PHYSICIANS' COMPLIANCE WITH ANTI-MALARIAL
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CHILDREN ATTENDING SECONDARY HEALTH
FACILITIES IN SOKOTO METROPOLIS

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ABSTRACT

Introduction: Rational use of drugs against most common and life‑threatening tropical diseases such as malaria remains a huge challenge, particularly in sub-Saharan African region. The correct use of antimalarial drugs is the key not only to therapeutic success but also to deterring the spread of drug resistance malaria.

Aims: To assess the physicians' compliance with the national anti'-malaria treatment guidelines among Under five (U-5) years children in secondary health facilities in Sokoto metropolis.

Methods: This was a cross-sectional study conducted as an exit interview among 292 mothers/caregivers of febrile U-5 children with antimalarial prescription, that presented to the out-patient clinics of the selected secondary health facilities in Sokoto metropolis. Simple random sampling technique using balloting option was used to select 2 secondary Health facilities in the metropolis, Proportionate allocation was done to allocate study subjects to the selected Health facilities based on average weekly outpatient attendance. The data was collected using an interviewer-administered questionnaire. Descriptive statistics was used to analysed data using IBM SPSS version 22.

Results: Of the 292 children, only 115(39.4%) had malaria parasite test requested by the physician, out of which 63(54.8) had microscopy, while 52(45.2) of the children had malaria Rapid Diagnostic Test (mRDT). One hundred and eighty-five (65.1%) of the children were treated presumptively with anti-malarial drugs. Artemisinin based Combination Therapy (ACT) was prescribed in 221(77.8%) of the under-fives. The commonest prescribed ACT was Artemether-Lumefantrine in 113(77.4%) of the children. Majority 263(92.6%) of the prescriptions were in brand names.

Recommendation: The physicians' compliance with national malaria treatment guidelines using the proportion of U-5 children was suboptimal. There was over prescription of anti-malarial drugs, as majority of the patients treated for malaria had no laboratory evidence for the treatment. However, compliance with the use of ACT was good. This study shows also suboptimal compliance with WHO prescribing indicators with respect to prescription in generic names. Regular training of the health care providers by the government is recommended to improve adherence to antimalarial treatment guideline.

Keywords: *Physicians; Compliance; Anti-malarial; Treatment Guideline; Under five years: Sokoto*

INTRODUCTION

Malaria is the commonest cause of hospital attendance in all age groups in all parts of Nigeria.[1] It is also one of the four commonest causes of childhood mortality in the country, the other three being pneumonia, diarrhoea and measles.[2] It is estimated that 50% of the population has at least one episode of malaria each year while children under 5 have on the average of 2–4 attacks in a year.[3] Malaria have been shown to be the leading cause of hospital admission and also the leading cause of death accounting for 24.0% mortality in children in Sokoto.[4] Transmission of malaria is more intense in the wet season especially in the northern part of the country.[4,5] The outcome of the 2002–2004 drug efficacy research conducted in the six geopolitical zones in Nigeria showed a high level of resistance to antimalarial drugs especially chloroquine that ranged from 5.8% to 96.3%, this report led to the change in the national antimalarial treatment policy in the year 2005 to artemisinin‑based combination as a first line medication against malaria recommended by WHO.[3] Despite considerable efforts throughout the century to control malaria, it is still the most prevalent and most devastating disease in the tropics mainly due to poor therapy or irrational drug use.[6]

There were an estimated 229 million cases of malaria worldwide and malaria deaths stood at 409 000 in 2019, children under the age of 5 (U-5) years are the most vulnerable group affected by malaria and accounted for 274 000 (67%) of all malaria deaths worldwide.[7] *Plasmodium falciparum* account for about 99.7% of malaria in Africa,[7] *Plasmodium malariae* accounts for almost 2% of infections, while *Plasmodium ovale* is rare, accounting for approximately 0.2% of all infections, mixed infections account for 4%.[8] Sub Saharan Africa accounted for 94% of global cases of malaria[9] and 94% of world malaria deaths, of which 67% were children under five.[7,10] Malaria is endemic in Nigeria, It is caused by a protozoan of *Plasmodium specie* the *Plasmodium falciparum, plasmodium malariae, plasmodium ovale and plasmodium vivax*.[3] In 2019, 6 countries accounted for approximately half of all malaria deaths worldwide: Nigeria (23%), the Democratic Republic of the Congo (11%), United Republic of Tanzania (5%), Burkina Faso (4%), Mozambique (4%) and Niger (4%).[7]

The primary goal of treatment in malaria is to cure the patient of the infection and thereby reduce morbidity and mortality, a second purpose is to encourage rational drug use to prevent or delay the development of antimalarial drug resistance.[3] Resistance to both insecticide‑treated net and common antimalarial agents in addition to other factors such as increased production and consumption of substandard and fake drugs, financial and budgetary constraints by some heads of government, market inefficiency, distortions, behaviour of health systems and lack of effective vaccines are responsible for persisting threat pose by malaria.[11] Studies have shown that presumptive treatment of febrile patients is associated with high levels of antimalarial overuse and development of resistance.[12]

Presumptive diagnosis and treatment of childhood fevers by health care providers may be attributed to the high endemicity of malaria, perceived delay in laboratory test results, non-availability of diagnostic test kits (RDTs) in consulting rooms, as well as doubts about their reliability.[12,13] Although several strategies are presently available for the control of the disease, one strategy that has been consistently used in the last three and a half centuries is chemotherapy.[3] Malaria is an eminently preventable, treatable and curable infection, drugs and other interventions for its prevention and treatment are widely available, many of these are easy to apply and are affordable and accessible, there is therefore, no justification for this country to continue to suffer under the severe disease and economic burden brought upon by malaria.[3]

Rational use of drugs against most common and life‑threatening tropical diseases such as malaria remains a huge challenge, particularly in sub-Saharan African region.[1] The correct use of antimalarial drugs is the key not only to therapeutic success but also to deterring the spread of drug resistance malaria.[14]

This study was carried out to assess the physicians' compliance with the national anti'-malaria treatment guidelines among U-5 children in secondary Health facilities in Sokoto metropolis.

Materials and Methods

Sokoto state, one of the 36 states in Nigeria is located in the extreme North-West of the country. It is bordered to the north by Niger Republic, Zamfara state to the east and Kebbi State to the south and west. The metropolitan city of the state has a total of 5 LGAs and 6 secondary health facilities (HFs) unevenly distributed across the metropolitan LGAs. The state has a projected population of 5,474,534, and total number children under five years in the state is 1094907. Sokoto metropolis is estimated to have a projected population of 427,760 people and 85,552 children U5.[15]

This cross-sectional study was carried out among children under 5 years attending outpatients' clinic in selected secondary health facilities in Sokoto metropolis, Sokoto State. The sample size was estimated at 292 using the Cochran formula for calculating the sample size for cross-sectional studies.[17] A 56.8% prevalence of physician's compliance with anti-malarial treatment guidelines among under five children from a previous study,[18] a precision level of 5%, and an anticipated 95% response rate were used. Simple random sampling technique using balloting option was used to select 2 out of 6 HFs in the metropolis (Specialist Hospital and Maryam Abacha WCWC) were selected. Proportionate allocation was done to allocate study subjects to the selected HF based on average weekly outpatient attendance. Mothers/caregivers of U-5 children who presented at the outpatient clinics in the selected health facilities during the period of the study were interviewed and their prescription forms were collected and sorted out following their exit from the doctor's consulting room. Those that had drug prescription for treatment of malaria were consecutively selected and enrolled in to the study until the sample size allocated for the respective health facilities was obtained. A set of semi-structured, interviewer administered questionnaire was used to obtain information on the Socio-demographic characteristics, brief history of illness and type of malarial treatment as seen on the prescription form of the study participants (U5 children). The questionnaire was reviewed by senior researchers in the department to ascertain content validity. It was then pretested on 30 patients attending outpatients' clinic in another Secondary HF not selected for the study. Some questions were rephrased for clarity based on the observations made during the pretesting. Six staff of Health Information Management Departments assisted in questionnaire administration after pre-training on conduct of survey research, the study objectives, and questionnaire administration. Ethical clearance for the study was obtained from Sokoto State Research and Ethics committee. Permission to carry out the study was sought from the authorities of the selected HFs where the study was conducted, while written informed consent was obtained from the mothers/caregivers of the study participants before data collection.

Data were entered into and analysed using the IBM® SPSS Statistical Package version 22.

RESULTS

Majority 101(34.6%) of the under-five children in this study that had history of febrile illness were within the age range 1-12 months. The mean age of the children was 20.9±15.2 months. There were 158(54.1%) male children and 134(45.1%) female children, Male to Female ratio is 1:0.8. One hundred and seventy- six (60.3%) of the mothers/caregivers were between the age of 31-40 years and only 9(3.1%) were ≤ 20 years. The mean age of the respondents was 34.02±6.4 years, majority 249(85.2%) of the caregivers were the mothers of the U5 years children. Most 200(68.5%) of the respondents were Hausa's and Muslims 256(87.7%). Highest proportion 122(41.8%) of the respondents had secondary school level of education, while 41(14.0) had qur'anic education, only 8(2.7%) had no any form of education. One hundred and four (36.6%) of the respondents were full time housewives, 77(26.4%) were civil servants. (Table 1).

Table 1: Sociodemographic characteristics of the respondents

Variable	Frequency	Percent (%)
CHILDREN (n = 292)		
Age in months		
1-12	101	34.6
13-24	82	28.1
25-36	47	16.1
37-48	34	11.6
49-59	28	9.6
Sex		
Male	158	54.1
Female	134	45.9
MOTHERS/CAREGIVERS (n = 292)		
Age in years		
≤20	9	3.1
21-30	72	24.7
31-40	176	60.3
>40	35	12.0
Sex		
Male	79	27.1
Female	213	72.9
Tribe		
Hausa	200	68.5
Yoruba	45	15.4
Igbo	35	12.0
Others	12	4.1
Religion		
Islam	256	87.7
Christianity	36	12.3
Relationship to the child		
Mother	249	85.2
Father	11	3.8
Relation	28	9.6

Others	4	1.4
Educational level		
None	8	2.7
Qur'anic only	41	14.0
Primary	13	4.5
Secondary	122	41.8
Tertiary	108	37.0
Occupation		
Civil servant	77	26.4
Business	31	10.6
Farmer	9	3.1
Labourer	23	7.9
Student	37	12.6
Full housewife	104	35.6
Others	11	3.8

Fever was the commonest presenting symptom among the children of the respondents 292(100%), followed by malaise 264(90.4%), loss of appetite 268(91.8%), prostration 130(44.5%), chills and rigors 149(51.0%), convulsion 63(21.6%), headache 113(38.7%), joints pain 28(9.6%) and other lesser complains 4(1.4%).

Table 1: Common presenting symptoms of children treated for malaria

Variables	Frequency (n = 276)	Percentage (%)
Fever		
Yes	292	100
No	0	0
Malaise		
Yes	264	90.4
No	28	9.6
Loss of appetite		
Yes	268	91.8
No	24	8.2
Prostration		
Yes	130	44.5
No	162	55.5
Chills and rigors		
Yes	149	51.0
No	143	49.0
Vomiting		
Yes	139	47.6
No	153	52.4
Convulsion		
Yes	63	21.6
No	229	78.4
Headache		
Yes	113	38.7
No	179	61.3

Joint pain		
Yes	28	9.6
No	264	90.4
Others		
Yes	4	1.4
No	288	98.4

One hundred and fifteen (39.4%) of the 292 children had malaria parasite test requested by the physician, out of which 63(54.8) had microscopy, while 52(45.2) of the children had malaria Rapid Diagnostic Test (mRDT). Of the 52 children that had malaria test with mRDT it was positive in 37(71.2%), while in 63 of the children that had malaria parasite test done using microscopy it was positive in 50(80.0%). Two hundred and Eighty-four (97.3%) of the children received malaria treatment, of which 185(65.1%) of the children were treated presumptively with anti-malarial drugs. Of the 115 children that had malaria test requested by the physicians, most 99(86.1) of the children received malaria treatment after malaria test result (table 3).

Table 3: Compliance of physicians with malaria treatment guidelines in under-fives

Variable	Frequency	Percent (%)
Malaria test ordered (n=292)		
Yes	115	39.4
No	177	60.6
Type of malaria test done (n=115)		
mRDT	52	45.2
Microscopy (MP)	63	54 .8
Malaria test results		
mRDT (n=52)		
Positive	37	71.2
Negative	15	28.8
Microscopy (MP) (n=63)		
Positive	51	80.9
Negative	12	19.1
Received malaria treatment (n=292)		
Yes	284	97.3
No	8	2.7
Received malaria treatment presumptively (n=284)		
Yes	185	65.1
No	99	34.9
Received malaria treatment after malaria test result (n = 115)		
Yes	99	86.1
No	16	13.9
R.eceived ACT (n=284)		
Yes	221	77.8
No	63	22.2

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Artemisinin based Combination Therapy was prescribed in 221(77.8%) of the under-fives. while 63(22.2%) received monotherapy. The route of administration was oral only in 146(51.4%), both oral and injectable in 75(25.7%) and injectable only in 56(19.7%). Among the ACTs, the commonest oral ACTs prescribed orally was Artemether-Lumefantrine in 113(77.4%), followed by Dihydroartemisinin-piperaquine in 29(19.9%) and a combination of Artesunate injection and oral Artemether-Lumefantrine in 7(9.3%) of the under-five. The commonest Injectable anti-malaria use as monotherapy was arthemeter in 36(64.3), followed by Artesunate in 14(25.0%) of the children, while the commonest oral monotheraphy antimalarial used was Sulphadoxine-pyrimethamine in 4(57.1%) of the children. Majority 263(92.6%) of the prescriptions were in brand names (Table 3).

Table 4: Pattern of anti-malarial prescription for under-fives

Variable	Frequency	Percent (%)
Combination therapy (n = 221)		
Oral ACTs (n=146)		
Artemether-Lumefantrine	113	77.4
Dihydroartemisinin-piperaquine	29	19.9
Artesunate-Amodiaquine	4	2.7
Artesunate-Mefloquine	0	0.0
Injectable (Inj) + Oral (n=75)		
Inj. Artesunate + Oral Artemether-Lumefantrine	7	9.3
Inj. Artesunate + Oral Artesunate-Amodiaquine	2	2.7
Inj. Artesunate + Oral Dihydroartemisinin-piperaquine	4	5.3
Inj. Artemether + Oral Artemether-Lumefantrine	43	57.3
Inj. Artemether + Oral Artesunate-Amodiaquine	11	14.7
Inj. Artemether + Oral Dihydroartemisinin-piperaquine	5	6.7
Inj. Arte-ether + Oral Artesunate-Amodiaquine	1	1.3
Inj. Arte-ether + Oral Artemether-Lumefantrine	2	2.7
Inj. Artesunate + Oral SP	0	0.0
Inj. Artemether + Oral SP	0	0.0
Inj. Arte-ether + Oral SP	0	0.0
Monotherapy (n= 63)		
Injectables (n= 56)		
Artesunate	14	25.0
Artemether	36	64.3
Arte-ether	6	10.7
Quinine	0	0.0
Chloroquine	0	0.0
Orals (n=7)		
Sulphadoxine-pyrimethamine (SP)	4	57.1
Chloroquine	3	42.9
Quinine	0	0.0
Amodiaquine	0	0.0
Mode of Prescription (n=284)		
Brand name	263	92.6
Generic	21	7.4

DISCUSSION

Majority (34.6) of the under-five children in this study who had a history of febrile illness were 1 to 12 months of age similar findings was reported by a study done in Lagos state, Nigeria.[12] Arute et al[6] also reported that malaria is commoner in the age range 1-10 years. The most common clinical presentation among the respondents' children was fever and this is in agreement with the finding of a study conducted in Osun state, Nigeria where most (78.6%) of the respondents presented with fever,[19,20] it is also in keeping with the findings of studies in Abuja[21]and in Jos Plateau state, Nigeria[22] where also fever was the most common presentation among the respondents.

In this study, majority of the children with history of fever were treated presumptively for malaria while only 39.4% were tested for malaria, this finding is in keeping with the findings of previous studies done in Lagos state, Nigeria[12] and in Congo.[23] Of those tested for malaria, almost one third of the children were negative for malaria using the rapid diagnostic test. This suggests the possibility of misdiagnosis of fever presentation as malaria among those presumptively treated with attendant consequences.[12] This may result in wastage of drugs that should be given to true malaria cases, unnecessary and avoidable adverse drug reactions in the patient which can be lethal and delay in the detection of the real illness.[23] Also, when fever is used as the sole criteria for diagnosis of malaria, over diagnosis is frequently substantial, especially during periods of low malaria transmission.[20] Rational use of drugs against most common and life‑threatening tropical diseases such as malaria remains a huge challenge, particularly in sub‑Saharan African region.[11] Behaviour of health systems and lack of effective vaccines are some other factors responsible for the persisting threat pose by malaria.[24]

The pattern of antimalarial prescriptions is dominated (77.8%) by ACT in our study, this is consistent with the report from Lagos state, Nigeria where 91.0% of the studied population had ACT,[12] Ango et al[6] also reported that ACTs prescription accounted for 60.1% of the antimalarial prescription in their study, Builders et al[22] and Nsengi et al[23] also reported similar findings, but the dominance of ACT use in this study is not in agreement with the finding of Meremikwu et al[25] in which less than a fifth of the primary and secondary health facilities studied used the recommended anti-malaria treatment.

The commonest prescribed ACT in the present study for the treatment of uncomplicated malaria was Artemether-Lumefantrine, which is in tandem with the finding of a previous study done in primary Health care facilities of Sokoto, where Artemether-Lumefantrine among the ACTS was prescribed for 84.9% of the respondents[6] and the findings of reports from Delta state, Nigeria[26] and Lagos state, Nigeria[12] that reported 75.0% and 91.0% respectively. Monotherapy with chloroquine, sulphadoxine-pyrimethamine and artemisinin compounds were the first, second and third most common prescription practices respectively,[25] the findings of their study was as a result of the fact that the audit was conducted in a period when Nigeria was transiting from chloroquine to artemisinin-based combination therapy (ACT) as the recommended treatment for uncomplicated malaria. It was observed in this study that of the ACTs, 25.7% of the prescription contained oral and injectable, Injectable antimalarial only in 19.7%. The prescription of injectable antimalarial in this study is above the WHO acceptable limit of ≤10%.[5,12] Unnecessary use of injections has been reported in several studies.[6,12,27,28]

The malaria control guidelines recommend that parenteral artemisinin be initiated in patients with complicated malaria and changed to oral ACTS once the patient's condition improves to

a state that enables oral therapy.[3] The use of injectable antimalarial may be due to misconceptions that injections are either more effective, or have faster onset of action, compared to other formulations.[12] Furthermore, use of injections can increase the risk of blood transmissible infections such as viral hepatitis and HIV infections.[11]

Monotherapy was mostly artemisinin-based medicines using injectable antimalarial in this study.[1,12] The commonest oral antimalarial drug use as monotherapy was Sulphadoxine-pyrimethamine (SP) followed by Chloroquine, this is in agreement with the findings of other studies.[12,26] Drug therapeutic efficacy trials conducted in the six geo-political zones in Nigeria have shown a high level of resistance to these drugs ranging from 23 to 96%.[3,20] The World Health Organization (WHO) has recommended that an antimalarial agent may not be used as first line when the level of resistance is above 25% in an area.[3] Prescription practices have been shown to influence the emergence of resistance to antimalarial drugs, thus the success of a new treatment policy would depend on the adherence of health care providers and patients to treatment recommendations.[1,3] The percentage of antimalarial drugs prescribed by their generic names was very low (7.4%) in this study, reports from Gaza[29] and Saudi[30] reported similar findings, but this is lower than some reports from Nigeria, 36.7% reported by Otokpa et al,[12] 43.1% by Arute et al,[6] Igboeli et al[18] reported 39. 6% and 37.4% by Mayah et al.[11] However, similar studies conducted outside Nigeria reported higher rate, 60.5% in Ghana[31] and 61.2% in Saudi Arabia.[32] This contradicts WHO recommendation in promoting rational use of drugs that states that drugs should be prescribed in their international proprietary names.[6] Drug prescription written in generic names avoids confusion during dispensing and reduces the cost of purchasing branded drugs.[11]

CONCLUSIONS

The physicians' compliance with national malaria treatment guidelines using the proportion of U-5 children was suboptimal. There was over prescription of anti-malarial drugs, as majority of the patients treated for malaria had no laboratory evidence for the treatment. Artemether-lumefantrine and artesunate were the commonest prescribed anti-malarials prescribed as combination therapy and monotherapy respectively. However, compliance with the use of ACT was good. This study shows suboptimal compliance with WHO prescribing indicators with respect to prescription in generic names. The proportion of antimalarial drug prescription in injectable form falls above the WHO acceptable limit of ≤10%.

RECOMMENDATION

Regular training of the health care providers by the government is recommended to improve adherence to antimalarial treatment guideline.

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