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PREVALENCE OF MALARIA AMONG PREGNANT WOMEN ATTENDING AHMADU BELLO UNIVERSITY MEDICAL CENTER, ZARIA, KADUNA STATE

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ABSTRACT

Malaria is a protozoan disease that poses public health challenges in Nigeria. Inadequate diagnostic test of malaria is responsible for high morbidity and mortality rates in rural areas of Sub-Sahara Africa. This study aimed at the prevalence of malaria among pregnant women attending Ahmadu Bello University Medical Centre (ABUMC), Zaria. A cross-sectional study was conducted among 100 pregnant women attending ABUMC, Zaria. About 2ml of blood was collected through venipuncture into EDTA bottle from the study population from June to August, 2015 and tested for the presence of malaria parasites using microscopy. Prior to sample collection, a structured questionnaire was administered to obtain some socio-demographic and risk factors associated with the disease. A total of 100 pregnant women participated in the study. The overall prevalence of malaria infection among these studied subjects was 60%. Higher prevalence of malaria was recorded among the age group below 15 years (100%), genotype AA (65.7%), those that were unemployed (60.5%), those with secondary education (68.4%) and those in their first trimester of pregnancy (70%). There was no significant difference in prevalence of malaria according to age group ($\chi^2 = 6.403$, $p = 0.380$). This study reported a high prevalence of malaria among antenatal pregnant women attending ABUMC, Zaria. Effort should be made to provide free bed nets to pregnant women on their first antenatal visit and scale-up intermittent preventive treatment of pregnant women for malaria.

Keywords: Microscopy, Blood Sample, Pregnant Women, Malaria, Prevalence

INTRODUCTION

Malaria is one of the most widespread infectious disease which is life-threatening and a major public health challenge worldwide, with pregnant women and under 5 children being the most vulnerable (Luxemburger *et al*., 2001). The significant risk factor of malaria infection is the poor pregnancy outcomes such as low birth weight, anaemia, early foetal loss, stillbirth and prematurity among pregnant women (Luxemburger *et al*., 2001; Guyatt *et al.*, 2004). However, suppression of the immune system always occurs especially for primigravidae with higher risk of malaria infection (Leber *et al.*, 2010; McLean *et al*., 2015).

An estimates of 216,000,000 cases of malaria was recorded in year 2016 with 445 000 deaths due to malaria in ninety one countries of the world (WHO, 2017). In Nigeria, malaria is endemic and accounts for 25% of infant mortality, 30% of childhood mortality and about 74% of all deaths of children below 5 years (WHO, 2016). Malaria accounted for an estimated 438,000 deaths world-wide in 2015 with 90% deaths occurring in Africa, and under-5 children and pregnant women the major victims (WHO, 2015). The ailment impose heavy burden on economic development with social consequences (Nkumama *et al.*, 2017).

The reported prevalence of malaria in Nigeria is based on the use of microscopy and rapid diagnostic test (RDTs). Conventional light microscopy of a blood smear is the gold standard for the detection of malaria parasites and the recognized technique for the laboratory confirmation of malaria. It is sensitive and can detect densities as low as 5-10 parasites/µl of blood (WHO, 1990). In Nigeria, 97% of the people are in danger of malaria and with the highest number of malaria victims globally and a projected 100,000,000 malaria infection annually (NMFS, 2011). Studies conducted in Nigeria had reported various malaria prevalence, for instances, 45.4% in Zaria, Kaduna (Igiri *et al.*, 2018), 61.8% in Bauchi (Samalia *et al.*, 2017), 43.1% in Rivers (Wogu *et al*., 2018), 11% in Sokoto (Buhari *et al.*, 2016), 2.1% in Bauchi (Kadas *et al.*, 2019), and 2.0% in Lagos (Oluwagbemiga *et al*., 2018). Since Nigeria is an endemic country as far as malaria is concerned and pregnant women are at risk of acquiring this disease with more severe complications which may endanger the life of their unborn child. The study was therefore conducted to determine the prevalence and awareness of malaria among pregnant women

attending Ahmadu Bello University Medical Centre (ABUMC) Zaria, Kaduna State Nigeria.

MATERIALS AND METHODS

Study Design. It was a cross-sectional study conducted among pregnant women. Pregnant women with feverish condition attending ABUMC, Zaria were randomly enrolled from June to August, 2015.

Sample Size Determination: A total of 100 pregnant women that attended ABUMC, Zaria having feverish condition were selected for this study.

Study Area. The study was carried out in Ahmadu Bello University Sickbay at Samaru main campus in Sabon Gari Local Government Area of Kaduna State Nigeria.

Ethical Approval and Informed Consent: Ethical approval for this work was obtained from the office of the Director, Ahmadu Bello University Medical centre and oral consent was obtained from the participants before their enrollment in the study. Inclusion criteria include pregnant women who were febrile, attending the medical facility who gave their consent while non-pregnant women and pregnant women attending the ABUMC who were febrile but did not give their consent were excluded from the study.

Sample Collection and Processing

Upper hand of each participants were fastened using tourniquet, and cotton wool was soaked in methylated spirit to clean and sterilized the site for blood collection. 2 ml syringe with 21 g needle was used to aseptically withdraw 2mls of blood into an Ethylene Diamine Tetra-acetic Acid (EDTA) bottle for malaria parasite determination. Dry cotton wood was placed at the site of venipuncture and needle was gently removed while sharps were safely disposed in the sharp box (Igiri *et al*., 2018).

Preparation and staining of blood film: For the thick film, a drop of blood about 15mm was placed in the middle of a clean microscope slide and spread to make a thick smear with the corner of a second slide. The smear slide was allowed to air dry and was dipped into a Field's stain A for 5 seconds and excess stain drained off. The slide was dipped into Field's stain B for 5 seconds and excess stain was drained off, washed gently in clean water. The back of the slide was wiped clean and placed upright in a draining rack for the film to air dry (Cheesbrough, 2009). A drop of blood was placed at the end of a clean dry slide and with the aid of a clean smooth edge spreader held at an angle of 30ºC a thin film was made. The film was allowed to air dry and covered with Leishman's stain for 5 minutes, diluted with clean water and allowed for 10 minutes. The stain slide was washed off with clean water after 10 minutes and the back of the slide was wiped clean with cotton wool and placed on a draining rack to dry (Cheesbrough, 2009).

Examination of Stained Slides: Both thick and thin films prepared and appropriately stained were observed under the microscope at x40 and x100 oil immersion. The different stages of the malaria parasite (trophozoites, schizont and gametocyte) were observed and reported.

Questionnaire and Data Collection: The socio-demographic information of each study participant and certain risk factors associated with malaria was obtained using a structure questionnaire. Data collected included age, educational level, occupation, gestational age, and genotype

Data Analysis: The data obtained were analyze using statistical package for social science (SPSS version 23.0) and Chi-square test was used to determine the significant association between patterns of distributions at a p value < 0.05.

RESULTS

A total of 100 pregnant women participated in the study. The overall prevalence of malaria infection among these studied subjects was 60%. Table 1 shows the prevalence of malaria in relation to socio- demographic factors of the study participants. Among these, the prevalence of malaria among age groups was highest 100% for age group below 15 and the least 0(0%) prevalence was among those in the age group 41-45. There was no significant difference in prevalence of malaria according to age group (χ^2 = 6.403, p = 0.380). However, the prevalence differed among the educational level (χ^2 = 1.495, p = 0.683), with those in the secondary level having the highest prevalence 68.4% while the least 42.9% prevalence was observed among those without formal education.. Among the gestational period, those in their first trimester had the highest prevalence 70.0% of malaria while those in their second trimester had the least 53.5%. With regard to genotypic status, those with AA genotype had the highest 65.7% prevalence of malaria while the least 33.3% was observed among those that do not know their genotypic status (Table 1).

Table 2 shows the results of the prevalence of malaria in relation to clinical symptoms of the study participant. The results showed that fever, sweat, headache, and pains were not associated significantly with malaria prevalence. A significant association with malaria prevalence was reported among participants with chills and rigours (χ^2 = 4.834, p = 0.023).

Prevalence of malaria with respect to predisposing factors and preventive measures among pregnant women in the study area is presented in Table 3. About 44(3. 62.9%) of the respondents indicated that they use insecticide treated net while 16(53.3%) replied that they did not use insecticide treated net as malaria preventive measure. With respect to predisposing factors, 28 (36.8%) of the respondent reported that they was present of stagnant water in their environment while 12(50.0%) indicated that they was no stagnant water in their environment. In addition, they was higher 34(41.5%) prevalence of malaria among respondents that indicate that they do not use mosquito net then those that use 6(33.3%) mosquito net at home. There was no significant association with malaria prevalence reported among the present of stagnant water (χ^2 = 1.316, p = 0.251), mosquito net (χ^2 = 0.407, p = 0.524), and environmental sanitation (χ^2 = 0.260, p = 0.610).

Table 1: Prevalence of malaria among pregnant women in relation to some socio- demographic factors

Variables	No. Examined	No. Positive (%)	χ^2	*p*-value
Age group				
Below 15	2	2(100)		
15-20	11	6(54.5)		
21-25	30	19(63.3)		
26-30	26	18(69.2)	6.403	0.380
31-35	16	8(50)		
36-40	11	7(53.8)		
41-45	4	0(0)		
Educational Level				
Primary	3	2(66.7)		
Secondary	19	13(68.4)	1.495	0.683
Tertiary	71	42(59.2)		
No formal education	7	3(42.9)		
Occupation				
Civil servant	25	15(60)		
Business/petty	12	7(58.3)	0.018	0.999
Trader	25	15(60.0)		
Housewife	38	23(60.5)		
Gestational Period				
First trimester	30	21(70.0)		
Second trimester	43	23(53.5)	2.016	0.365
Third trimester	27	16(59.3)		
Genotypic Status				
AA	67	44(65.7)		
AS	27	14(51.9)	3.423	0.181
Unknown	6	2(33.3)		

χ^2 = Pearson's chi-square value
P significant at <0.05 (2-tailed)

Table 2: Prevalence of malaria among pregnant women in relation to clinical symptoms presented

Clinical Symptoms	No. Examined	No.positive (%)	χ^2	p-value
Chills and rigours				
Yes	24	5(20.8)	4.834	0.023*
No	76	35(46.1)		
Sweating				
Yes	22	9(40.9)	0.01	0.921
No	78	31(39.7)		
Headache				
Yes	41	18(43.9)	0.441	0.507
No	59	22(37.3)		
Fever/chills				
Yes	35	13(37.1)	0.183	0.669
No	65	27(41.5)		
Pains				
Yes	25	9(36)	0.222	0.637
No	75	31(41.3)		

χ^2 = Pearson's chi-square value
P significant at <0.05 (2-tailed)
* = Significant association

Table 3: Prevalence of malaria among pregnant women with respect to predisposing factors and preventive measures

Variables	No. Examined	No. Positive (%)	χ^2	*p*- value
Predisposing factors				
Present of stagnant water				
Yes	76	28 (36.8)	1.316	0.251
No	24	12(50.0)		
Overgrown weeds/bushes				
Yes	59	22(37.3)		
No	41	18(43.9)	0.441	0.507
Mosquito nets				
Yes	18	6(33.3)	0.407	0.524
No	82	34(41.5)		
Staying late night outside				
Yes	10	5(12.5)	0.463	0.496
No	90	35(87.5)		
Preventive measures				
Use of insecticide treated nets				
Yes	70	44(62.9)	0.794	0.373
No	30	16(53.3)		
Screen doors or windows				
Yes	15	9(60.0)	0.001	1.000
No	85	51(60.0)		
Eliminate breeding site				
Yes	24	17(70.8)	1.544	0.214
No	76	43(56.6)		
Use of mosquito repellent				

Yes	22	14(63.6)		
No	78	46(59.0)	0.155	0.693
Environmental sanitation				
Yes	20	11(70.0)		
No	80	49(57.5)	0.260	0.610
Antenatal care and health education				
Yes	32	21(65.6)	0.620	0.431
No	68	39(57.4)		

χ^2 = Pearson's chi-square value
P significant at <0.05 (2-tailed)
* = Significant association

DISCUSSION

Malaria is denoted as a disease of poverty and it primarily affects low and lower-middle income countries (WHO, 2014). This study reported high prevalence of malaria in ABUMC, Zaria Kaduna State with 60% of the participants being positive for malaria infection. This result is consistent with previous studies conducted in Zaria and other parts of Nigeria. The outcome of this finding is in agreement with earlier observations that Nigeria is known for high prevalence of malaria and it is a leading cause of morbidity and mortality in the country (80.5%) (Olasehinde *et al.*, 2010). Also malaria risk map estimated that malaria prevalence in Nigeria varied from below 20% in some areas to over 70% (Onyiri, 2015).

The present findings showed that malaria prevalence was significantly higher among those aged below 15 years (100%) and 26-30 years (69.2%) compared to those above 30 years. This high prevalence could be attributed to the fewer numbers of participants in this age group that were available in the study area. Furthermore, it could be attributable to life styles and high level and risk of exposure to malaria parasite as a result of favorable environmental conditions as the study was carried out from June to August (wet season) when infection rates was high due to stagnant water which accumulates due to poor drainage systems in the environment thereby creating more breeding sites for mosquitoes that act as vectors for malaria parasites and enhancing the proliferation of the plasmodium species.

Consistent with the present finding, previous studies reported prevalence of 67.8% , 68.3% , 69.2% among pregnant women in Delta, Benue and Niger state and 64.0 %, 59.6 %, and 58.0 % among children in Kebbi, Awka, and Abuja respectively (Mbanugo *et al*., 2005; Amuta *et al*., 2014; Singh *et al.*, 2014; Nmadu *et al.*, 2015; Eke, *et al*., 2018; Onochie and Egwunyenga, 2019).

However, higher malaria prevalence were reported among pregnant women that visited primary healthcare facilities in Imo, Ogun, Gboko, Osun, and Calabar at 80.1%, 78.9%, 76.9%, 72%, and 71.4% respectively (Oladeinde *et al.*, 2002; Adefioye *et al*., 2007; Houmsou *et al*.,2010; Ohalete *et al*., 2011; Noland *et al*., 2014).

With respect to predisposing factors, there were no significant differences in the prevalence of malaria with the present of stagnant water, staying late night, and use of mosquito net. However, in endemic malaria transmission region as in the study area, high prevalence of malaria is often recorded with second trimester and children due to low specific immunity (Ibeziako *et al.*, 1980; Desai *et al.*, 2007). This high prevalence underscores the fact that, malaria is still a heavy burden in the country. In highly endemic area, where semi-immune adults usually have substantially acquired resistance to strains of plasmodia, the prevalence of malaria is higher and its severity greater in pregnant women, children and young adults (Michael *et al*., 2019).

The pregnant women who are in the first trimester showed a high prevalence than those who are in their second and third trimester. This disagrees with the reports of Desai *et al.* (2007) and Kadas *et al*. (2019) who reported that the second trimester carries higher risk of the disease. The difference in this finding may be due to the fact that pregnant women who attended the antenatal care in the ABUMC start receiving intermittent preventive treatment (IPT) in their second and third trimester thereby reducing the prevalence of the parasites.

With respect to the educational level, pregnant women with secondary education had the highest prevalence of malaria and they was no significant association among the education level (*P*>0.05; Table 1). Pregnant women with genotype AA had the highest prevalence of malaria. Hence, it could be attributed to poor or low immunity of individuals with AA to malaria since resistance to malaria had been found to be associated with certain genetic factors.

CONCLUSION

High prevalence of malaria was observed among pregnant women attending ABUMC, Zaria. Prompt diagnosis and treatment of malaria among pregnant women will help in reducing the prevalence of malaria in this study area. Effort should be made to provide free bed nets to pregnant women on their first antenatal visit and to also scale-up intermittent

preventive treatment of pregnant women for malaria. This will help combat the prevalence of malaria in the study area.

Ethical approval*:* Informed consent was obtained from each study participant. The ethics committee of Ahmadu Bello University Sickbay approved the study.

Conflict of Interest

There are no conflicts of interest.

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