
Assessment of Antimalarial Drug Use among the Patients in a Tertiary Hospital in Northern Part of Nigeria

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ABSTRACT

Aims: To assess the pattern of antimalarial drug use among the patients attending the teaching hospital in Jos North local Government of Nigeria.

Study Design: Cross-sectional study.

Place and Duration of Study: Tertiary hospital in Jos North Local Government of Plateau state of Nigeria, between July and September, 2012.

Methodology: A sample size of 441 male and female patients was selected into this study using a universal sampling. Information on the knowledge, attitudes and practices with respect to antimalarial drug use were obtained with the aid of a pre-tested interviewer-administered questionnaire. Data was analyzed using the SPSS software.

Results: Four hundred and forty one (441) patients completed the questionnaire. Respondent knowledge of malaria with respect to description of malaria decreased (42.7% to 0.2%). Almost all the patients were able to describe the causes and symptoms of malaria. One hundred and sixty nine (38.3%) frequently treated their malaria with Sulphadoxine-Pyrimethamine (SP) combination, Three hundred and eighty two (86.6%) reported to have used oral preparation, almost half of the respondents (47.6%) obtained these medications from many sources apart from hospitals, only two hundred and forty eight reported to comply to treatment. Majority of the participants always used some methods for the prevention of malaria.

Conclusion: Concerted effort should be made to educate the population on malaria as well as the importance of drug adherence. Provision of ACTs at subsidized costs will go a long way in improving malaria treatment services in Nigeria, indigenous plantations for cultivating active ingredients and local manufacturing of ACTs is further expected to lower the costs of the drugs and increase its utilization and lower the incidence and impact of malaria. It will be important for interventions to be directed at educating the consumers on malaria pathogenesis, diagnosis, therapy and prevention and importance of drug adherence in order to improve the quality, efficacy of treatments and to reduce local morbidity and mortality in the future.

Keywords: Assessment; malaria; antimalarial drug use; patients; tertiary hospital.

1. INTRODUCTION

Malaria is acknowledged to be by far the most important tropical parasitic disease causing great suffering and loss of life. More than two billion people, nearly 40% of the world's population are at risk [1]. It is a public health problem of global concern because of its high economic burden on the nation, high prevalence of mortality in children, pregnant women and non-immune individuals [2]. Malaria is also directly responsible for 20% of childhood deaths in Africa and leading cause of mortality in Nigeria where it is holo-endemic [3]. Malaria is a leading cause of morbidity and mortality among

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children in sub-Saharan Africa. Valid quantitative estimates of malaria mortality are useful for monitoring the impact of prevention and control activities, targeting public health interventions, and advocacy [4].

The reemerging of malaria in many parts of the world is due to the rapid increase of resistance to most of the available anti-malarial drugs, as well as resistance of vectors to insecticides [5]. Drug resistant strains of *Plasmodium falciparum* have been found in many endemic areas of the world and many of conventional anti-malarial drugs have been associated with treatment failure [5]. *P. falciparum* is now highly resistant to chloroquine in most malaria-affected areas. Resistance to SP is also widespread and has developed much more rapidly. Resistance to mefloquine is confined only to those areas where it has been used widely (Thailand, Cambodia, and Vietnam) but has arisen within six years of systematic deployment [6].

The high burden of the disease is associated with mortality and morbidity despite the concerted effort of many countries and the local partners to combat the disease [7]. This has led to the development of newer drug regimen to keep the pace with the evolution of resistance acquired by malaria parasites [3]. Protective vaccine strategies have focused on developing an immune response which blocks the initial infection, using the parasite antigen CSP-1 (circumsporozoite protein) [8].

WHO has recommended Artemisinin Combination Therapy (ACTs) as first line therapy for the treatment of uncomplicated malaria [9], therefore appropriate use of these agents and attitude of the patients to pattern of drug use is important to enhance the goal of treatment and prevent emergence of resistance to therapy [10].

Research had shown that pattern of drug-use in cases of malaria infection either on prescription basis or self-medication can result in high incidence of resistance strain [3]. The knowledge and attitude of patient can influence drug-therapy. Studies in Africa have shown that the initial treatment of malaria fever often takes place at home without consulting trained professionals [2]. Also understanding the knowledge and behaviour of patients and how they actually use antimalarial will aid in devising strategies to increase the correct use of these drugs [11]. Drugs have two key roles for malaria control. First, prompt and effective treatment of malaria prevents progression to severe disease and limits the development of gametocytes, thus blocking transmission to mosquitoes [12]. Second, drugs can be used to prevent malaria in endemic populations, including various strategies of chemoprophylaxis, intermittent preventive therapy, and mass drug administration [13].

Health facility-based survey is of importance because it helps to assess the pattern of antimalarial drug use and prevalence of the malaria disease in the tertiary health facility, therefore the objective of this study is to assess the pattern of drugs use and thereby providing information that can be used to improve knowledge and attitude of the patients towards drug usage.

2. MATERIALS AND METHODS

2.1 Study Area and Population

Bingham University teaching Hospital is a missionary hospital located at Zaria bye pass in Jos North Local Government Area of Plateau State. A sample size of 441 respondents in outpatients' clinics were drawn from different low to high socio-economic classes consisting of the highly educated, lowly educated and non-school educated among the population, patients who did not complete their questionnaires were excluded from the study. The tool for data collection was a pre-prepared questionnaire, which was administered to patients, who had previous malaria episode and used anti-malarial or drug perceived to be an anti-malarial. The questionnaire comprised of questions on socio-demographic characteristics, knowledge and attitude of patients to malaria and antimalarial drug use. Most of the questions were precoded, but the open ended questions were coded when the data had been collected. The purpose of the study and the confidentiality of the information collected were explained to the interviewees who were 11 years and above.

2.2 Study Design

A descriptive cross sectional survey was carried out to assess pattern of drug use of antimalarials among the outpatients attending a tertiary hospital in Jos North Local Government of Plateau state of Nigeria.

2.3 Data Analysis

The data collected from this study were subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) for windows (version 16.0). Data was summarized using frequency tables, means and percentages. Bivariate analysis was done with Chi-square test to compare proportions for variables. Results were considered to be statistically significant where $P < 0.05$.

3. RESULTS

3.1 Demographic Characteristics of the Respondents

Four hundred and forty one patients participated in the study, 244(55.3%) females and 197(44.7%) males. Most of the interviewees were aged 31-40 years 137(31.1%) of the respondent. Many of the respondents 194(43.9%) were graduates Majority of respondents 246(55.4%) were self employed, 126(28.6%) were civil servants and 69(16.0%) were unemployed (Table 1).

Table 1. Demographic characteristics of the respondents

Variables	Frequency	Percentages (%)
Gender		
Male	197	44.7
Female	244	55.3
Age group(years)		
11-20	16	3.7
21-30	126	28.6
31-40	137	31.1
41-50	79	17.9
> 50	83	18.7
Level of education		
Primary	54	12.2
Secondary	156	35.4
Undergraduate	35	7.9
Graduate	194	43.9
None	2	0.5
Occupation		
Self employed	246	55.4
Civil servant	126	28.6
Unemployed	69	16.0

3.2 Respondent Knowledge of Malaria

Majority of the respondents 208 (47.2%) described malaria as a disease caused by a parasite, 326 (73.9%) of the respondents understood malaria to be a non-transmissible disease, 100 (22.7%) of the interviewee did not know the organism that cause malaria. All the participants 440 (99.7%) described symptoms of malaria correctly with the exception of 1 (0.2%) illiterate (Tables 2 and 3).

3.3 Antimalarial Drug Used

Less than half of the participants 169 (38.3%) reported to have use Sulphadoxine/ Pyrimethamine (SP) combination, followed by chloroquine 157 (35.6%), ACT 120 (27.2%), artemisinin 40 (9.1%) and other antimalarial drugs 8 (1.8%) in Table 7.

3.4 Respondents Knowledge of Treatment of Malaria

382 (86.6%) of the interviewee administered the antimalarial drug in tablet form while 105 (23.8%) reported to have used the injectable antimalarial drug (Table 5). Majority of the respondents 232 (52.6%) purchased their antimalarial drugs from hospitals while the remaining respondents 219 (49.7%) obtained their drugs from other sources in Table 6. More than half of the participants 227 (51.5%) reported to always use some methods of prevention for malaria, there was a statistically significant ($p < 0.05$) association between respondents who always used some methods to prevent malaria and those who sometimes used these methods. Of 441 participants, only 248 (56.2%) completed the antimalarial drugs in Table 8.

Table 2. Respondents knowledge of the causes of malaria

Causes of malaria	Frequency	Percentage (%)
Parasite	208	47.2
Bacteria	112	25.4
Virus	38	8.6
Others	83	18.8

Table 3. Respondents knowledge of the transmission of malaria

Transmission of malaria	Frequency	Percentage (%)
Mosquitoes	348	78.9
Dirty environment	65	14.7
Infectious	115	26.1
Non-infectious	326	73.9

Table 4. Respondents knowledge of the route of antimalarial drug administration

Routes of administration	Frequency	Percentage (%)
Oral	382	86.6
Intramuscular	41	9.3
Intravenous	18	4.1

Table 5. Respondents knowledge of the sources of antimalarial drugs

Sources of antimalarial drugs	Frequency	Percentage (%)
Government clinic	212	48.1
Mission clinic	20	4.5
Pharmacy	140	31.8
Traditional practitioner	40	9.1
Others	29	6.6

4. DISCUSSION

This study has shown that respondents' knowledge about the description of malaria is poor, majority of the respondents did not know that malaria is caused by a parasite; the interviewees associated the cause of malaria with virus, bacteria and no causative agent. The low level of understanding about the cause of the disease is very surprising because of the high level of education of the respondents; more than half of the study population had at least primary education, less than half were graduates.

Almost all the respondents demonstrated bad knowledge of the transmission of malaria, only some of the participants who highly educated understood malaria to be a non-transmissible disease. However, the respondents in our study were generally knowledgeable about mosquito as malaria vector, and 78.2% indicated mosquito bite as a possible cause. This is higher than the studies conducted in Kenya and Ethiopia [14,15], the higher understanding could have been due to higher educational level of the patients, and since almost all the interviewees were literate.

Table 6. Respondent knowledge of malaria

Level of education	Description		Transmission		Causes		Symptoms	
	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect	Correct	Incorrect
Primary	6(1.4%)	48(10.9%)	20(4.5%)	34(7.7%)	30(6.8%)	24(5.4%)	54(12.3%)	-
Secondary	46(10.4%)	10(24.9%)	42(9.5%)	114(25.9%)	112(25.4%)	44(10.0%)	156(35.4%)	-
Undergraduate	24 (5.4%)	11(2.5%)	6(1.4%)	29(6.6%)	31(7.0%)	4(0.9%)	55(7.9%)	-
Graduate	131(29.7%)	63(14.3%)	46(10.4%)	148(33.6%)	171(38.8%)	23(5.2%)	194(44.0%)	-
None	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)

Table 7. *Antimalarial drugs used

Level of education	ACT	Artemisinin	SP	Chloroquine	Others
Primary	12(2.7%)	8(1.8%)	20(4.5%)	16(3.6%)	-
Secondary	42(9.5%)	9(2.0%)	54(12.2%)	52(11.8%)	3(0.7%)
Undergraduate	2(0.5%)	3(0.7%)	19(4.3%)	16(3.6%)	-
Graduate	64(14.5%)	20(4.5%)	75(17.0%)	73(16.6%)	4(0.9%)
None	-	-	1(0.2%)	-	1(0.5%)

*Multiple responses

Table 8. Respondents knowledge of treatment of malaria

Level of education	*Preparation		*Sources		Prevention		Compliance	
	Oral	Parenteral	Hospital	Others	Always	Sometimes	Correct	Incorrect
Primary	43(9.8%)	13(3.0%)	32(7.3%)	24(5.4%)	8.2(7.0%)	10(2.3%)	29(6.6%)	25(5.7%)
Secondary	135(30.6%)	40(9.1%)	82(18.6%)	76(17.2%)	92(20.97%)	70(15.9%)	85(19.3%)	71(16.1%)
Undergraduate	30 (6.8%)	6(1.4%)	16 (3.6%)	19(4.3%)	13(3.0%)	12(2.7%)	18(4.1%)	17(3.9%)
Graduate	172(39.0%)	45(10.2%)	101(22.9%)	99(22.5%)	113(25.6%)	71(16.1%)	115(26.1%)	79(17.9%)
None	2(0.5%)	1(0.2%)	2(0.5%)	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)	1(0.2%)

*Multiple responses

$P=0.05, df=5, X^2 =12.08$ (Significant)

This study has also shown high respondents knowledge on symptoms of malaria, such as fever, headache, vomiting and loss of consciousness. These findings are consistent with other studies carried out in malaria endemic areas in which knowledge on symptoms of malaria was demonstrated [16], also this contrasts with the first Kenyan study, where 35% thought that malaria did not cause any disability [13].

In our study, all the respondents knew malaria could be treated. The findings in the current study further reveal that Sulphadoxine/Pyrimethamine and chloroquine were the most frequently used antimalarial drug. Consistent with our observations, other studies carried out in malaria endemic region of Nigeria, reveals that despite the change in the National guidelines for treatment of malaria in Nigeria, Sulphadoxine/Pyrimethamine and CQ were the most frequently purchased anti-malarial drugs in the community [2,3]. Access to ACTs, is still constrained by cost as they cost much more than the previously used antimalarials, with a dose averaging about 504 naira (\$4) [17]. The high cost of ACTs often results in patients opting for a cheaper alternative or not buying the full regimen [18].

Since drug resistance had become a major problem with the emergence of resistance of *P. falciparum* to nearly all used antimalarial drugs [19]. In response to widespread resistance to older antimalarial drugs, WHO has recommended Artemisinin Combination Therapy (ACTs) as first line therapy for the treatment of uncomplicated malaria, but in our survey only many of respondents who had tertiary education reported to have use this drug. Artemisinin derivatives used as monotherapy is no longer encouraged as WHO in order to preserve the efficacy of artemisinins as an essential component of life-saving ACTs, has called for a ban on the use of oral artemisinin monotherapies at various levels including manufacturers, international drug suppliers, National health authorities and funding agencies involved in the funding of essential antimalarial medicine [3].

The survey of our findings reveals that all of the interviewees including those with tertiary education administered these antimalarials in injectable form; this is not surprising since all the participants sourced their antimalarial from other sources apart from hospitals. These findings are in agreement with study conducted by [14], this shows that injections is exploited by those in the private sector involved in selling drugs, who tend to administer injections for every ailment in order to attract clients [20]. Pharmacokinetics and clinical trials indicated that oral forms of drugs are effective as injections, with oral medications more cost effective [21].

Patients in Nigeria access treatment for malaria in a diverse range of outlets in the public and private sectors. The public sector consists of primary health centres (PHC), secondary and tertiary hospitals while the private sector is large and heterogeneous consisting of a wide range of providers both registered and unregistered such as private hospitals, pharmacies, patent medicine dealers and traditional healers with patent medicine dealers accounting for more than half of all providers [22]. Another study in Anambra state, Nigeria [23], showed that urban-rural geographic differentials exist in access to malaria treatment services, increasing the vulnerability of the rural dwellers to consuming inappropriate treatment which is likely to worsen their disease burden.

In our study, we also found that all the respondents used many methods for the prevention of malaria; this finding is in agreement with other studies [14]. The correct ideas about the prevention of malaria may have been due to more educated population. Preventing the foci of resistant falciparum malaria from widening requires the rational use of antimalarials [23] and the intensification of vector control, such as source reduction through destruction of mosquito breeding sites, and avoidance of man-vector contact by using protective measures, e.g., bed nets and repellents [24]. These measures call for combined individual and community participation [24], and can be used in developing broader-based control strategies [25].

This study also revealed that all of the interviewees from lowly to highly educated did not use the drugs correctly; various published studies showed that inappropriate or inadequate use of antimalarials was associated with treatment failure [26]. Appropriate education is central to safe and effective use of drugs. The risk of harm of the development of drug resistance and irrational use of drug is less when antimalarial or other types of drugs are prescribed by an informed health practitioner [27]. Their knowledge of pharmacology and physiology of the body and how drugs works

in different disease states will enable them to have understanding of the appropriate antimalarial in this era or age of fast growing resistant-strain of *P. falciparum* to the older antimalarials and enhance adequate communication or counselling to patients and drug-users [28].

This study was limited to only one of the 774 LGAs in Nigeria hence cannot be generalizable. However, this has provided useful information on the knowledge and attitude of patients towards antimalarial usage. Another limitation is inability to determine the economic status of the patients due to lack of information on this.

5. CONCLUSION

Provision of ACTs at subsidized costs will go a long way in improving malaria treatment services in Nigeria, indigenous plantations for cultivating active ingredients and local manufacturing of ACTs is further expected to lower the costs of the drugs and increase its utilization and lower the incidence and impact of malaria. It will be important for interventions to be directed at educating the consumers on malaria pathogenesis, diagnosis, therapy and prevention and importance of drug adherence in order to improve the quality, efficacy of treatments and to reduce local morbidity and mortality in the future.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Ethical approval was sought and obtained from the Ethical Committee of the Department of Health Research and Ethics Committee, Bingham University Teaching Hospital, and the interviews were based on the free and informed consent of the study participants.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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