International Journal of TROPICAL DISEASE & Health
3(4): 283-291, 2013

SCIENCEDOMAIN *international*
www.sciencedomain.org

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

Modupe I Builders[1*], Emmanuel Ogbole[1] and Jonah Y Peter[2]

[1]Department of Pharmacology and Therapeutics, College of Health Sciences, Bingham University, PMB 005, Karu, Nigeria.
[2]Department of Medical Microbiology and Parasitology, College of Health Sciences, Bingham University, PMB 005, Karu, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author MIB designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors EO and JYP managed the analyses of the study. Author JYP managed the literature searches. All authors read and approved the final manuscript.

Research Article

Received 21st April 2013
Accepted 11th June 2013
Published 22nd August 2013

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

**Corresponding author: Email: modupebuilders@yahoo.com;*

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.

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].

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 [4]. 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 [4].

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 [5]. This has led to the development of newer drug regimen to keep the pace with the evolution of resistance acquired by malaria parasites [3].

WHO has recommended Artemisinin Combination Therapy (ACTs) as first line therapy for the treatment of uncomplicated malaria [6], 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 [7].

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 [8].

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 (Table 2).

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 3.

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. 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. 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 4.

Table 2. 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%)	110(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 3. *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 4. 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(20.9.7%)	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)

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 graduands.

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 [8,9], the higher understanding could have been due to higher educational level of the patients, and since almost all the interviewees were literate.

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 [10], also this contrasts with the first Kenyan study, where 35% thought that malaria did not cause any disability [8].

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) [11]. The high cost of ACTs often results in patients opting for a cheaper alternative or not buying the full regimen [12].

Since drug resistance had become a major problem with the emergence of resistance of *P. falciparum* to nearly all used antimalarial drugs [13]. 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 [9], 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 (14). Pharmacokinetics and clinical trials

indicated that oral forms of drugs are effective as injections, with oral medications more cost effective [15].

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 [16]. Another study in Anambra state, Nigeria [17], 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 [9]. 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 [18] 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 [19]. These measures call for combined individual and community participation [20], and can be used in developing broader-based control strategies [21].

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 [22]. 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 [23]. 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 [24].

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

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.

ACKNOWLEDGEMENTS

We appreciate the support and cooperation of the staff of Bingham University Teaching Hospital and all interviewers that participated in the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. World Health Organization. World malaria report; 2011.
2. Abuaku BJ, Koram KA, Binka FN. Antimalarial drug use among caregivers in Ghana. Afr Health Sci. 2004;4(3):171–177.
3. Omole MK, Onademuren OT. A Survey of Antimalarial Drug Use Practices among Urban Dwellers in Abeokuta. Nig Afr J. Biomed Res. 2010;13:1–7.
4. Ridley RG: Medical need, scientific opportunity and the drive for antimalarial drugs. Nature. 2002;415:686-693.
5. Khadjavi A, Giribaldi G, Prato M. From control to eradication of malaria: the end of being stuck in second gear?. Asian Pac J Trop Med. 2010; 3:412-420.
6. World Health Organization. Guidelines for the Treatment of Malaria, Geneva; 2006. WHO/HTM/MAL/2006.1108.
7. Ongore DF, Knight KR, Minawa AA. A study of knowledge attitudes and Practices kap of a rural community on malaria and the mosquito vector. East Afr Med J. 1989;66:79-90.
8. Watsierah CA, Jura WG, Raballah E, Kaseje D, Abong'o B, Ouma C. Knowledge and behaviour as determinants of anti-malarial drug use in a peri-urban population from malaria holoendemic region of western Kenya. Malar J. 2011;10:99.
9. Yeneneh H, Gyorkos TW, Joseph L, Pickering J, Tedla S. Antimalarial drug utilization by women in Ethiopia: a knowledge attitudes-practice study. Bulletin of the World Health Organization. 1993;71(6):763-772.
10. Buabeng KO, Duwiejua M, Dodoo AN, Matowe LK, Enlund H. Self-reported use of anti-malarial drugs and health facility management of malaria in Ghana. Malar J. 2007;6:85.
11. 11.Etuk SJ, Ekanem EI. Impact of mass media campaigns on the knowledge and attitudes of pregnant Nigerian women towards HIV/AIDS. Trop Doct. 2005;35:101-102.
12. Kachur SP, Slutsker L. Measuring malaria drug efficacy and transmission intensity. Lancet. 2006;368:10-12.
13. Builders MI. Antimalarial drugs: A review. Int J Pharm. 2013;3(1):40-46.

14. Oladepo O, Kabiru S, Adeoye BW, Oshiname F, Ofi B, Oladepo M, et al. Malaria treatment in Nigeria*:* the role of patent 42. medicine vendors*.* The Future Health Systems, Innovations and knowledge for future health systems for the poor. Policy Brief March. 2008;1:5-43.
15. Builders MI, Aguwa CN. Patients' Attitudes Towards Analgesic Usage in Nsukka Community. Der Pharmacia Lettre. 2012;4(2):641-648.
16. Uzochukwu BS, Ezeoke OP, Emma-Ukaegbu U, Onwujekwe OE, Sibeudu FT. Malaria treatment services in Nigeria: A review. Nig Med J. 2010;51:114-9.
17. Onwujekwe O, Hanson K, Uzochukwu B, Ezeoke O, Eze S, Dike N. Geographic inequities in provision and utilization of malaria treatment services in southeast Nigeria: Diagnosis, providers and drugs. Health Policy*.* 2010;94:144-149.
18. Tropical diseases: progress in research 1989-1990. Tenth programme report of the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR). Geneva, World Health Organization; 1991.
19. Goriup S. Perspectives and constraints on chemotherapy and practical considerations in the use of vaccines: analysis of available measures for malaria control in Africa south of the Sahara. Transactions of the Royal Society of Tropical Medicine and Hygiene. 1989;83:81-83.
20. Goriup S. Perspectives and constraints on chemotherapy and practical considerations in the use of vaccines: analysis of available measures for malaria control in Africa south of the Sahara. Transactions of the Royal Society of Tropical Medicine and Hygiene.1989;83:81-83.
21. Ruebush IITK, Weller SC, Klein RE. Knowledge and beliefs about malaria on the Pacific coastal plain of Guatemala. American Journal of Tropical Medicine and Hygiene. 1992;46:451-459.
22. Ansah EK, Gyapong OJ, Agyepong IA, Evans DB. Improving adherence to malaria for children: the use of pre-packages chloroquine tablet Vs chloroquine syrup. Trop Med Int Health. 2001;6:496-504.
23. Aguwa CN. Clinical Pharmacy in the Tropics. 2nd ed. Nigeria: Optimal Publishers Enugu; 1996.
24. Ekanem OJ, Weisfied J, Amme LA, Nahlen BL, Ezedinachi ENU, Walker O, et al. Sensitivity of *Plasmodium Falciparum* in Nigeria Children. Bull WHO. 1990;68:45–52.

© 2013 Builders et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/3.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history.php?iid=257&id=19&aid=1904