatment of malaria, the detection, and control of epidemics, control of vectors using larvicide and bed nets treated with insecticide, and the prevention and treatment of malaria in pregnancy. Biolarviciding is the application of biological agents called larvicides to kill mosquitoes by destroying mosquito larvae and/or pupae. Vector control is necessary in order to greatly reduce cases of malaria infection by controlling the vector that is responsible for the transmission of the infection. In pregnancy, malaria infection is a major cause of morbidity and mortality in both the mother and her newborn baby. The situation is worse in first pregnancies as they are yet to develop immunity against *Plasmodium falciparum*, the major species that has been implicated. Uniquely, *P. falciparum* - infected red cells sequestrate in the placenta, causing maternal anaemia and intrauterine growth retardation or even fetal demise. The two main methods used for achieving vector control are spraying of insecticides indoors and the use of Insecticide Treated Nets (ITNs). Almost a decade after the launch of RBM not much has been done in the aspect of the provision of ITNs and effective drugs (Yamey, 2000).

Over 30 million women become pregnant in Africa annually and are at great risk of malaria infection especially from *Plasmodium falciparum,* and this can prove fatal for both mother and fetus. Prevention of malaria in pregnancy is one of the main challenges of public health in Africa and also the priority for the Roll Back Malaria partnership. Effective management of malaria infections, use of Insecticide Treated Nets (ITNs), and, in areas of stable transmission, Intermittent Preventive Treatment (IPT) are the three major recommended approaches of the Roll Back Malaria program. This study therefore focused on assessing age-dependence on malaria prevalence among pregnant women attending tertiary hospital in Port Harcourt.

2.0 METHODS

2.1 Study Design

This was a longitudinal study involving 400 pregnant women aged 21-40 years attending antenatal clinics in Braithwaite Memorial Specialist Hospital, Port Harcourt (BMSH) and General Hospital, Bori (GHB) both in Rivers State. Structured questionnaires were given to the pregnant women to obtain their demographic data.

2.2 Ethical Approval

Ethical clearance was obtained from Ethics committee of Rivers state Ministry of Health. Subjects gave their written consent prior to recruitment into the study.

2.3 Eligibility criteria

Pregnant women who were attending the antenatal clinic were included. Pregnant women within the age bracket of 21-40years were also recruited. Pregnant women with signed consent form were also admitted into the study. Pregnant women with fever, weakness, anorexia, those who have just taken anti-malaria drugs, and those who are HIV positive were excluded from the study.

2.4 Sample Size Determination

The sample size was determined using the formula of Araoye, (2004).

$$n = \frac{Z^2 pq}{d^2}$$

n = Sample size minimum

Z = 95% confidence interval = 1.96

p = Proportion of the target population = ?

q = 1.0 - p

D = Degree of accuracy (95% interval) = 0.05%

Sampling method

Subjects were selected in a simple random method using a numbering system where subjects who picked "1" were selected and those that picked "0" were rejected (Faith *et al.,* 2021; Catherine *et al.,* 2021)

Sample Collection

The subjects were well-positioned and a tourniquet was tied at the upper arm to expose cubital veins. The sample collection site was cleansed with 70% ethanol using a cotton wool swab. A 5ml sterile syringe was used for the collection of blood by venipuncture into EDTA bottles,

mixed and labeled. The procedure was repeated for all subjects. Site was cleaned with a dry cotton swab.

2.5 Malaria Determination (Thick and Thin Film)

Making of thick film

A thick blood film was made by pipetting 12ul of blood onto a clean grease-free slide 1cm away from the edge of the slide and spread with a spreader slide to make a thick smear. The slides were air-dried.

Making of Thin Film

A thin film was made by pipetting 3ul of blood onto a clean grease-free slide 1cm away from the edge of the slide. A clean spreader slide held at an angle of 45 degrees was placed on the drop of blood and the blood was allowed to spread along the entire width of the spreader slide. The spreader slide was pushed forward rapidly and smoothly to obtain a feathered edge.

Giemsa Staining Technique for Thick and Thin Film

Working Solution: The stock Giemsa solution was diluted 1 in 10 (10%) in buffered distilled water of pH 7.2. The thin film was fixed in methanol for 2mins and allowed to dry by evaporation. All the slides were placed on a staining rack and flooded with 10% Giemsa stain using a pipette for 30 minutes. The stain was gently flushed off the slide by adding drops of clean water while avoiding tipping off the stain to avoid leaving deposits of scum over the film. The slides were placed film side downwards on a slide rack to drain and dry ensuring the film does not touch the rack (Cheesbrough, 2009).

Microscopy and Parasite Density Estimation

The thick and thin films were examined microscopically using immersion oil and x 100 objectives. The number of parasites against 100 white blood cells was counted and recorded. The number of the parasite was calculated using a standard formula:

$$\frac{\text{Standard white blood cell count}}{100} \text{ x number of parasites } = \text{ parasite/µl of blood}$$

2.6 Statistical Analysis

The data were analyzed statistically using chi-square test to test for independence among the categorical variables at α level of 0.05 (level of significance).

3.0 RESULTS

Table 1: Prevalence of Malaria by Age Groups among Pregnant Women in Braithwaite Memorial Specialist Hospital, Port Harcourt and General Hospital,Bori.

	BMSH		GHB	
Age (years)	**No. of Subjects**	**No. of Positive Mp(%)**	**No. of Subjects**	**No. of Positive Mp(%)**
21 – 25	22	8(36.4)	86	38(44.2)
26 – 30	72	26(36.1)	74	17(23.0)
31 – 35	80	18(22.5)	28	10(35.7)
36 – 40	26	6(23.1)	12	5 (41.7)

P-value = 0.0001

In the table below, pregnant women from BMSH and GHB of age group 21 – 25 (36.4%), (44.2%) were more infected by the malaria parasite followed by pregnant women of age group 26 – 30 (36.1%) from BMSH and 31 -35 (35.7%) from GHB. The least infected were pregnant women in the age group 31– 35 (22.5%) from BMSH and 26-30(23%) from GHB.

4.0 DISCUSSION

The prevalence of malaria was high in pregnant women of age group 21 – 25 from GHB because of their active involvement in farming, trading, and other socio-cultural activities that draw them outside their homes. For BMSH, the prevalence was lower in pregnant women of age 26 – 30 years and the reason could be that these women are mainly working-class with better socio-economic status resulting in better housing and eating habits, better awareness of the transmission of the parasite. The result of this study is a reflection of exposure patterns among the various age groups and disagrees with findings from Eastern Sudan which reported that age was not significantly associated with malaria during pregnancy (Adam, 2005). The result from Bori also agrees with the work of Uneke *et al.,* (2007) of Abakiliki, South Eastern Nigerian which recorded that the most infected pregnant women were those of age group 20 – 24 years (20.8%) and Wogu *et al.,* 2013 (30%).

In General Hospital, Bori women within the age of 21 - 25 were susceptible to malaria infection because of early marriages, daily activities include farming, staying outdoors, and good breeding sites for the malaria vector. This is attributed to the fact that these women have parasites in them which is asymptomatic coupled with their immunity which is lowered due to the pregnancy. In this study, pregnant women of a young age were found to have a higher prevalence. This is in agreement with studies done by Gontie *et al*., (2020) which reported young pregnant women were more exposed to malaria with higher parasite densities than older age pregnant women. This could be attributed to increased awareness of the disease, prevention, and more exposure to health care services by older mothers. It could also be a result of acquired immunity by older mothers to malaria infections due to previous exposures. Nevertheless, the finding from this

study did not agree with studies done by Adam *et al*., (2005) which reported that age had no significant effect on the prevalence of malaria parasitemia among pregnant women.

Conclusion

This study has shown that the prevalence of malaria parasitemia among pregnant women is relatively affected with age.

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