Journal of Epidemiological Society of Nigeria Dec. 2017 Volume 1 No 1 :45-52

MALARIA DIAGNOSIS AND TREATMENT PRACTICES IN PUBLIC PRIMARY HEALTH CARE CLINICS IN PANKSHIN LOCAL GOVERNMENT AREA, PLATEAU STATE, NIGERIA

Daboer JC[1], Afolaranmi TO[1], Banwat ME[1], Tagurum YO[1], Gokir JD[2]

[1]Department of Community Health, University of Jos

[2]Department of Community Health, Plateau State College of Health Technology Pankshin

Corresponding author:- Daboer JC

Email address:- jonathandabor@yahoo.co.uk

Phone:- +234-7038959300

ABSTRACT

***Background**: Malaria remains the most important infectious disease in sub-Saharan Africa. Over exposure of the parasite to antimalarial medicines has precipitated the emergence of drug resistance to these medicines. The World Health Organization in 2010 issued a new policy of universal parasite-based diagnosis as a prerequisite for treatment. This study aimed at determining if Primary Health Care workers in Pankshin Local Government Area are complying with the new policy.*

***Methods**: Using stratified sampling technique, six clinics were selected from Pankshin Local Government Area. Relevant information on all patients treated for malaria between 1st May 2015 and 30th April 2016 was extracted from clinic records. All health workers who attended to patients were interviewed while a facility inventory form was used to collect information on availability of drugs and supplies. Data generated were analyzed using Statistical Package for Social Sciences version 20.*

***Results**: Out of 2909 patients studied, only 37.3% were tested for malaria parasites before treatment; 68.4% of whom had microscopy while 20.5% had Rapid Diagnostic Test. For those not tested 22.5% had Artemisinin Combination Therapy while 48.1% had non-Artemisinin Combination Therapy. Out of those who tested negative for malaria parasite, 8.8% and 21.6% were treated with Artemisinin Combination Therapy and non-Artemisinin Combination Therapy respectively Those who tested positive received Artemisinin Combination Therapy alone (35.5%) or in combination with other drugs (64.5%). Testing influenced the choice of drug for malaria treatment and this was statistically significant ($p < 0.001$).*

***Conclusion**: Pretreatment testing for malaria and adherence to test results in Primary Health Care clinics in Pankshin are low. Concerted efforts are required for their training and supervision on the current guidelines on malaria diagnosis and treatment.*

***Key words**: Malaria, testing, adherence, Pankshin Nigeria*

INTRODUCTION

Malaria remains one of the most important infectious diseases globally with heavy public health and socioeconomic burden especially in sub-Saharan Africa.[1,2] Though global partnerships between the World Organization (WHO),

development partners and nation States have led to significant reduction in malaria incidence and mortality, the disease remains a significant public health scorch.[3-6] An estimated 3.4 billion people are at risk of malaria living in 104 countries and territories.[7,8] In 2015, over 212 million incidents of malaria and 429 000 malaria deaths occurred globally.[3] In 2016 however the initial progress seemed to have stagnated as over 216 million cases were recorded.[9] About 90% of malaria cases and 92% of the deaths in 2015 occurred in Africa. In addition, 303 000 children aged less than five years of age, 292 000 of whom were from Africa were lost to malaria in 2015.[3,10]

In the last decade there has been a significant decline in the incidence and mortality from malaria. Between 2010 and 2015, malaria incidence fell by 21% worldwide and in Africa while malaria deaths fell by 29% globally and by 31% in Africa. During the same period under-five mortality from malaria fell by 35% globally.[3] These resulted from the roll out of powerful interventions such as the use of the Long Lasting Insecticidal Nets, Indoor Residual Spraying, Artemisinin Combination Therapy (ACT) and improved diagnosis. The ACTs, in particular, have revolutionized the treatment of severe uncomplicated malaria. In recent years, however, malaria parasite resistance to ACTs has been detected in certain countries thereby threatening to reverse the gains so far made in global malaria control.[11] The major factor believed to be responsible for malaria parasite resistance to ACTs is the indiscriminate use of ACTs for presumptive treatment of malaria.

In order to forestall further malaria parasite resistance, in 2010 the WHO introduced new guidelines for malaria management which mandated all persons seeking care for suspected malaria to first have a parasitological diagnosis; either microscopy or Rapid Diagnostic Test (RDT) before drug treatment.[12] The rationale behind this approach is not only to prevent indiscriminate deployment of ACTs with the attendant risk of widespread development of drug resistance but also to enable more accurate diagnosis of malaria and the identification of other causes of fever for appropriate treatment. In line with this, in 2011 Nigeria updated its malaria treatment guidelines to conform to the WHO recommendation. By the new guidelines, malaria diagnosis for all suspected cases must be based on parasite identification.[13] In addition, a key objective of Nigeria's National Malaria Strategic Plan (NMSP) 2014-2020 is that by 2020, all persons seeking care for suspected malaria should first be tested either by RDT or microscopy methods.[14] To reach the goal of universal testing by 2020, National Malaria Control Programme (NMCP) has been scaling up testing services to all tiers of the healthcare delivery system.

The third tier of Nigeria's healthcare system is mainly manned by the Primary Healthcare (PHC) Workers which include Community Health Officers (CHOs), Community Health Extension Workers/Junior Community Health Extension Workers (CHEWs/JCHEWs), Laboratory technicians and health records technicians. They generally require continuous training and close supervision to be able to appropriately manage suspected cases of malaria. The second challenge in the PHC centers is the non-availability of the microscopes for microscopy and stock out of RDT kits and other consumables. In spite of these challenges, these frontline health workers attend to a large proportion of suspected malaria cases in Nigeria. In many rural areas, they may be the only health workers accessible to the population. Their knowledge and practices of universal testing for malaria, therefore, has a major impact on whether or

not the policy succeeds. Various studies have documented varying degrees of compliance to the universal malaria parasite testing policy. In a national survey of the formal private health facilities across Nigeria published in 2016, 73.8% of health facilities carried out pre-treatment parasitological diagnosis. Out of these 61.8% used microscopy while 38.2% used RDT.[8] Most of the facilities in this study, however, were staffed by doctors and nurses. In Tanzania, pretreatment testing for malaria by PHC workers was found to be about 63% and as many as 14% of those with negative RDT were still prescribed antimalarial drugs.[15] In Papua New Guinea, 77.6% of suspected malaria cases were tested and as many as 15.3% of those who tested negative were given antimalarial medicines.[16] By implication, many healthcare workers still doubt the specificity of the RDT in diagnosing malaria. There is scant information on the current practice of parasite-based malaria diagnosis in our locality.

The objective of this study was to determine the level of compliance to the national policy on universal parasite-based testing for malaria diagnosis among primary health care workers in a rural setting and the factors influencing it. Information emanating therefrom could be deployed in designing appropriate strategies to ensure that universal parasite-based malaria testing is implemented by all primary health care workers in Plateau State, Nigeria.

METHODS

Plateau State with 17 LGAs is located in central Nigeria with rocky mountains and plains of lowland. It has annual rainfall between 131.75cm and 146 cm and a temperature range of 13^0C to 22^oC most part of the year.[17] The State is classified as supporting mesoendemic transmission of malaria.[14] Pankshin is one of the 17 LGAs with a general hospital and 36 functional public PHC centers. All the public PHC clinics were included in the study. The health facilities were stratified according to the health districts into six groups of equal sizes and the busiest PHC center was selected from each stratum to have a total of six PHC facilities for the study. Clinic attendance record for the one year preceding the study (1st May 2015 to 30th April 2016) was scrutinized for each selected clinic and relevant information on all patients managed for malaria was extracted into a case record form developed by the researchers for this purpose. A total of 2909 patient records were selected for the study.

All clinic staff involved in seeing patients were interviewed using a semi-structured interviewer administered questionnaire developed by the researchers regarding their practices of malaria diagnosis and treatment and the training and supervision they had received. A health facility inventory form was then used to collect information on the availability of antimalarial drugs, equipment and consumables required for malaria testing and treatment. Permission was obtained from the Director of PHC, Pankshin while verbal informed consent was obtained from the health workers interviewed. Ethical approval was obtained from the Health Research Ethics Committee of Jos University Teaching Hospital. All collected data were analyzed using SPSS version 20 and Chi square test was used for significance test at $p \leq 0.05$.

RESULTS

The patients ages ranged 5-months to 75 years with median age at 7 (interquartile range: 3-18) years. The single largest age group among the patients as shown in Table 1 was those aged 5 years or less (37.2%) and 57.8% of the patients were females. Out of the 2909 patients seen at the health facilities, 37.3% had a malaria parasite test done before treatment. Among those tested, 68.4% was by microscopy, 20.5% RDT while 11.1% had both. Irrespective of the testing method, 86.4% tested positive for malaria parasites. Among patients not tested, 22.5% were given ACTs alone and 48.1% received non-ACT antimalarials while among those with negative test result 8.8% and 21.6% were given ACTs and non-ACT antimalarials respectively. Ninety four (63.5%) of those with negative test results were given antibiotics. Among patients with positive test results, 35.5% received ACTs alone while 64.5% received ACTs and non-ACT antimalarials as well as other drugs like antibiotics, antihelminthic and antipyretics. From Table 1, older patients were more likely to be tested for malaria parasite before treatment than the younger patients ($p<0.001$).

Table 1: Relationship between age of the patients and the testing for malaria parasite Malaria test

Age (years)	Done Freq (%)	Not done Freq (%)	Total	χ^2	P - value
≤ 5	295 (27.2)	788 (72.8)	1083		
6 – 14	183 (46.9)	207 (53.1)	390	106.5	< 0.001
15 – 24	249 (52.0)	230 (48.0)	479		
≥25	359 (37.5)	598 (62.5)	957		
Total	**1086**	**1823**	**2909**		

Table 2 shows that patients who had parasitological confirmation of malaria diagnosis were more likely to be given an ACT alone compared to those who were not tested $p<0.0001$. In addition, patients who tested positive for malaria parasite whether using microscopy or RDT were more likely to be given an ACT alone compared with those who tested negative $p<0.0001$. Regarding the use of antibiotics, patients who had malaria parasite test done were less likely to be administered antibiotics compared to those who were not tested ($p<0.0001$). A total of twenty six trained health workers were employed in the six PHC facilities studied, one of whom was a doctor while 18 were CHEWs and 2 CHOs. The median years of experience of the workers were 13.5 (interquartile range 8-26) years. Only 7.7% of staff had attended at least one malaria training course in the six to twelve months preceding the study while 16 (61.5%) had never had any update training on malaria management since leaving school. However, they were confident about the effectiveness of ACTs in treating malaria. Most of the staff reported monthly or quarterly supervision by their superiors but these visits did not involve support on malaria management. At the time of visit, three clinics were experiencing stock out of RDT kits and also had no microscopes.

Table 2: Malaria test and medicine use

All patients	ACT alone given				
	Yes (%)	No (%)	Total (%)	χ^2	p value
Tested	346 (31.9)	740 (68.1)	1086		
Not tested	410 (22.5)	1413 (77.5)	1823	31.1	<0.0001
Total	**756 (26.0)**	**2153 (74.0)**	**2909**		
All tests ACT alone given					
	Yes (%)	**No (%)**			
Positive	333 (35.5)	605 (64.5)	938		
Negative	13 (8.8)	135 (91.2)	148	42.0	<0.0001
Total	346 (31.9)	740 (68.1)	1086		
All patients	**Antibiotics given**		**Total**		
	Yes (%)	**No (%)**			
Tested	134 (12.3)	952 (87.7)	1086		
Not tested	357 (19.6)	1466 (80.4)	1823	25.5	<0.0001
Total	**491(16.9)**	**2418 (83.1)**	**2909**		

DISCUSSION

The age distribution of the patients varied very widely with 7 years as the median age but the largest singular age group was made up of patients aged 5 years and less. It is generally recognized that malaria is a disease of children with the greatest morbidity and mortality occurring among children in this age group. In areas of hyperendemic and holoendemic transmission children suffer from chronic anaemia and malnutrition on account of persistent malaria parasitaemia.[18, 19] Where the transmission pattern is mesoendemic or hypoendemic, children suffer effects that are consistent with their partial immunity status including cerebral malaria.[18] Pankshin LGA, like other parts of Plateau State, belongs to the mesoendemic ecological zone and so these children are expected to suffer a mixture of chronic effects of heavy malaria parasitaemia and cerebral manifestations of the disease. Other studies on malaria management in outpatient clinics have also confirmed the preponderance of under-five year olds among the clinic attendees.[4,15] Majority of the patients were female and this is consistent with findings from other studies.[20,21] Women are said to have better health seeking behaviour than their men counterparts. This explains why more females would present to health facilities for treatment in case of any ill health.

The overall testing rate was low as only 37.3% of the patients treated for malaria during this period had a malaria test done. Earlier in 2016, a nationwide study among private PHC facilities in Nigeria had found a much higher testing rate of 73.8%.[8] This was probably because the private health facilities were mostly manned by physicians who were more knowledgeable on current guidelines on malaria management and more skilled in the testing procedure. A higher testing rate of 63% was also found in another study in Tanzania among PHC workers,[15] just as 77.6% was documented in Papua New Guinea.[16] Elsewhere on the African continent, a combined testing rate for microscopy and RDT was put at 94.6%.[22] Considering the core objective of the NMSP 2014-2020 of getting every suspected malaria case tested before treatment, a testing level of 37.3% in our study is still poor. This is more so that the policy change from the WHO took effect from 2010 and the Nigerian malaria Control

Programme effected its policy change in 2011. The PHC workers in Nigeria generally work with poor equipment, infrastructure and supplies. In order to obviate these challenges including the required training for microscopy, the RDT was rolled. In this study, majority of the tests carried out were microscopies as opposed to RDT. This is unexpected bearing in mind the rural setting of most of the health facilities. This could be due to stock outs of RDTs. Indeed three of the six PHC clinics visited for this study were either experiencing stock outs at the time of visit or had experienced same at some time in the preceding one year. This over reliance on microscopy means that health facilities where capacity for microscopy is lacking will simply not test. This probably explains the generally low testing rate in this study. The use of RDT in this study was even lower than the 38.2% recorded in the 2016 study.[8] Among those tested, as high as 86.4% had parasitaemia. It was close though higher than the 71.3% found in Oyo State.[23] It was also higher than the 38% documented in a community based study in Jos in 2010.[19] Since the suspicion of malaria was very high in all those tested, the level of parasitaemia was also very high.

Compliance of health workers to test results was rather poor. For instance, among patients who were not tested for malaria, 22.5% were given ACT alone in addition to the 8% who received ACT in combination with other antimalarials. The use of non-ACT antimalaria for non tested patients was also very common. Treating patients without testing and non adherence to test results have been shown to be highly common and are associated with over diagnosis and over treatment of malaria.[23-25] The effect has been the emergence of drug resistance to common antimalarial medicines. As a result of the reported widespread occurrence of parasite resistance to non-ACT antimalarial medicines, their use has been withdrawn from national malaria treatment guidelines. However, PHC clinics still use them especially in rural areas during periods of stock out of ACTs.[24]

Among patients with confirmed parasitaemia more were treated with non-ACT antimalarials than with ACTs. This negates the goal of universal malaria testing as a prerequisite for the use of ACTs for uncomplicated malaria. The predominant use of non-ACT antimalarials to treat parasitologically confirmed malaria is worrisome and this concern has also been expressed by other researchers. [23,24] It is uncertain why ACTs were combined with non-ACTs to treat some patients. In the contemplation of the prescribers the double prescription would probably increase the efficacy of the treatment. However, this explanation would contradict the assertion by most of the health workers in this study who expressed confidence in the effectiveness of ACTs. It is instructive that the same proportion of health workers in this study had never attended any update training on malaria management since leaving school. This was worsened by the fact that supervisory visits were few and far between and did not include support to the frontline staff on malaria management. The sample size of workers was probably too small to capture their true perception about ACT effectiveness. Even patients who tested negative for malaria were administered ACT and non-ACT antimalarials. The use of antibiotics in these patients was common though hardly justifiable. When health workers are not sure of the diagnosis, they prescribe a combination of drugs in order not to miss a disease but where a diagnosis is certain as is the case in this study, it can only be explained by poor knowledge of treatment guidelines.

The goal of universal testing for malaria is to enable better use of ACTs, minimize the risk of

development of parasite resistance to ACTs and to facilitate further investigation of other causes of fever. In this study, testing enabled prescribers to better select the appropriate drug to administer to the patients thereby furthering the achievement of the goal of the policy on universal pretreatment malaria testing.

CONCLUSION

The practices of pretreatment testing and adherence to test results for malaria were poor among the healthcare workers in the PHC clinics in Pankshin LGA of Plateau State. The use of non-ACT antimalarial medicines to treat both tested and non-tested patients was common. This could be due to poor training and supportive supervision of these workers. It is recommended that training and retraining of healthcare providers at PHC facilities be prioritized for the new malaria management guidelines.

Acknowledgement

The authors are grateful to the Director of PHC, Pankshin LGC as well as staff of all the PHC clinics visited during the study. We also appreciate the staff of the Plateau State College of Health Technology, Pankshin who participated in the data collection.

References

1. Snow RW, Craig MH, Newton CR.CJ, Steketee RW. The public health burden of plasmodium falciparum malaria in Africa: Deriving the numbers. Working paper 11. Disease Control Priorities Project. Bethesda, Maryland: Fogarty International Centre, National Institutes of Health. 2003: 1-81
2. Onwujekwe O, Uguru N, Etiaba E, Chikezie I, Uzochukwu B, Adjagba A. The economic burden of malaria on households and the health system in Enugu State, Southeast Nigeria. PLoS 2013. Available at http://doi.org/10.137/journal.Pone.0078362 . Last accessed 12/11/2017
3. World Health organization. World malaria Report 2016. WHO. Geneva.2016:1-186
4. World Health Organization. WHO. Malaria factsheet. Available at www.who.int/mediacentre/factsheets/fs094 /en/ Last accessed 12/11/2017
5. World Health Organization. The African Regional Health Report: The Health of the people. Bulletin of the World Health Organization 2018:96
6. Daboer JC, Bot TC. Malaria: the prospects and challenges of eradication - A review. Jos Journal of Medicine 2010; 5 (1): 13-18
7. World Health Organization. World malaria Report 2013. WHO. Geneva. 2013:1-284
8. Mokuolu OA, Ntadom GN, Ajumobi OO, et al. Status of the use and compliance with malaria rapid diagnostic tests in formal private health facilities in Nigeria. Malaria J.2016;15(4):1-11
9. World Health Organization. World malaria Report 2016. WHO. Geneva.2016:1-186
10. Odey F, Esu E, Effa E, et al. Management of severe malaria in children under 5 years in private and public health facilities in Cross River State, Southeastern Nigeria: an audit of current practice. Clinical Audit 2013; 5:43-48
11. World Health Organization. Global Malaria Programme. Minutes of the Evidence Review Group meeting on the emergence and spread of multi-drug resistant falciparum lineages in the Greater Mekong subregion 19-20 December 2016. WHO Geneva Switzerland. Available at www.who.int/malaria/mpac/ Last accessed 19/12/2017

12. World Health Organization. World Malaria Report 2010. WHO. Geneva. 2010:1-238
13. Federal Ministry of Health, Nigeria. National Guidelines for Diagnosis and Treatment of Malaria, 2015. 3rd Edition FMoH Abuja:1-63
14. Federal Ministry of Health, Nigeria. National malaria Strategic Plan 2014-2020. FMoH Abuja:1-132
15. Mubi M, Kakoko D, Ngasala B, et al. Malaria diagnosis and treatment practices following introduction of rapid diagnostic testing in Kibaha District, Coast Region, Tanzania. Malaria Journal. 2013; 12:293. Available at http://www.malariajournal.com/contyent/12/1/293 Last accessed 22/01/2018
16. Pulford J, Smith I, Mueller I, Siba PM, Hetzel MW. Health Worker Compliance with a 'Test And Treat' Malaria Case Management Protocol in Papua New Guinea. PLoS ONE 2016; 11(7): e0158780. https://doi.org/10.1371/journal.pone.0158780
17. Plateau State Government, Nigeria. Land and people. Available at www.plateaustate.gov.ng Last accessed 22/01/2018
18. Editorial. The burden of malaria: understanding the balance between immunity, public health and control. J. Med Microbiol 2000, 49:1053-1055
19. Daboer JC, Chingle MP,Ogbonna C. Malaria parasitaemia and household use of insecticide treated bed nets: a cross-sectional survey of under-fives in Jos, Nigeria. Nigerian Medical Journal 2010; 51 (1):5-9
20. Kaur M, Sodhi SK, Kaur P, SinghJ, Kumar R. Gender differences in healthcare seeking behavior of tuberculosis patients in Chandigarh. Indian J.Tuberc 2013;60:217-222
21. Rahman MS. Sex, gender and health seeking behavior determinants. NU Journal of Humanities, Social Sciences and Business Studies 2016, 2;(3):1-16
22. Manyando C, Njunju EM, Chileshe J, Siziya S, Shiff C. Rapid diagnostic tests for malaria and health workers' adherence to test results at health facilities in Zambia. Malaria Journal. 2014; 13:166. doi:10.1186/1475-2875-13-166.
23. Ige OK, Ayandipo EO, Impact of Malaria Rapid Diagnostic Test on prescription pattern of ACTs in Oyo State, Nigeria. MalariaWorld Journal 2014,5;(2):1-5
24. Uzochukwu BS, Ezeoke OP, Emma-Ukaegbu U, Onwujekwe OE, Sibeudu FT. Malaria treatment services in Nigeria: A review. Niger Med J 2010;51:114-9