



Malaria and Haematological Parameters of Pregnant Women Attending General Hospital Geidam, Yobe State, Nigeria

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Abstract

Background: Malaria infection and complications during and after pregnancy remained a major public health concern in the tropics and subtropics, with approximately 24 million pregnant women reported. In Nigeria, pregnant women are hard hit by malaria due to their compromised immunity. The focal point of this study was to investigate the influence of malaria parasitaemia on some hematological parameters in pregnant women attending General Hospital Geidam, Yobe State, Nigeria.

Methodology: Systemic sampling technique was used to select 288 pregnant women who registered for antenatal clinics and visits the General Hospital Geidam. Informed consent was sought from the pregnant women who participate in the study and was screened for malaria.

Result: Malaria prevalence was found to be higher in women between 25-29 years of age (79 1.74) and lower in women between 40-45 years of age (4 ± 0.92).

Conclusion: Malaria was found to be prevalent among the study population and it may have an effect on the hematological parameters of the pregnant women.

Keywords

Malaria; Hematological parameters; Pregnancy

Introduction

Malaria infection and complications remains a major public health concern during pregnancy in endemic areas, especially the tropics and subtropics. Malaria complications during pregnancy have been reported to have emotional impact on an estimated 24 million pregnant women. The disease accounts for approximately 28.1% of Out Patient Visits to health facilities, a projected estimate of 13.7% admissions and 9.0% of maternal deaths in endemic regions of the world. In pregnancy, malaria infection is reportedly asymptomatic in high transmission areas, thus contributing invariably to the development of complications such as low birth weight, preterm birth and to a larger extent, death of the prospective mother and her foetus.

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As funding to combat both malaria and maternal mortality increases, understanding how malaria specifically affects pregnant women is crucial in an effort to improve maternal and perinatal health and curb the spread of this preventable infectious disease. The focal point of this study is to investigate the influence of malaria parasitaemia on some hematological parameters in pregnant women attending General Hospital Geidam, Yobe State, Nigeria.

Methodology

Study area

This study was conducted in General Hospital Geidam, Yobe State, Nigeria. Geidam is of the 17 Local Government Area of Yobe State. The Local Government has an area of 4,357 km² and a population of 157,295 at the 2006 census [1].

Study population

Informed consent was sought from 288 pregnant women attending antenatal clinic at the General Hospital Geidam. Subjects either reside permanently in Geidam town or drawn from nearby villages. The study lasted for five months from June to October 2016.

Ethical consideration

Ethical clearance was obtained From State Ministry of health and each participant was consented.

Sample collection

Venous blood (5 mL), was collected from 288 pregnant women who consented to participate in the study using aseptic techniques. To avoid coagulation, each blood sample was immediately transferred into a sterile Ethylenediamine Tetra Acetate (EDTA) container, mixed thoroughly and then labeled.

Examination of parasitaemia

Blood smears were prepared according to standard protocols [2]. Briefly, a drop of blood sample was placed on a grease free microscope slide and spread using the end of a plastic bulb pipette to make a thick or thin smear. The smear was then allowed to air dry for an hour, stained in 2% Giemsa solution (for thick smear) and 5% Giemsa solution (for thin smear) in phosphate buffer (pH 7.1) as previously described [2]. This It was allowed to air dry and examined in under 100× objective under oil immersion.

Haemoglobin (Hb) estimation

This was done according to standard procedures [3]. Briefly, four (4) milliliters of Drabkin's solution was transferred into a test tube and 20 µL of venous blood samples in EDTA was added and thoroughly mixed. This was allowed to stand for 10 mins at room temperature and read in a spectrophotometer. The test and standard were then recorded.

Determination of Packed Cell Volume (PCV)

The micro-hematocrit method of Coles was used to determine PCVs. Briefly; blood samples were collected into capillary tubes, sealed at one end in Bunsen flame and centrifuged at 10,000 rpm

for 5 minutes using a micro hematocrit centrifuge. Using a micro hematocrit reader, the PCV was read and recorded.

Determination of Red and White Blood Cells Count (RBCs and WBCs)

Red blood cell count was done according to the method of Schalm. Briefly; 0.02 mL blood sample was pipetted into a clean test tube containing 4 mL of blood cell diluting fluid to make 1 in 200 dilution of the blood samples. The diluted blood sample was loaded in a Neubauer counting chamber. and a All red blood cells in the five groups of 16 small squares in the central area of the Neubauer chamber and were enumerated at x40 using a light microscope at x 40 objective. The number of cell estimated was multiplied by 10,000 and 50 to obtain the red and white blood cell count per cubic millimeter of blood, respectively.

Data analysis

Data obtained was analyzed by Analysis of Variance (ANOVA) using the Statistical Package for Social Science (SPSS) version 20. Data was expressed as Mean \pm SD. P-value of ≤ 0.05 was considered as significant.

Results

The mean \pm SD of malaria parasitaemia among pregnant women was higher 79 ± 1.74 in the age group 25-29 years and least in those less than aged 19 years.

The pregnant women with genotype HbAA had the highest prevalence of malaria parasite while HbSS genotype pregnant women recorded lowest prevalence due to their low turnout in the study area. However, patients with heterozygous HbAS genotype were considerably protected, looking at the low numbers infected. The observed difference was statistically significant at $p \leq 0.05$.

Discussion

Findings on malaria parasites indicate that a significant number of pregnant women were positive for malaria parasite by 79 ± 1.74 , although asymptomatic. This result contradicts those of other studies with the same sample size, for example: Akinboroye and Aribodor reported higher results 83 ± 1.9 and 86 ± 1.0 respectively [4,5]. Conversely, our result is relatively higher with those of Mvondo 45 ± 0.71 ; Nair and Nair 57 ± 1.10 and Egbute, 59 ± 0.74 respectively [6-8]. Availability of mosquito breeding sites (fresh water) in the study area (Geidam) was attributed to the high prevalence rate recorded in this research. Our finding further reveals high prevalence of malaria in younger women between the ages of 25-29 years than older women (Table 1). This corroborate with the work of Dicko [9] who revealed that teenagers and young adult pregnant women were more susceptible to malaria than older pregnant women. Dicko [9] further attribute the development of immunity to malaria in older women as a result of frequent infections as the cause of leading to low parasitaemia in adult women. Additionally, our work showed high prevalence of infection in primigravidae than in multigravida. This agrees with the work of Stekette which reported that multigravida pregnant women acquire immunity from previous infections and may have also experienced physiological changes caused by pregnancy. Onwere [10] also found high prevalence of infection in primigravidae. Brabin, [11] attributed suppression of Ccell-mediated immunity in first pregnancy than in subsequent ones as the cause of high prevalence of infection

Table 1: Prevalence of malaria parasitaemia among pregnant women by age.

Age (Bracket)	No. Examined	No. infected	No. not infected
15-19	3		
20-24	77	24 \pm 1.23	3 \pm 0.23
25-29	94	61 \pm 2.00	18 \pm 2.3
30-34	82	79 \pm 1.74	29 \pm 1.0
35-39	22	12.0 \pm 1.91	43 \pm 3.8
40-45	10	12.0 \pm 1.20	12 \pm 1.78
Total	288	4 \pm 0.92	7 \pm 1.66

Table 2: Haematological parameters among pregnant women by age.

Age	Haemoglobin (g/dl)	Packed Cell Volume (%)	Erythrocyte counts($10^9/l$)	WBC Counts(μ/l)	Parasitaemia (%)
15-19	7.8 \pm 3.8	35 \pm 8.0	6.3 \pm 1.6	7.8 \pm 3.8	1.3 \pm 0.5
20-24	7.4 \pm 1.6	32 \pm 1.0	6.2 \pm 1.2	7.1 \pm 3.6	1.4 \pm 0.4
25-29	8.2 \pm 1.8	35 \pm 8.0	4.2 \pm 1.0	7.5 \pm 2.7	1.3 \pm 0.5
30-34	8.4 \pm 1.7	37 \pm 6.8	5.2 \pm 2.0	7.0 \pm 2.4	1.2 \pm 0.4
35-39	8.6 \pm 1.5	35 \pm 1.5	7.2 \pm 2.0	7.8 \pm 2.9	1.3 \pm 0.5
40-45	7.6 \pm 1.6	34 \pm 6.4	6.6 \pm 2.0	7.9 \pm 2.7	1.3 \pm 0.4

Table 3: Prevalence of malaria parasitaemia among pregnant women by genotype.

Genotype	No. Examined	No. of infected	% of infection
AA	217	178	82.0
AS	70	18	19.8
SS	1	1	0.1
Total	288		

in primigravidae. Our work also showed high prevalence of malaria in pregnant women with genotype HbAA while those with genotypes HbAS genotype were considerably protected, looking at the low numbers infected. In the course of this study, only one sickle cell (HbSS) homozygous pregnant woman was encountered and consented to participate in this research. This results agrees with the work of Eteng and Fairhust which showed high malaria parasitaemia in patients with genotypes HbAA than those with HbAS [12,13]. Certain genetic conformation has been associated protection against malaria in HbAS genotypes. Akinboroye [4] also reported an interference with the growth and replication of Plasmodium parasites in patients with HbAS genotypes. Due to the availability of sufficient hemoglobin, RBCs of patients with homozygous HbAA genotypes were revealed to support the growth and development of Plasmodium parasites. About 87% of malaria positive primigravidae mothers and 45% malaria positive multigravid mothers have hemoglobin levels below the World Health Organization benchmark for pregnant women (11 g/dl). Even among the uninfected group, the primiparae still recorded a greater prevalence of low haemoglobin levels. The pregnant women especially the primiparae recorded relatively lower hemoglobin levels as opposed to the multigravida. This study confirms that anaemia is more intrinsic feature common among primigravidae compared to multigravida as also recorded by Nagaraj and Mbanefo [14,15]. This is because malaria, a major cause of anaemia in pregnancy in endemic areas is known to be more severe among primigravidae (Tables 2 and 3) [16].

Conclusion

In conclusion, malaria was found to be prevalent among the study population and it may have an effect on the hematological parameters of the pregnant women.

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