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Prevalence and Management Outcomes of Malaria among Different Age Categories Accessing Healthcare Services in a Private Secondary Health Facility in Nigeria

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ABSTRACT

Background

Malaria remains a Public Health challenge in Sub-Sahara Africa causing high mortality and morbidity. This study looks at the Prevalence and Management Outcomes of malaria cases that presented by different age categories at a Private Secondary Hospital by the residents of Agbani Road, Enugu state.

Methodology

This is hospital based cross-sectional retrospective study of patients who presented with fever from Month of January 2017 to Month of December, 2020. Malaria Diagnosis was made by WHO recommended RDT test kits and Microscopy, Structured questionnaire was used to collect information on Long Lasting Insecticidal Nets (LLINs) use from all the patients who patronize the hospital. All malaria positive cases were treated according to Malaria Treatment Guidelines. Analysis of data was done by SPSS.Version22.

Results

Out of 678 febrile Patients, 65% (443/678) stronglytested positive to malaria: P-value = 0.00135. 50% (221/443) malaria cases, 68% (70/103) admitted cases, 78% (31/40) complicated cases and 91% (10/11) death respectively occurred moreamong < 10years and pregnant mothers. 89% (396/443) successful treatment rate was achieved (P=0.000) and 83% (39/47) of resistantmalaria responded to antibiotics, P-value0.0001).9% (40/443) of the treated cases and Only 1 % (7/73) of cases who use LLINs returnedwith malaria within 28days.

Conclusion

Malaria Prevalence and outcomesis worseamong < 10 years and pregnant mothers and some anti-malaria resistant cases responded to antibiotics.LLINs use reducesprevalence of malaria re-infection in this setting.

Keywords: *Malaria;Prevalence; Management outcomes; Agbani Road; Enugu State; Nigeria.*

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INTRODUCTION

Malaria remains Public Health challenge in sub-Sahara Africa due to high mortality and morbidity especially when presented late to a health facility for treatment.[1] According to the latest World malaria report, released in November 2018, there were 219 million cases of malaria in 2017, up from 217 million cases in 2016. The estimated number of malaria deaths stood at 4,35,000 in 2017.Stratification of World malaria pictures shows that 97 countries and territories, half of the world (3.2 billion) is at risk. Globally, 125 million women are at risk of malaria every year. 10,000 cases of malaria-related deaths and anaemiain pregnancy, the burden of malaria is highly concentrated in sub-Saharan Africa, there were an estimated 405 000 deaths from malaria globally with children under five accounted for 67% (2,72,000) of all malaria deaths worldwide. Nigeria account for 173.6million cases of malaria (Abt 87% of African burden).[1]

In Africa, 30 million pregnant women lives in malaria-endemic areas. According to,[3] malaria causes up to 2,00,000 new-born death and 10,000 maternal deaths. It causes 38 % severe anaemia and death in pregnancy.[2] Malaria is a risk for 97% of Nigeria's population and there are an estimated 100 million malaria cases with over 300,000 deaths per year in Nigeria. In Nigeria, Plasmodium falciparum is the predominant parasite species, mainly transmitted by Anopheles gambiae S.S., An. funestus and An. arabiensis. Although limited impact of interventions was documented, and available data was insufficient to clearly define the country's current malaria epidemiological profile. However, the 2010 Nigeria Malaria Indicators Survey (NMIS) revealed that malaria parasite prevalence is still high. Average parasite prevalence is 42% among children under five years of age with zonal variations ranging from 27.6% in the South-east to 50.3% in the South-west geopolitical zone.[3,4]

In line with Malaria case management protocol, all suspected malaria cases should have a parasitological test (microscopy or RDT) to confirm the diagnosis.[5-12] Deployment of both microscopy and RDTs should be supported by a quality assurance programme; The results of parasitological diagnosis should be available within less than two hours of the patient presenting in a health facility. In the absence or delay, patients with suspected severe malaria, and other high-risk groups, should be treated on clinical grounds.[6,12] The recommended ACTs for treating children and adults with uncomplicated P. falciparum malaria (excluding pregnant women in their first trimester)are: Artemether plus Lumefantrine; Artesunate plus Amodiaquine; Artesunate plus Mefloquine; Dihydroartemisinin plus Piperaquine; Artesunate plus Sulfadoxine-Pyrimethamine.[6,12]

Case managements of malaria has key challenges ranging from non-compliance with the malaria diagnosis and treatment policy and guidelines- including continued use of mono-therapies such as Chloroquine, low parasite-based diagnosis, and absence of pre-referral treatment for severe malaria especially at community level; frequent stock-out of ACTs and diagnostics; inconsistent conduct of malaria medicines therapeutic efficacy studies; irregular post market surveillance of ACTs; Large proportion of health workers not trained or retrained in malaria case management and limited post training monitoring of health workers; poor knowledge of signs for referral of severe malaria in rural areas; absence of diagnosis Quality Assurance and Quality Control (QA/QC) system to malaria, Pharmacovigilance system and quality of care monitoring system.[5,6]

Malaria prevention in pregnancy still suffers absence of designated programme management personnel and Non-attainment of universal coverage with Intermittent preventive treatment in pregnancy (IPTp); absence of a plan or budget for Malaria in Pregnancy (MIP)at State or LGA level; persisting reports of Sulfadoxine/Pyrimethamine (SP)stock-outs and irregular supply of LLINs for routine distribution through the ANC channel; and absence of community approach to delivery of MIP services (including IPTp and case management) engendering a form of social exclusion of women with faced with economic and cultural barriers to facility-based care.[7] There seems to be high increase in malaria burden in private hospitals hence researches at private hospitals are considered very important especially in low resources settings.

Majority of malaria cases in Nigeria present at the private hospitals due to the poor state of the healthcare delivery system which reflects the declining standards and facilities at the Federal, State and Local Government Level.[8] The services provided at these public health facilities are generally perceived by members of the public as being very poor[9,10] hence the documented high use of private hospitals by patients.[11]

At Health Solution Specialist Hospital located at Agbani Road of Enugu state, there is a noticed increase in the reported cases of malaria, resistance to malaria treatment as well as observed malaria complications despite compliance to the malaria treatment guidelines. Also noted is that malaria management outcomes for different age groups categories of patients who presented at the hospital ranges from discharge, resistant to anti- malaria, referrals, complications, abortion in pregnant mothers, low birth weight to death in some cases. The concomitant rise in malaria burden as well as observed increase in non-malarial fever and changing epidemiology of malaria and treatment outcomes in malaria in different age categories at the hospital informed the decision for this research in order to have a better insight the outcomes.

Therefore, this study was designed to take a critical look at the prevalence and management outcomes of malaria cases presented by different age categories at this hospital among the residents of Agbani Road of Enugu state, Nigeria with a view to enhancing better understanding of the malaria cases and its evolving epidemiology while providing evidence for better patients' managements in similar settings in Nigeria

METHODOLOGY

Study Design

The study was a cross-sectional retrospective hospital based study involving all patients who presented with fever at the Health Solution Specialist Hospital from Month 2017 to Month 2020. This design is indicative here because it makes the study of many respondents possible and quicker.

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Study Area

The Health Solution Specialist Hospital is a private specialist hospital located at Agbani Road in Enugu metropolis. The Agbaniroad is one of the thickly populated areas in the metropolis. It spans from Ziks Avenue to Awkunanaw in Gariki area of the metropolis. Agbani road is located in Enugu South Local government area of the state. It has many settlements and streets with urban and urban slums within the area. Occupations of the residents are predominantly civil service, traders and artisans. Private hospitals, Patent Medical Vendors with Pharmacies including Traditional Birth Attendants are offering medical services in the area due to the reasons outlined in.[9-11]

The hospital has six departments dully registered by Enugu state government to carry out specialized services. It has a Board headed by a Chairman and the Chief Medical Director that directs the day-to-day management of the hospital. The six different departments have head of department that reports to the CMD through the Medical Team Leader for medical related issues, and through the Director of Administration for non-medical related issues. The hospital has main headquarter at 238 Agbaniroad and other three out-station clinics located at Achara Layout, Asata Enugu and Presidential road. The staff strength of the hospital is 35.

Population of Study

The study populations were all the patients who patronized the hospital from month of January 2017 to month of December , 2020 whose names appeared on both out and in- patient hospital registers. At the time of the study, a total patient population of 2325 was recorded from ICT Department of the hospital.

Sampling Procedure

Here, 820 patients out of total of 2,325who patronized and presented to the hospital had fever while only 678 (83%) out of these 820 patients with fever were purposively selected and studied because of consistent medical information in the folders. This sample was stratified into nine different groups based on their ages which range from under -five to above 60 years of age. A total of nine age -groups including pregnant mothers were studied. The study population was also stratified by sex and by their use of long lasting insecticidal Nets-LLINs as shown below: Table 1.

Data Collection

Desk review of all medical records including out-patients' and in-patients' records domicile at ICT department of the hospital was done to collect the demographic and malaria indicator data. Treatment case notes of all the patients were reviewed to collect the treatment and management outcome information of the study patients. As a policy and being a malaria friendly hospital, structured questionnaire was used to collect Long Lasting Insecticidal Nets (LLINs) use information from all the patients who patronize the hospital. All records of the selected patients with Nursing, Pharmacy, Doctors, Laboratory scientists, Administration staff, Dieticians and Physiotherapist departments were reviewed. Laboratory documents and results with patients' detailed case notes were used to obtain the malaria specific information including symptoms, drugs and progress reports. Malaria diagnosis was made by quality assured WHO recommended RDT test kits and microscopy. All positive cases were treatment in-line with Nigeria malaria treatment protocols.

Ethical Consideration

The Ethical Committee of Enugu State Ministry of Health and that of Central Washington College–Tutorial Centre of the University of America gave approval for this study. Administrative permit for the study was obtained from the management of the hospital.

Data Analysis

Data entry was done with Epi Info version 3.5.2 and subsequently the data was analyzed with SPSS version 22. Quantitative data - During the analysis, coding and grouping by sex, age and pregnancy was done for ease of analysis. The patients' ages were grouped into nine categories viz: >5yrs, 6-10yrs, 11-20yrs and 21-30yrs, 31-40year, 41-50yrs, 51-60yrs, >60 years, pregnant mothers for the generation of frequency table. Pearson moment correlation analysis was used to assess the degree of association between the variables. The statistical significance was set at p-value < 0.05.[Table 2-4]

Table 1. Age distribution of study groups.

S/N	Age	# of patients with Fever	Malaria Positive cases (RDT/Microcopy)	Female	Male	# of patients that Use LLINs
1	0-5**	129	83	31	52	14
2	6-10**	181	138	61	77	12
3	20-Nov	65	44	20	24	6
4	21-30	25	20	15	5	5
5	31-40	87	56	26	30	9
6	41-50	41	23	17	6	2
7	51-60	38	22	10	12	1
8	>60	37	12	4	8	3
9	Pregnant Mothers	75	45	45	0	21
Total	9	678	443	229	214	73
** 0-5 and 6-10 represents children0-10 years' age category						

Table 2. Prevalence of symptoms of Malaria among different age categories.

Age	Fever/Shivering/Chills	Headache	Dizziness	Joint pain/ muscle pains	Abdominal pain / Vomiting	Pallor Jaundice	Convulsion/ unconsciousness	Painful eyes	Loss of appetite/ bitterness of mouth	Sweating Weakness
0-5	83	40	16	18	75	35	39	1	67	35
10-Jun	138	34	107	111	19	16	59	6	130	100
20-Nov	44	12	10	12	16	12	4	2	29	40
21-30	20	10	10	13	6	7	3	1	19	20
31-40	56	23	30	32	33	13	7	3	50	47
41-50	23	11	12	18	17	10	2	2	12	20
51-60	22	10	3	4	2	6	3	1	18	19
>60	12	2	1	1	3	2	0	0	10	12
Pregnancy	45	31	43	32	23	25	1	2	45	41
Total	443	173	232	241	194	126	118	18	380	334
Loss of appetite, bitterness of mouth, Sweating, Weakness, Joint pain, muscl pains and dizziness are most common symptoms of malaria presentations in this setting.										

Table 3. Prevalence of management outcomes among different age categories.

Age	# of patients that Responded to anti-Malaria only	# of patients Resistant to Malaria treatment only	Anti-malaria Resistant cases that responded to combined anti-malaria and antibiotics	# patients admitted in hospital	Referred To another Specialist Hospital	Patients that Came back less than 28 days after first treatment	Patients that Came back with malaria more than 28 day after first treatment	# of cases that had complication of malaria (transfusion, organ failures etc	# of pregnant women with tion(abortion, miscarriage, low birth weight etc	# of malaria death
0-5	74	9	8	27	2	12	3	17	0	5
10-Jun	126	12	10	30	1	9	2	6	0	4
20-Nov	38	6	5	7	0	2	1	2	0	0
21-30	19	1	1	2	0	3	1	3	0	0
31-40	52	4	3	12	0	2	1	1	0	0
41-50	21	2	2	3	0	2	6	2	0	0
51-60	19	3	2	4	0	1	4	1	0	1
>60	10	2	1	5	0	1	5	0	0	0
Pregnancy mothers	37	8	7	13	5	8	12	8	8	1
10-Jun	396(89%)	47(11%)	39	103	8	40	35	40	8	11
Treatment Outcome of all positive cases of malaria.										

Table 4. Showing analysis of correlation of age distribution of respondents and management outcomes.

		Age	Responded to antimalarial	Patients Resistant to Malaria treatment only	Resistant cases that responded to anti-malaria and antibiotics	Patients admitted in hospital	Referred_To_specialist_Hospital	Came_back_less_than_28_days_after_treatment	Came_back_more_than_28_day_after_treatment	Cases_with_complications	pregnant_women_with_complication	Malaria deaths
Age	Pearson Correlation	1	-0.077	-0.033	-0.039	-0.009	-.141**	-0.037	-.361**	0.009	-.305**	0.067
	Sig. (2-tailed)		0.128	0.51	0.436	0.865	0.005	0.458	0	0.858	0	0.181
	N	395	395	395	395	395	395	395	395	395	395	395
Responded_to_anti-Malaria	Pearson Correlation	-0.077	1	.951**	.888**	.619**	.114*	.525**	.263**	.576**	.280**	.461**
	Sig. (2-tailed)	0.128		0	0	0	0.024	0	0	0	0	0
	N	395	395	395	395	395	395	395	395	395	395	395
Patients_Resistant_to_Malaria_treatment_only	Pearson Correlation	-0.033	.951**	1	.933**	.588**	.123*	.529**	.194**	.556**	.238**	.435**
	Sig. (2-tailed)	0.51	0		0	0	0.015	0	0	0	0	0
	N	395	395	395	395	395	395	395	395	395	395	395
R_cases_respond_to_antimalaria_antibiotics	Pearson Correlation	-0.039	.888**	.933**	1	.549**	.136**	.517**	.186**	.545**	.197**	.467**
	Sig. (2-tailed)	0.436	0	0		0	0.007	0	0	0	0	0
	N	395	395	395	395	395	395	395	395	395	395	395
Patients_admitted_in_hospital	Pearson Correlation	-0.009	.619**	.588**	.549**	1	.160**	.374**	.310**	.508**	.242**	.285**
	Sig. (2-tailed)	0.865	0	0	0		0.001	0	0	0	0	0
	N	395	395	395	395	395	395	395	395	395	395	395
Referred_To_specialist_Hospital	Pearson Correlation	-.141**	.114*	.123*	.136**	.160**	1	.309**	.484**	.130**	-0.021	.194**
	Sig. (2-tailed)	0.005	0.024	0.015	0.007	0.001		0	0	0.009	0.682	0
	N	395	395	395	395	395	395	395	395	395	395	395

Came_back_less_than_28_days_after_treatment	Pearson Correlation	-0.037	.525**	.529**	.517**	.374**	.309**	1	.300**	.471**	-0.048	.402**
	Sig. (2-tailed)	0.458	0	0	0	0	0		0	0	0.339	0
	N	395	395	395	395	395	395	395	395	395	395	395
Came_back_more_than_28_day_after_treatment	Pearson Correlation	-.361**	.263**	.194**	.186**	.310**	.484**	.300**	1	.239**	.221**	.232**
	Sig. (2-tailed)	0	0	0	0	0	0	0		0	0	0
	N	395	395	395	395	395	395	395	395	395	395	395
Cases_with_complications	Pearson Correlation	0.009	.576**	.556**	.545**	.508**	.130**	.471**	.239**	1	.309**	.504**
	Sig. (2-tailed)	0.858	0	0	0	0	0.009	0	0		0	0
	N	395	395	395	395	395	395	395	395	395	395	395
pregnant_women_with_complication	Pearson Correlation	-.305**	.280**	.238**	.197**	.242**	-0.021	-0.048	.221**	.309**	1	0.085
	Sig. (2-tailed)	0	0	0	0	0	0.682	0.339	0	0		0.092
	N	395	395	395	395	395	395	395	395	395	395	395
Malaria_deaths	Pearson Correlation	0.067	.461**	.435**	.467**	.285**	.194**	.402**	.232**	.504**	0.085	1
	Sig. (2-tailed)	0.181	0	0	0	0	0	0	0	0	0.092	
	N	395	395	395	395	395	395	395	395	395	395	395
**. Correlation is significant at the 0.01 level (2-tailed).												
*. Correlation is significant at the 0.05 level (2-tailed).												
Results from analysis above shows there is a positive correlation between age of respondents and management outcome of malaria at 5% significance level.												

DISCUSSION

678 Patients of Female: Male ratio of 52:48 who presented with fever in the hospital was enrolled in this study. This shows that febrile illness does occur nearly equally in both sex as noted in work done by.[13] This study also revealed that malaria was responsible for more than 81%(103/127)of the total hospital admission in this setting as reported in study done in Ethiopia.[13-32] 65%(443/678)of all the patients with febrile illness tested positive to malaria while 33%(223/678) were negative and 2%(12/223) had invalid or indeterminate results.23%(103/443)out all the positive Malaria cases had severe malaria hence were admitted at the hospital for proper management. These results therefore revealed that the Prevalence and burden of Malaria is high among these communities as noted in,[14] However more Prevalence rates have been reported in other studies done in Enugu of which one of them reported more than 95% prevalence rate.[15] 50%(221/443) of all cases occurred among

age group (< 10years)and pregnant women, This research shows that < 10years and pregnant mothers are more vulnerable which was supported by studies done in.[16] This means that a new evolving change in the Epidemiology of malaria in this settings has been documented as such should be sign of concern to scientists, However, many other studies reported that children lesser than 5 years of age and pregnant mothers are more vulnerable to malaria as noted in[17] studies done insub-Saharan Africa. This study also found that 78%(31/40) of complicated malaria as well as 68%(70/103) hospital admission for severe malaria and 91% (10/11) malaria death occurred among same groups especially among those who presented late which is line with the findings in study.[18] This high mortality rate has been documented in[19] studies but < 5 years and pregnant mothers were implicated more. It therefore means that special attention should be paid to this newly evolving epidemiology which may be as a result of anti-malaria abuse.

Among the positive cases, 89% (396/443) successful treatment rate was achieved meaning that ACT used according to approved treatment protocol and guidelines is still very effective in management of malaria in this setting as noted in.[20] However, the recorded 11% treatment failure may be associated with poor compliance to treatment regimen by patients as noted in.[21] Also very critically implicated is the availability of many anti-Malaria drugs in the market that are poorly regulated which resulted in availability of mono therapy being purchased and used by patients. The use of these sub-standard drugs by patients were influenced by cost since it plays important role to the type of anti-malaria being used by the patients as noted in,[22] The research revealed that 83% (39/47) of the malaria cases that failed to respond to anti-malaria were sensitive to antibiotics which agrees with work done in.[23] It therefore implies that clinicians should consider all non -malaria febrile illness as bacterial infectious disease as such should consider appropriate antibiotics as next line of action should it occurs in similar settings. 9% (40/443) of the treated cases came back with fever in lesser than 28days as re-infection at the hospital with Positive Malaria result. Among 16% (73/443) of positive cases who use LLINs, only 1 % (7/73) returned with fever in lesser than 28 days. This study therefore revealed that the LLINs use among this setting is very low since only 16% of all the patients use LLINs as noted in the post-LLINs assessment survey done in.[24,25,31] The patient who returned lesser than 28 days may be a re-infection as noted in the study done in,[26] Despite the fact that the LLINs use is very low, it still offers a significant protection to the people since those who use LLINshas small proportion that returned to the hospital. The finding therefore supported the claims that LLINs use reduces burden of malaria as noted in same studies done in.[27-31]

CONCLUSION

This research revealed that there could be changing Epidemiology in malaria presentation in this setting. It also noted that all the classical symptoms of malaria were very evident with malaria still leading in total number of hospital admissions in this setting. It has shown as well that ACTs are effective in treatment of malaria especially when used in line with the approved case management protocols. It is also very important of note that all cases of resistant malaria to anti-malaria treatment responded well to antibiotics hence scientists are advised to consider this as a management options when dealing with malaria resistance strains. This study has shown that malaria Prevalence is more among < 10 years of age in this community. Therefore, scientists should be wary of non -malaria fever outcomes emerging in this setting with special emphasis on the use LLINs to reduce the burden. Very important to note is that most of the complicated malaria occurred among patients who presented late as such health education of the community is very important to promote early presentation at the hospitals. Limitation of this study lies in the use of one private secondary hospital for this study. It therefore recommended another study in the same or similar setting involving many private hospitals for better understanding and consolidation of the evidence therein.

Despite these limitations, this study has provided a good guide for clinicians in making evidence-based decisions in management of malaria cases in similar settings. Therefore, scientists should be wary of new change in the epidemiology of malaria as well take special note of non -malaria fever outcomes that respond to antibiotics that is gradually emerging in this setting. An emphasis should be laid on the use of Long-Lasting Insecticidal Nets-LLINs to reduce frequency visits to hospital.

CONFLICTS OF INTEREST

None.

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