International Journal of Research and Reports in Hematology

3(2): 53-59, 2020; Article no.IJR2H.63756

Prevalence of Malaria amongst Pregnant Women Attending Comprehensive Health Centre Dutsin-Ma Local Government Area, Katsina State, Nigeria

M. S. Abdullahi[1*], M. A. Abdulazeez[2], L. Mudassir[3] and A. Aminu[4]

[1]Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences, Ahmadu Bello University, Zaria, Kaduna, Nigeria.
[2]Department of Human Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, Ahmadu Bello University, Zaria, Kaduna, Nigeria.
[3]Department of Biochemistry, Mewar University, Gangrar, Chittorgarh, Rajasthan, India.
[4]Department of Pharmacy, Katsina College of Health Sciences and Technology, Katsina, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Author MSA designed the study, wrote the protocol and wrote the first draft of the manuscript. Author MAA performed the statistical analysis. Author LM managed the analyses of the study. Author AA managed the literature searches. All authors read and approved the final manuscript.

Article Information

Editor(s):
(1) Dr. Dharmesh Chandra Sharma, G. R. Medical College & J. A. Hospital, India.
Reviewers:
(1) Raad Abbas Kadhim, University of Babylon, Iraq.
(2) Augustine Adu Frimpong, Southern University and A&M College, USA.
Complete Peer review History: http://www.sdiarticle4.com/review-history/63756

Original Research Article

Received 02 October 2020
Accepted 09 December 2020
Published 26 December 2020

ABSTRACT

Aim: The aim of this study is to evaluate the epidemiology and burden of malaria amongst pregnant women attending antenatal clinics in Comprehensive Health Center, Dutsin-ma, (CHCDTM) Katsina state, Nigeria.
Study Design: This study was designed to assess the epidemiology and burden of malaria amongst pregnant women, a total of 150 pregnant women were randomly selected between the active rainfall season to the early winter period (June and December) 2019. The sample population was selected irrespective of age, educational background and occupation, cultural and religious affiliation.
Palce and Duration of Study: The study was was carried out at Comprehensive Health Center Dutsin-Ma (CHCDTM), within a duration of six (6) months.

**Corresponding author: E-mail: asmedic2011@gmail.com;*

Methodology: Blood samples were aseptically collected into ethylene-diamine tetraacetic acid (EDTA) bottles and each blood sample was analyzed for malaria parasite. All specimens were analyzed within one hour of collection. Giemsa-stained thick and thin blood films were performed, the average of ten views of a slide were counted and used for the determination of parasite density. The Giemsa stain was carried out using standard quality control procedure as described [8].
Results: The result from the study shows that 108 (72%) were found to be infected with malaria. Malaria infection among age groups 25-29 years was highest with frequency of 39(36.1%) and lowest 1(0.9%) among age group 15-19 years. Respondents in their second trimester had the highest prevalence 87(80.5%) with least prevalence in first trimester 9(6%). Multigravida had the highest infection rate 63(58.3%) while secundigravida had the least prevalence 16(14.8%). There is a significant difference in parasite burden in relation to gravidity ($p < 0.05$).
Conclusion: Conclusively the burden of malaria amongst pregnant women attending CHCDTM is significant across the various examined dependent variables which implies that malaria remains one of the highest prevalent disease facing pregnant women.

Keywords: Epidemiology; giemsa; multigravida; secundigravida; maleria.

1. INTRODUCTION

One of the major challenges of the health sector development and civilization is menace of malaria amongst humans [1]. About 200 million cases, nearly half million death and 300-500 million people are being infected each year [2]. Malaria is the most common primary health problem in tropical and developing countries of Sub-Saharan Africa and South East Asia. During pregnancy the immune system is suppressed as such pregnant women are more predispose to malaria infection [3]. Malaria is caused mainly by four *Plasmodium* species namely *Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae* and *Plasmodium ovale,* and it has the highest number of morbidity and mortality amongst the tropical diseases [4].

Each year, 25-30 million women become pregnant in malaria endemic area of Africa, and similar numbers are exposed to malaria in Asia, Oceania, and South America [5]. Associated burden of malaria during pregnancy include spontaneous abortion and miscarriage, still birth, unstable socio-economic status. Its major impact on pregnant women is severe anemia, maternal deaths and low birth weight. According to Federal Ministry of Health (FMOH), malaria is associated with 11.0% of all maternal deaths and 70.5% of morbidity in pregnancy in Nigeria [4]. It accounts for up to 15% maternal anaemia, 5%-14% of low birth weight (LBW), and 30% of "preventable LBW; 300 million cases (90%) occur in Africa [6].

Considering the pre-existing challenges associated with pregnant women and paucity of information on malaria in the study location, this study aims at evaluating the epidemiology and burden of malaria amongst pregnant women attending antenatal clinics in Comprehensive Health Center, Dutsin-ma, (CHCDTM) Katsina state Nigeria.

2. METHODOLOGY

2.1 Study Area

The study was carried out in CHC Dutsin-Ma Local Government Area in Katsina state which is located in the Northwest region of Nigeria. It is a health facility with about one hundred bed space. The health facility receive patients from both urban and rural area with an estimate of about 500 outdoor patients yearly.

2.2 Criteria for Selection

The study area was selected considering the endemic nature of the disease (malaria) in the local government area and the secondary function of the health facility. Considering the resource person comfort and compliance of the participants, a total of 150 pregnant women were randomly selected between the active rainfall season to the early winter period (June and December) 2019. The sample population was selected irrespective of age, educational background and occupation, cultural and religious affiliation.

2.3 Collection of Samples

Blood samples were aseptically collected into ethylene-diamine tetraacetic acid (EDTA) bottles as described [7]. About 2ml of blood sample was

obtained by venipuncture from each patient using a sterile needle and syringe. Each blood sample was analyzed for malaria parasite. For confidentiality, no personal identifiers (names, address, etc) were used on the blood sample of the participants instead, bar-coded numbers were used to ensure anonymity of the donors, to facilitate laboratory procedures and minimize the chances of errors during the handling of the blood specimens. All specimens were analyzed within 1 hour of collection.

2.4 Microscopic Examination and Giemsa Staining

Giemsa-stained thick and thin blood films were performed, the average of ten views of a slide were counted and used for the determination of parasite density. Grease free slides were used and a small drop of blood was spread out in a circle at the center of the slides with a micropipette in order to make the thick film. For the thin film, a drop of blood using a micropipette was placed at 1cm from the end of the slide, a cover slip was placed on the slide at an angle of 450 and a thin film was made by gently pushing the cover slip forward to produce feathered edge where the cells were in a monolayer. A grease pencil was used to label the slides, which were allowed to air dry at room temperature, and were fixed after drying in methanol for one minute, making it ready for staining. The Giemsa stain was carried out using standard quality control procedure as described [8].

2.5 Data Analysis

Data generated were intended to quantify the prevalence level and analyze variables that may be related. Analysis was carried out using Graphpad instat version 3.0. Differences in proportion were compared using chi square and p-value < 0.05 was set as the level of statistical significance.

3. RESULTS AND DISCUSSION

3.1 Results

Out of the 150 blood samples examined, 108(72%) were found to be infected with malaria in the study area. The demography of the respondents is shown in Table 1. According to age, the age range 25–29 has the highest frequency of 39(36.1%) with least observed in the age range of 40 above 8(5.3%). Over one-third of the women are unemployed housewife 64 (42.6%) followed by those involved in petty traders and civil servants 56(37.3%) with the least being farming/cattle rearing/fishing 10(20%). Majority of the women reported to have no formal education 119 (79.3%) and about 24(16%) had attended a tertiary institution.

The pregnancy history of the respondents shows three-quarters of the women 115 (76.6%) are multigravidae with least 16 (10.6%) to be secundigravida. Moreover, majority of the women 129 (86%) were in their second trimester, with only 9 (6%) in their first trimester.

Table 1. Demographics of the respondents showing frequency of some variables

Variables	Frequency (%)
Age	
15-19	24 (16)
20-24	18 (12)
25-29	43 (28.6)
30-34	26 (17.3)
35-39	14 (9.3)
40-44	16 (10.6)
45-above	9 (6)
Occupation	
Civil service	18 (12)
Farming/cattle rearing/fishing	10 (6.6)
Petty trading/Hawking	38 (25.3)
Student	22 (14.6)
Unemployed/Housewife	64 (42.6)
Educational status	
No formal education	119 (79.3)
Primary	2 (1.3)
Secondary	5 (3.3)
Tertiary	24 (16.0)

In Table 3, all the women reported to be aware of malaria 150 (100%). 111 (74%) of the respondents got the awareness through personal experience while the rest 39 (26%) through awareness campaigns either in hospitals or community centers, media outlets. 116 (77.3%) were observed to be used to treated net and mosquito coil while 27 (18%) used mosquito coil. Furthermore, 134 (89.3%) reported to take preventive drugs, with others 16 (6.6%) in the negative affirmation with significant difference of P<0.0001.

The age of the respondents in relation to malaria prevalence in Table 4 show that the age range 25-29 have the highest prevalence of malaria 39(26%) and closely followed by 30-34 having a prevalence of 23(15.3%) with the least prevalence 1(0.6%) observed in the age range 15–19, though, statistical analysis showed no significant difference (x^2 = 4.162, df = 6 p >0.05) indicating no relationship between their age and degree of exposure to malaria parasite.

Table 2. Pregnancy history of respondents

	Categories	Frequency (%)
Gravidity	Primigravidae	29 (26.8)
	Secundigravidae	16 (14.8)
	Multigravidae	63 (58.3)
Gestational age of pregnancy	First trimester	9 (6)
	Second trimester	87 (80.5)
	Third trimester	12 (8)

Table 3. Knowledge, attitude and practice of the respondents to malaria

Variables	Frequency (%)
Malaria awareness	
Yes	150 (100)
No	0
Source of awareness	
Media (radio, television, newspaper)	0
Awareness campaign (hospital/community centre)	39 (26)
Personal experience	111 (74)
Preventive measures adopted	
Treated net	7 (4.6)
Mosquito coil	27 (18)
Mosquito coil/treated net	116 (77.3)
Use of preventive drugs	
Yes	134 (89.3)
No	16 (10.6)

Table 4. Age of respondents in relation to prevalence of malaria

Age	No. Examined %	No. Infected (%)
15-19	24(16)	1(0.6)
20-24	18(12)	14(9.3)
25-29	43(28.6)	39(26)
30-34	26(17.3)	23(15.3)
35-39	14(9.3)	12(8)
40-44	16(10.6)	11(7.3)
45 and above	9(6)	8(5.3)
Total	150	108(72)

(X^2 = 4.162; df = 6; p = 0.6548)

Table 5. Prevalence of malaria by trimester

Trimester	No. Examined	No. Infected (%)
First trimester	9	3 (2)
Second trimester	129	95 (63.3)
Third trimester	12	10 (6.6)
	(X^2 = 0.4983; df = 2; p = 0.7795)	

Table 6. Gravidity of the participants

Variable	Frequency (%)
1 -5	93(62)
6 – 10	45(30.0)
11 and Above	12(8)

Table 7. Prevalence of malaria by gravidity

Gravidae	No. Examined	No. Infected (%
Primigravidae	20	8 (5.3)
Secundigravidae	27	12 (8)
Multigravidae	103	88 (58.6)
	(X^2= 27.310; df = 2; p = 0.0001)	

Prevalence of malaria by trimester in Table 5 showed women in their second trimester to have the highest malaria prevalence 95(63.3%) with least in the first trimester 3(02%). The statistical analysis showed no significant difference (x^2 = 0.4983; df = 2; p> 0.005) revealing no relationship between trimester and malaria prevalence.

Based on gravidity of the participants in Table 6, women having around 1-5 pregnancies had the frequency of 93(62%) and least of 12(8%) in those with 11 and above pregnancies. Prevalence of malaria by gravidity in Table 7 showed women in their second pregnancy (primigravidae) to have the least prevalence of 8(5.3%), while multigravidae has the highest prevalence 88(58.6%). Moreover, the statistical analysis indicated a significant difference (X^2= 27.310; df = 2; p = 0.0001), thus, showing a parasite burden between gravidity and malaria prevalence.

3.2 Discussion

The incidence level of malaria in this study is related largely to the poor environmental conditions as well as personal cleanliness according to the sociodemographic level. Malaria prevalence among pregnant women recorded in this study is 72%. This rate is observed to be higher than previous studies of [9,10,11] which both reported 11%, 20%, 41% in Owerri, Anambra and Abia. These perceived differences could be linked to varying climatic conditions, less rainfall and surface water that enhances the survival, multiplication and activity of the vector [11]. The prevalence of malaria observed in this study could be due to lack of proper drainage systems and persisting stagnant water bodies which serve as a suitable breeding habitats for mosquitoes that vector malaria parasite in the study area. The high prevalence in this study compared to the aforementioned may be attributed to the increase in the benefits of attending antenatal clinics, the use of treated nets in combination with other preventive measures as well as the use of prophylactic drugs (Pyrimethamine-Sulfadoxine) as reported by the women. The age group of 25-29 years has the highest malaria prevalence followed by 20-24 years. This outcome is in line with earlier reports of [12], who reported that age range 24years had the highest infection risk. Low malaria prevalence in older pregnant women (above 30) is similar to previous study by [13,14]. This difference in prevalence among the age groups may be attributed to the level of acquired immunity which increases with ages, and this could confer protection against malaria infection [15]. On the basis of gravidity, multigravidae had the highest infection rate and does not corroborates with the findings of [16,11].

4. CONCLUSION

The present study revealed a high prevalence of malaria among pregnant women, thus elucidating the continuous threat that malaria pose to the well-being of pregnant women. It can be inferred that so many inter-related factors predisposes pregnant women to malaria infection and thus contribute to the burden of pregnancy outcome.

CONSENT AND ETHICAL APPROVAL

Ethical clearance was obtained from both Patients and Department of Public health, Dutsin-ma Katsina state with serial number DPH/013/1020. Ethical clearance was also obtained from the Patients inform of Written informed consent after the purpose and importance of the study were explained. To ensure confidentiality participant data were linked to a code number.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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