Pattern of Prescription of Anti-malarial Drugs in the Primary Health Care Facilities in Sokoto State Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Authors UMA and MOO designed the study, wrote the protocol , performed the statistical analysis and wrote the first draft of the manuscript. Authors AUK, MB, MTU, AA gave the study concept and design and managed the analyses of the study. Authors YFK, SAB and AM managed the literature searches and performed data collection. All authors read and approved the Final manuscript.

Original Research Article

ABSTRACT

Introduction: Prescription practices for malaria have been shown to influence the emergence of resistance to antimalarial drugs. Appropriate antimalarial drug use contributes to reductions in morbidity and mortality due to malaria with a consequent socioeconomic benefit, thus the success of a new malaria treatment policy would depend on the adherence of health care providers and patients to treatment recommendations. This study aimed to determine the prescribing pattern of anti-malaria in primary health care facilities in Sokoto State.
Methods: A cross sectional study was carried-out in the Primary Health Care facilities in Sokoto State. Screening of prescription forms from the patients who presented at the outpatient clinic during the period of the study in the selected health facilities was done at the point of exit, and only those with antimalarial prescription were consecutively selected. An interviewer administered

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questionnaire was used to obtained brief history of the illness among 276 respondents who were enrolled in to the study. Record of Rapid Diagnostic Test (mRDT) for the diagnosis of the malaria was obtained from the patients and or their caregivers. Data were analyzed using IBM® SPSS version 20 statistical packages.

Results: Majority 85 (30.8%) of the respondents were aged ≤ 1-10 years followed by 21-30 years 81 (29.3) Of the 276 antimalarial prescription forms obtained from the respondents, artemisinin-based combination therapy (ACT) was 166 (60.1%) and monotherapy was 110 (39.9%). The commonest artemisinin-based combination therapy prescribed for the respondents was Artemether-Lumefantrine 141 (84.9%) followed by Artesunate- Amodiaquine 16 (9.6%). The commonest oral mono-therapy prescribed was Sulphadoxine-pyrimethamine 28 (75.7%) while the most prescribed injectable monotherapy was artemether 59 (80.8%). Rapid Diagnostic Test for malaria (mRDT) was done for 274 (99.3%) respondents; those with mRDT positive were 238 (86.9%). The commonest presenting symptoms was fever 274 (99.3%) flowed by headache 225 (80.7%) and loss of appetite 215 (77.9%).

Conclusion: The pattern of antimalarial prescription observed in this study was mainly artemisinin-based combination therapy. However, antimalarial monotherapy is still being prescribed. There is need for regular training of the health care workers on the appropriate treatment of malaria using the national guideline for treatment of malaria. Regular supply and availability of ACTs in all health facilities across the state will ensure full compliance with national guideline for malaria treatment using ACTs.

1. INTRODUCTION

Human malaria infection remains an important public health problem in many regions of the world. Malaria infection continues to spread particularly in sub- Saharan Africa due to a combination of factors; weak health systems, wrong attitude of the people, large population movement, deteriorating sanitation, climatic changes, increasing drug resistant strains and in certain cases uncontrolled developmental activities [1]. In 2019, there were an estimated 229 million cases of malaria worldwide. The estimated number of malaria deaths stood at 409 000, children aged under 5 years are the most vulnerable group affected by malaria; they accounted for 274,000 (67%) of all malaria deaths worldwide. The WHO African Region carries a disproportionately high share of the global malaria Burden, the region was home to 94% of malaria cases and deaths [2].

In Nigeria, malaria is endemic and stable, a major cause of morbidity and mortality, resulting in 25% infant mortality and 30% childhood mortality [3].

More than 90% of the total population are at risk of malaria and at least 50% of the population suffers from at least one episode of malaria each year. Beyond the impact on children and pregnant women, it affects the general population [4]. The disease is the commonest cause of outpatient attendance across all age groups with about 66% of clinic attendance due to malaria and thus constituting a great burden on the already depressed economy [4,5] In spite of considerable efforts throughout the century to eradicate or 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].

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 [7]. Lack of knowledge about rational use of antimalarial drugs among patients is a serious problem, especially in areas of intense transmission, where antimalarial drugs are given repeatedly to treat fevers (even in the absence of malaria), thus increasing the risk of resistance and adverse drug reactions [8].

The informal use of antimalarial drugs could increase the risk of incorrect dosing, treatment failure, occurrence of adverse drug reaction and drug interactions, all of which could impact negatively on antimalarial treatment safety [9].

As a response to the antimalarial drug resistance situation, WHO now recommends that treatment policies for falciparum malaria in all countries experiencing resistance to monotherapies such as chloroquine, sulphadoxine-pyrimethamine and amodiaquine, should be combination therapies; preferably those containing an artemisinin derivative [10]. Nigeria made this paradigm shift

to use artemisinin-based combination therapy (ACT) as first line and second line treatment of uncomplicated malaria in 2005 [11]. The policy and guidelines recommend the use of ACTs for the treatment of uncomplicated malaria, with artemether-lumefantrine (AL) being the first choice [11].

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 providers and patients to treatment recommendations [12,13], the correct use of anti-malarial drugs is the key not only to therapeutic success but also to deterring the spread of drug resistance malaria [14]. This study is therefore aimed at determining the prescribing pattern of anti-malaria in the Primary Health Care facilities in Sokoto State.

2. MATERIALS AND METHODS

Sokoto State, one of the 36 States in Nigeria, is located in the extreme Northwest of Nigeria. It is bordered to the North by Republic of Niger, Kebbi state to the South and West and Zamfara state to the East. The State has 23 Local Government Areas (LGAs), 3 senatorial zones (Sokoto East, Sokoto West and Sokoto North), and 244 political wards. It has a land mass of $25,972km^2$ (10,0282m), and a population of 3,666,999 million people based on 2006 census, with a projected population of 5,675,488 people in 2019 [15]. There are 524 functional Health facilities in the state which comprised of Tertiary, secondary and primary Health facilities.

This was a descriptive cross-sectional study carried out among patients attending outpatients' clinic in Primary Health Care (PHC) facilities in Sokoto state, Nigeria, between August and September, 2019. All patients attending outpatient' clinics in the PHC facilities in the LGAs in Sokoto State and had antimalarial drugs prescription after being attended to by a health worker were considered eligible for enrolment into the study. Using the formula for calculating the sample size for a descriptive study, [16] a 75.0% prevalence of anti-malarial prescription pattern for patients attending outpatient clinics in PHC facilities from the previous study [17] and a precision level of 5%, a sample size of 276 was obtained considering a response rate of 95%. The eligible study subjects were selected by multistage sampling technique. At stage one: one LGA was selected from each of the 3 Senatorial zones in the State by simple random sampling

using balloting procedure. At the second stage: one ward was selected from each of the selected LGA by simple random sampling using balloting option. At third stage: three health facilities were selected from each of the selected ward in the selected LGAs by simple random sampling using balloting procedure making a total of 9 PHCs. Proportionate allocation of the study subjects was done based on average weekly outpatient attendance in the respective primary health care facilities. All the patients who presented at the outpatient clinics in the selected primary health care facilities during the period of the study had their prescription forms collected and sorted out, 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 and brief history of illness from the patients and or their caregivers. The questionnaire was reviewed by senior researchers in the department to ascertain content validity. It was then pretested on 27 patients attending outpatients' clinic in another PHC outside the selected LGA (Gwiwa low cost PHC Wamakko LGA) of Sokoto State. Some questions were rephrased for clarity based on the observations made during the pretesting. A data sheet was used for recording of information regarding the type of malarial test carried out for the patient and treatment for malaria as seen on the prescription form of the patients. 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. Data were entered into and analysed using the IBM[®] SPSS Statistical Package version 20. Frequency runs were done for further editing and cleansing of the data. Frequency distribution tables were constructed; and cross tabulations were done to examine relationship between categorical variables.

3. RESULTS

3.1 Socio-demographic Characteristics of the Respondents

Majority 85 (30.8%) of the respondents were within the age group ≤1-10 years followed by 21-30 years 81(29.3%). A large proportion 177 (64.1%), of the respondents were females while most of the study subject were from the Hausa

tribe 250 (90.6%) and Muslims 275 (99.6%). Majority of the respondents 92(33.3%) had Qur'anic education only followed by secondary education 67 (24.3%). Students constituted 86 (31.2%) of the respondents while famers were 59 (21.4%) as shown in Table 1.

3.2 Clinical Presentation of the Respondents

Fever was the commonest presenting symptom among the respondents 274 (99.3%). Other presenting symptoms were malaise 152 (55.1%), loss of appetite 215 (77.9%), prostration 39(14.1%), chills and rigors 126 (45.7%), convulsion 11 (4.0%), headache 225 (81.7%), joints pain 173(62.7%) and diarrhoea 20 (7.2%) as shown in Table 2.

3.3 Laboratory Investigations Done by the Respondents

Of the 274 (99.3%) who did mRDT, 238 (86.9%) was positive. Only 2 microscopies for malaria parasites were done and both were negative as shown in Table 3.

3.4 Prescription Pattern of Antimalarial Drug Monotherapy

The commonest oral antimalarial monotherapy prescribed for the respondents were sulphadoxine-pyrimethamine (28), chloroquine (8) and quinine (1) which correspond to 75.7%, 21.6% and 2.7% respectively, while injectable antimalarial were Artemether 59 (80.8%), and Artesunate 14 (19.2%) as shown in Table 4.

3.5 Prescription Pattern of Antimalarial Combination Therapy

Artemether-Lumefantrine was the commonest artemisinin based combination therapy prescribed for the respondents 141 (84.9%) followed by Artesunate-Amodiaquine 16 (9.6%), Dihydroartemisinine-Papiraquine 4 (2.4%), Artesunate-Mefloquine 3 (1.8%) and Chloroquine-SP 2 (1.2%) as shown in Table 5.

Table 1. Socio-demographic characteristics of the respondents

Variable	Frequency (%) (n = 276)
Age	
≤ 1-10	85 (30.8)
11-20	74 (26.8)
21-30	81 (29.3)
31-40	23 (8.3)
>40	13 (4.7)
Sex	
Male	99 (35.9)
Female	177 (64.1)
Tribe	
Hausa	250 (90.6)
Yoruba	14 (5.1)
Igbo	2 (0.7)
Others	10 (3.6)
Religion	
Islam	275 (99.6)
Christianity	1 (0.4)
Level of education	
None	46 (16.7)
Qur'anic only	92 (33.3)
Primary	49 (17.8)
Secondary	67 (24.3)
Tertiary	22 (8.0)
Occupation	
Farmer	59 (21.4)
Civil servant	25 (9.1)
Business	51 (18.5)
Student	86 (31.2)
Full housewife	36 (13.0)
Others	19 (6.8)

Table 2. Clinical presentation of the respondents

Variable	Frequency (%) (n = 276)
Fever	
Yes	274 (99.3)
No	2 (0.7)
Malaise	
Yes	152 (55.1)
No	124 (44.9)
Loss of appetite	
Yes	215 (77.9)
No	61(22.1)
Prostration	
Yes	39 (14.1)
No	237 (85.9)
Chills and rigors	
Yes	126 (45.7)
No	150 (54.3)
Vomiting	
Yes	117 (42.4)
No	159 (57.6)
Convulsion	
Yes	11 (4.0)
No	265 (96.0)
Headache	
Yes	225 (81.7)
No	51 (18.5)
Joint Pain	
Yes	173 (62.7)
No	103 (37.3)
Others	
Yes	20 (7.2)
No	256 (92.8)

Table 3. Laboratory investigations done by the respondents

Variable	Frequency (%)
Rapid Diagnostic Test (n = 274)	
Positive	238 (86.9)
Negative	36 (13.1)
Microscopy (n = 2)	
Malaria parasite seen	2 (100)
No malaria parasite seen	0 (0.0)

Table 4. Prescription pattern of antimalarial drug monotherapy

Variable	Frequency (%)
Oral monotherapy (n=37)	
Chloroquine	8 (21.6)
Sulphadoxine-pyrimethamine (SP)	28 (75.7)
Quinine	1 (2.7)
Injectable monotherapy (n=73)	
Artemether	59 (80.8)
Artesunate	14 (19.2)

Table 5. Prescription pattern of antimalarial drugs combination therapy

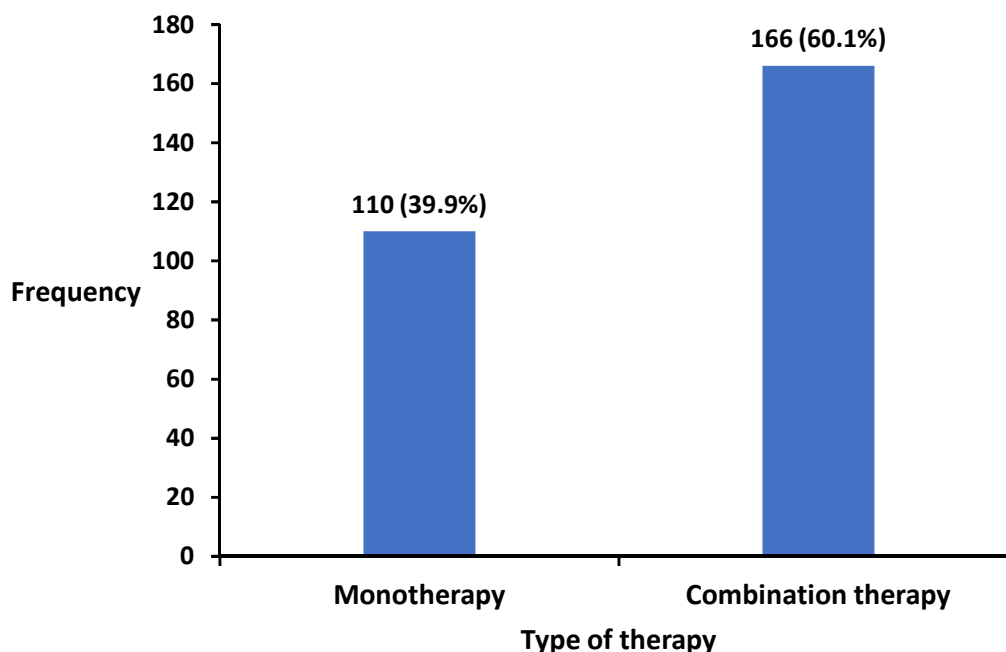| Variable	Frequency (%) (n = 166)
Artemether-Lumefantrine	141 (84.9)
Artesunate-Amodiaquine	16 (9.6)
Artesunate-Mefloquine	3 (1.8)
DihydroartemisininePapiraquine	4 (2.4)
Chloroquine-SP	2 (1.2)

Fig. 1. Type of treatment prescribed to the respondents

4. DISCUSSION

The finding from this study revealed that most (30.8%) of the respondents seen at the outpatient clinic and treated for malarial were aged ≤ 1-10 years, this shows that children constituted the largest proportion of the patients seen at the outpatient clinic in the study area which could be attributed to their vulnerability to malaria. This finding corroborate the findings of studies conducted in the urban Primary Health Care in Jos, Plateau state, Nigeria and in Delta State University, Abraka, Nigeria, where respondents aged 0-10years constituted the majority (45.3%) and (55.5%) respectively [17,18]. But the current finding from our study is in contrast to that of a study by Builders et al. [19] where majority (44.8%) of the respondents were between 21-50 years, it is also at variance with a study conducted in University of Nigeria Teaching Hospital, Enugu state, Nigeria where majority (53.8%) of the respondents were above

18 years of age [20]. This contrast may not be unrelated to the fact that the respondents from our study and those from Jos, Plateau state, Nigeria were drawn from PHC facilities. Several studies including the National Demographic Health survey have shown that malaria is the commonest cause of general outpatient clinics and paediatric admissions [4,5,21].

The most common clinical presentation among the respondents was fever and this is in agreement with the finding of a study conducted in Osun state, Nigeria where majority of the respondents presented with fever (78.6%) [22], it is also in keeping with the findings of studies in Jos, Plateau state and in Abuja, Nigeria where fever was the most common presentation among the respondents [19,23].

It was observed in this study that more than two-third of the respondents presented with headache and loss of appetite following malarial

infection; these findings also corroborate the findings in Osun state, Nigeria where overwhelming majority of the responded presented with loss of appetite (83.3%) and over two-third (69.0%) of them reported to have complained of headache [22].

The current study revealed high request for malarial investigations by the attending health care workers. Of the 276 respondents in this study who were attended to at the outpatient clinic, (99.3%) had Rapid Diagnostic Test for malaria (mRDT), while the remaining (0.7%) did microscopy for malaria parasite (mp). More than eighty six per cent of the mRDT done were reported to be positive while malaria parasite was seen in the two microscopic tests done. The high number of mRDT done is not surprising because the study was conducted in primary health care facilities where the most common malaria investigations ordered was mRDT and adequate mRDT kits were also provided to these facilities for malaria test, although very few of the health centers had microscopes and other reagents that would have facilitated microscopy for malarial parasites. The advantage of mRDTs is that they save the cost and time wasted on presumptive treatment particularly with the high cost of artemisinin-combination therapy (ACTs) which is now the recommended first line treatment for malaria [24]. The current study is at variance with a study by Otokpa et al. [25] where only (17.6%) of the children who presented at the clinic had investigations done with less than fifty percent turning out to be positive for malaria parasites.

This study showed that majority (60.1%) of the prescriptions were Artemisinin-based combination therapy (ACT) for the treatment of uncomplicated malaria. This agrees with other recent studies conducted in Nigeria, Ghana and Cameroon [14,26-29].

Although, ACTs accounted for (60.1%) of the prescriptions in this study, (39.9%) of the prescriptions were monotherapies which comprised both orals and injectables, with oral Sulphadoxine-pyrimethamine (SP) and injectable Artemether accounting for (75.7%) and (80.8%) respectively. The most prescribed ACT was Artemether-Lumefantrine, which is in tandem with the finding of a study done in Secondary Maternal and Child Care Centre, Lagos State, Nigeria where Artemisinin-based Combination Therapy (ACT) was prescribed for (91.0%) of the respondents and the most prescribed ACT was Artemether-Lumefantrine (60.9%) [25]. It is also

in consonance with a study carried out in Jos, Plateau state, Nigeria, where the most commonly prescribed antimalarial drug was Artemether-lumefantrine (58.1%) [17]. The finding of the current study further corroborates the findings of studies done in Delta, Osun and Borno states, Nigeria and in Ghana and Cameroon both in West Africa which reported that the commonest combination treatment for malaria prescribed to the respondents was Artemether-Lumefantrine (63.7%), (50.3%), (80.8%), (63.1%) and (72.2%) respectively [18,20,22,28,29].

5. LIMITATION OF THE STUDY

The main limitation in this study is deliberate misinformation either by omission or commission by the study subjects regarding their history of brief illness. However, one of the strengths of the study is opportunity for further operational research on policy direction for proper treatment of malaria cases based on WHO guideline.

6. CONCLUSION

The antimalarial prescribing pattern in the primary health care facilities was satisfactory; with most of the antimalarial prescriptions being Artemisinin-based Combination Therapy (ACT). There still remain a sizeable number of the health workers who engage in prescription of monotherapy for malarial treatment. This underscores the need for regular training workshops for the health workers to improve adherence to the national guideline for treatment of malaria, thus reducing the incidents of drug resistant malaria consequent upon inappropriate /inadequate treatment of malaria. Regular supply and availability of ACTs in all health facilities across the state will ensure full compliance with national guideline for malaria treatment using ACTs.

CONSENT

Written informed consent was obtained from the patients and or caregivers of patients before the commencement of the study. As per international standard or university standard, patient's written informed consent has been collected and preserved by the authors.

ETHICAL APPROVAL

Ethical clearance was obtained from the Research and Ethics Committee of the Sokoto State Ministry of Health. Permission to conduct

the study was sought from the administration of the respective LGAs.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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