

Home management of malaria among caregivers of under-five children in Owo, Ondo State, Nigeria

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Abstract

Introduction: Home management of fever by caregivers is particularly relevant for ensuring effective care to under-five children in Sub-Saharan countries with high-transmission of malaria like Nigeria. Our study aimed to assess home management of fever among mothers and other caregivers of under-five children attending Federal Medical Centre in Owo, Ondo State, Nigeria.

Methods: A descriptive, cross-sectional hospital-based study was carried out. A systematic random sampling technique was used to recruit participants (mothers and other caregivers). A structured interviewer administered questionnaire was used. Clinical findings and malaria test were performed on children using standard methods. Data were analyzed with SPSS version 15.

Results: Prevalence of home treatment of fever was 98.4%. Most of the caregivers bought anti-fever drugs from patent medicine shops and only 11.9 % of them got a prescription drug from pharmacies. Despite good knowledge about causes of malaria by caregivers (72.6%) and a prompt medical treatment within 24 h of fever onset (84.2%), many of their children were treated with only paracetamol (45%) and, therefore, they presented to the hospital febrile (61.8%), tachycardic (63.7%), and tachypnoic (83.9%). Almost all of the children were diagnosed with malaria (98%) associated with some types of complication such as convulsion (29.6%) and anaemia (52.7%). Chi square test showed a significant ($P < 0.005$) difference between treatment modality (inpatient versus outpatient) with regards to educational level, type of caregivers, place of domicile, use of antimalarial in combination with paracetamol, and presence of complications.

Discussion and Conclusion: In our study, home management of malaria by caregivers of under-five children was ineffective. Indeed, the effectiveness of home management of malaria depends not only on the early diagnosis, but also on a prompt and appropriate treatment. Therefore, proper health education programmes on this disease should be implemented among caregivers of under-five children.

KEY WORDS: Antimalarials; Caregivers; Child; Fever; Malaria.

Riassunto

Introduzione: La gestione domiciliare della malaria da parte dei “caregivers” è particolarmente importante per assicurare l’efficacia delle cure nei bambini con meno di 5 anni che vivono nei Paesi dell’Africa subsahariana come la Nigeria, dove la malaria è endemica. Il nostro studio è stato mirato a valutare la gestione domiciliare della febbre da parte delle madri e degli altri “caregivers” di bambini con meno di 5 anni accompagnati per febbre presso il Federal Medical Centre in Owo, nello Stato di Ondo, in Nigeria.

Metodi: E’ stato realizzato uno studio descrittivo, di tipo trasversale basato sui dati ospedalieri. E’ stato effettuato un campionamento sistematico casuale per reclutare i partecipanti (madri ed altri tipi di “caregivers”) ed è stato utilizzato un questionario strutturato somministrato da un’intervistatore. I risultati clinici ed i test per la diagnosi di malaria sono stati effettuati nei bambini attraverso i metodi standard. I dati sono stati elaborati con il software SPSS versione 15.

Risultati: Nel nostro campione il trattamento domiciliare della febbre con farmaci ha registrato una prevalenza del 98,4%. La maggior parte dei “caregivers” aveva comprato farmaci anti-piretici presso negozi per farmaci da banco e solo l’11,9% presso farmacie dietro prescrizione medica. Nonostante una buona conoscenza delle cause della malaria da parte dei “caregivers” (72.6%) ed un rapido trattamento farmacologico effettuato entro le 24 h dalla comparsa della febbre (84.2%), molti bambini sono stati trattati soltanto con paracetamolo (45%) e pertanto si sono presentati in ospedale febbrili (61.8%), tachicardici (63.7%) e tachipnoici (83.9%). A quasi tutti i bambini è stata diagnosticata la malaria (98%) associata a qualche forma di complicanza come le convulsioni (29.6%) e l’anemia (52.7%). Il test del chi quadrato ha evidenziato una significativa ($P < 0.005$) differenza riguardante le modalità di trattamento ricevuto in ospedale (ambulatoriale versus ricovero ospedaliero) con riguardo ai seguenti fattori: il livello di educazione, la tipologia ed il domicilio del “caregiver”, l’eventuale uso di antimalarico associato al paracetamolo e la presenza di eventuali complicanze.

Discussione e Conclusione: Nel nostro studio la gestione domiciliare della malaria da parte dei “caregivers” di bambini con meno di 5 anni è risultata inefficace. Infatti, l’efficacia della gestione domiciliare della malaria non dipende soltanto da una diagnosi precoce, ma anche da un tempestivo ed appropriato trattamento farmacologico. Pertanto, appropriati programmi di educazione alla salute su questa patologia dovrebbero essere implementati tra i caregivers di bambini con meno di 5 anni.

TAKE-HOME MESSAGE

Home management of fever by caregivers is particularly relevant for ensuring effective care to under-five children in Sub-Saharan countries with high-transmission of malaria like Nigeria. It depends not only on the early diagnosis of malaria, but also on a prompt and appropriate medical treatment. Therefore, health education programmes on this disease are crucial.

Competing interests - none declared.

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INTRODUCTION

Fever is the most common symptom of malaria and malaria is the most prevalent illness among under-five children in Sub-Saharan African countries like Nigeria [1–4]. Therefore, when the child has a fever, children's parents or care-givers commonly treat them as if they were affected by malaria, whether right or wrong [5]. Even if fever is the most characteristic symptom of malaria, clinical findings in malaria may range in severity from mild headache to severe complications leading to death, particularly in falciparum malaria [6]. However, other symptoms and signs of both uncomplicated and severe malaria are rarely given any consideration. As a consequence, non-specific symptoms of malaria such as headache, fatigue, abdominal discomfort, lassitude, muscle and joint aches, anorexia and vomiting may go unnoticed and delay effective treatment [1, 7]. However, an early diagnosis of malaria is essential because the delay in seeking hospital care can lead to delayed recovery with a subsequent high mortality rate [8]. Therefore, the ability of mothers or care-givers to suspect malaria in case of fever has important consequences. Indeed, an early diagnosis and adequate treatment are essential elements of appropriate malaria control programmes [8–10]. As the recent World Health Organization's Guidelines (2012) recommend, a 'community case management' of malaria strategy is needed to 'improve access to prompt and effective case management of malaria, especially in remote, underserved areas with high malaria transmission' [11]. According to this strategy, simple and reliable diagnostic tests, as well as effective and appropriate treatment for uncomplicated malaria should be provided at the community level by trained community-based providers, such as community health workers, mother coordinators and private vendors [11]. Home management of fever is also an integral part of malaria case management within the overall Roll Back Malaria (RBM) strategy (2005). RBM is a social movement founded by the World Health Organization, the World Bank, United Nations

International Children's Emergency Fund (UNICEF), and United Nations Development Programme (UNDP) and directed by national authorities in order to address malaria, especially in endemic countries [12]. One of the main objectives of RBM strategy is to enable and to increase the capacity of caregivers to recognize malaria illness promptly and take early appropriate action.

Accordingly, some studies in Burkina Faso and Nigeria showed that home management of fever can be particularly relevant for ensuring effective care to children under the age of five in areas with high-transmission of malaria [13, 14]. Unfortunately, treatment of malaria is started and, often, concluded at home by caregivers who are unaware of the causes, symptoms and signs of uncomplicated malaria as well as other causes of fever [4]. Yet, mothers and other caregivers often begin an unorthodox, inappropriate and dangerous treatment. As a result, by the time they got their children to the hospital, life threatening complications have developed [8]. In Nigeria, there are several studies about caregivers' knowledge, attitude and practices on malaria in young children [2–4, 9, 10]. Nevertheless, it is particularly important to ensuring effective care for non-immune people at risk of malaria, such as children under the age of five in high-transmission situations. This study aimed to describe the knowledge of mothers and care-givers about causes, treatment and preventive measures of malaria and to study caregivers' attitude concerning use of preventive measures and home treatment given to their children. In our research, we also analyzed health-seeking behaviour of caregivers of under-five children with fever attending Federal Medical Centre in Owo, Ondo State, Nigeria, in order to better understand their subsequent implications on health of children affected by malaria fever.

METHODS

Study area and population

The target population consisted of caregivers of under-five children with febrile illness

receiving healthcare services of the Federal Medical Centre (FMC) in Owo. The FMC is located in Owo Local Government Area of Ondo State, Nigeria. Owo Local Government Area has a population of about 219,000 people (2006 census). FMC is the only Federal health institution in Ondo State that provides primary, secondary and tertiary levels of health care for all-aged people. About 280 children aged 6-60 months are treated monthly for fever at children outpatient department/emergency room.

Study Design, sample size and sampling

This was a descriptive, hospital-based cross-sectional study, conducted over a period of three months from May 1st to July 31st, 2008. The sample size was determined using the sample size formula for estimation of proportions. Prevalence of home treatment of malaria in Nigeria of 76% was used [10]. Adding a 10% value because of attrition rate, a total of 373 was obtained. Based on this, the estimated sample size was 380 caregivers. A systematic random sampling technique was used to recruit participants, 280 children aged 1-60 months were registered monthly for three consecutive months at the children outpatient clinic/emergency room of FMC. Therefore, the sampling frame consisted of 840 subjects. By using a systematic random sampling, a sampling interval of 1 in 2 was obtained. Hence, a total of 420 caregivers were recruited for this study (rate of respondents = 90.5%, $n = 380$). A caregiver was defined as the mother, the father or any adult responsible for the care of the child [15].

Study Instruments

A structured questionnaire was administered to children's caregivers in Owo by health care officers of the Department of Family Medicine, Community Health, and Paediatrics of FMC, who were recruited as field workers for the study and trained using participatory approaches in communication skills, form-filling and demographic techniques. The questionnaire was divided into two sections: 1) Socio-demographic characteristics of caregi-

vers (age, sex, marital status, place of domicile, ethnic group, occupation and educational status) and their children (sex and age); and 2) Knowledge of caregivers about fever (cause, symptoms, and complications of malaria) and their subsequent behaviours (attitude toward 'seeking medical treatment', Insecticide-treated nets (ITNs) ownership and usage, time to start anti-malarial treatment, type of medical treatment used). Knowledge of correct treatment of malaria included questions about paediatric dose and treatment duration. In this study, antimalarial treatment was an Artemisinin-based combination therapies, which are current drugs for treatment of uncomplicated malaria. Home treatment of malaria includes usage of Artemisinin based combination therapy (ACTs) to be taken every day for 3 days [16]. Clinical data of the children (i.e. weight, temperature, heart rate, respiratory rate, current diagnosis of malaria, and types of complications as applicable) and modality of hospital treatments (inpatient versus outpatient) were recorded.

Temperature

Clinical thermometer model hospital and homecare CEO 123°C & °F (suitable temperature range: 35-42 degrees Celsius) was used to measure body temperature. Fever was taken as body temperature $\geq 37.5^\circ\text{C}$.

Laboratory Test

DiaSpot Malaria P.f. Rapid Diagnostic Test Device (Whole Blood), a qualitative, membrane based immunoassay test for the detection of *Plasmodium falciparum* antigen in whole blood, was used in this study. The model of the kits used was MAL7080021 with each pack containing forty test kits, forty droppers and two buffers. The correlation between the traditional thick and thin blood smears microscopic analysis and malaria *P.f. Rapid Diagnostic Test Device* (Whole Blood) has been found to be over 99.0%. Sensitivity and specificity have also been found to be 99.0%. Cost of the test was also comparable to the traditional method. Rapid diagnostic tests (RDTs) are affordable, alternative dia-

gnostic tools [17]. Malaria rapid diagnostic tests (RDTs) are recommended at community points of care because they are accurate and rapid [18]. Limitations of this test are as follows: i) It is for in vitro diagnosis only; ii) It can only be used for the detection of *P falciparum* antigen in whole blood specimens; iii) Neither the quantitative value nor the rate of increase in *P falciparum* antigen can be determined by the qualitative test.

Data analysis

Statistical Package for Social Sciences (SPSS) version 15 was used for data analysis. Means, modes, medians, Standard Deviation (SD), proportions and percentages were determined as applicable. The means and SD were calculated for continuous variables while ratios and proportions were calculated for categorical variables. Further analysis exploring relationships between variables was done using Pearson's chi-square (χ^2) test. P values of less than 0.05 was accepted as statistically significant. The malaria knowledge statements were made up of correct and incorrect statements. The answers were recoded so that respondents who agreed or disagreed with an incorrect statement were given a '0' and '1', respectively. 'Don't know' and no answer responses were treated as incorrect and coded as a '0' [19]. Therefore, knowledge was categorized as 'poor' (< 2 variables marked correctly), 'fair' (2 or 3 variables marked correctly), and 'good' (> 3 variables marked correctly).

Ethical clearance

Ethical clearance was obtained from health research ethics committee of FMC, Owo. Informed, written consent was obtained from all the caregivers.

RESULTS

Overall, 380 caregivers (M = 27, 7.1%; F = 353, 92.9%) were enrolled for this study, which ranged in age from 25 to 65 years ($M = 30.48$, $SD \pm 6.61$) and consisted of mothers ($n = 346$, 91%) or other type of caregivers ($n = 34$, 9%) including father ($n = 19$, 5%), sisters ($n = 6$, 1.5%), brothers ($n = 4$, 1.1%),

uncles ($n = 4$, 1.1%), and grandmothers ($n = 1$, 0.3%). A summary of the sociodemographic characteristics of the respondents is presented in Table 1.

In our study, there were 380 children (M = 176, 46.3%, F = 204, 53.7%) who ranged in age from 6 to 60 months ($M = 22.1$, $SD = 15.2$). Table 2 shows the sociodemographic characteristics and clinical data of children at presentation. Overall, more than half of the children were febrile ($n = 235$, 61.8%), with tachycardia ($n = 242$, 63.7%) and tachypnea ($n = 319$, 83.9%). Moreover, clinical examination and laboratory tests showed a high prevalence (98.4%) of home management of fever and among all cases, 372 (98%) were positive for malarial antigen(s) in RDT.

As showed in Table 3, caregiver's knowledge about causes of malaria was good ($n = 276$, 72.6%). However, attitude toward 'seeking medical treatment', and usage of ITNs for prevention of malaria and antimalarial drugs in case of fever were 'poor' (65.3%, 62.7%, and 43.5%, respectively). With regards to preventive measures of malaria, about half of the participants knew ($n = 225$, 59.2%) and less than half of them used ($n = 142$, 37.3%) insecticide-treated nets. However, there was a wide difference in their frequency of use by caregivers ('always' $n = 42$, 18.7%; 'often' $n = 112$, 49.8%; 'sometimes' $n = 62$, 27.5%; 'rarely' $n = 9$, 4.0%).

Table 4 shows that the prevalence of home management of fever by caregivers using some types of medications was high (98.4%). However, before presenting to the hospital, paracetamol was the most used drug ($n = 171$, 45%). A combination of paracetamol with antimalarial drugs was given by about one third of the respondents ($n = 126$, 33%), while antimalarial (artemisinin-based combination therapy) was used by 93 (10.3%) participants, and antibiotics by 2 (0.5%) caregivers. Moreover, anti-malarial treatment at home began within 24 h in a high percentage of respondents ($n = 320$; 84.2%). With regards to anti-fever drug's provider, majority of the respondents ($n = 275$, 77.7%) bought medications from patent medicine stores.

Table 1. Socio-demographic characteristics of caregivers ($n = 380$).

Characteristics	N	%
Age group in years		
≤ 29	159	41.8
30-39	196	51.6
≥ 40	25	6.6
Educational status		
No formal education	12	3.2
Primary	79	20.8
Secondary	167	43.9
Tertiary	122	32.1
Occupation		
None	33	8.7
Farming	14	3.7
Trading	184	48.8
Artisan	63	16.6
Professional	86	22.6
Ethnic group		
Yoruba	308	81.1
Ibo	39	10.2
Hausa	11	2.9
Others	22	5.8
Marital status		
Married	336	88.4
Single	44	11.6
Relationship to Child		
Mother	346	91.1
*Others	34	8.9
Place of domicile		
Within Owo (Urban)	269	70.8
Outside Owo (Rural)	111	29.2

Note: *Fathers 5%, other caregivers 3.9%.

Table 2. Sociodemographic characteristics and clinical data of children ($n = 380$).

Characteristics	N	%
Age group (months)		
6-12	159	41.8
13-24	95	25.0
25-36	57	15.0
37-59	69	18.2
Gender		
Male	176	46.3
Female	204	53.7
Temperature (°C)		
Normal (≤ 37.5)	145	38.2
Febrile (> 37.5)	235	61.8
Heart rate (beats/minute)		
Normal (≤ 100)	138	36.3
Tachycardia (> 100)	242	63.7
Respiratory rate (cycles/minute)		
Normal (≤ 30)	61	16.1
Tachypnea (> 30)	319	83.9

Table 3. Knowledge of causes, treatment and knowledge/use of preventive measures of malaria among caregivers.

Caregiver's Knowledge and Attitude	N	%
Knowledge of correct cause of malaria		
Mosquito bite	276	72.6
Others	104	27.4
Attitude toward 'seeking medical treatment'		
Correct	132	34.7
Wrong	248	65.3
Knowledge of correct treatment of malaria		
Good	103	27.1
Poor	277	72.9
Knowledge of Insecticide-treated nets (ITNs)		
Good	225	59.2
Poor	115	40.8
Use of Insecticide-treated nets (ITNs)		
Yes	142	37.3
Not	238	62.7

Table 4. Types of treatment and places where treatment was sought by caregivers.

Type of drugs used at home	N	%
Paracetamol	171	45
Anti-malarial drugs*	93	10.3
Combination of paracetamol and anti-malarial drugs	126	33.2
Herbal preparation	18	4.7
Tepid sponging	18	4.7
Antibiotics	2	0.5
Nothing	6	1.6
Time to start anti-malarial treatment in case of fever		
< 24 hours	320	84.2
≥ 24 hours	60	15.8
Source of medical treatments		
Pharmacy	42	11.9
Medicine Vendor	22	6.2
Patent medicine shop	275	77.7
Native doctor/Herbalist	11	3.1
Others	4	1.1

Note: *Current drugs for treatment of uncomplicated malaria are Artemisinin based combination therapies

Table 5. Type of diagnosis made and complications detected at the hospital.

Diagnosis	N	%
Malaria	314	82.7
Chest Infection	7	1.8
Ear Infection	2	0.5
Others	57	15
Type of complications (n = 203, 53.4%)		
Convulsion	60	29.6
Anaemia	107	52.7
Dehydration	4	2.0
Cerebral Malaria	6	3.0
Convulsion with anemia and dehydration	26	12.8

As shown in Table 5, malaria was diagnosed in 314 (82.7%) children, while other children were diagnosed with malaria and co-morbid chest infection ($n = 7$, 1.8%), ear infection ($n = 2$, 0.5 %), or other diagnosis ($n = 57$, 15%). Out of a total of 380 children, 203 (53.4%) were diagnosed with complications of malaria, such as convulsion ($n = 60$, 29.6%), anaemia ($n = 107$, 52.7%), dehydration ($n = 4$, 2.0%), cerebral malaria ($n = 6$, 3.0%), and convulsion with anemia and dehydration ($n = 26$, 12.8%). With regards to medical treatment given by physicians at the hospital,

antimalarial drugs were used in most of the cases ($n = 365$, 96.1%); further, 4 (1.1%) children were given anticonvulsant, 9 (2.5%) of them antibiotics, and only 2 (0.5%) children received a blood transfusion.

As shown in Table 6, one third of children ($n = 143$, 37.6%) were managed as inpatient, two third of them ($n = 237$, 62.4%) as outpatient. Chi square test showed a significant difference between treatment modality (inpatient versus outpatient) with regards to educational level ($\chi^2(3) = 26.498$, $P < 0.001$), type of caregivers ($\chi^2(1) = 11.887$, $P < 0.001$),

Table 6. Association between characteristics of caregivers, type and modality of medical treatment used at home and type of treatment settings.

Characteristics	Treatment settings		χ^2 , df and <i>P</i> -value
	Inpatient <i>N</i> = 143 (37.6%)	Outpatient <i>N</i> = 237 (62.4%)	
Educational level			
None	9 (7.5)	3 (2.5)	$\chi^2 = 26.498$ df = 3 <i>P</i> < 0.001*
Primary	42 (53.2)	37 (46.8)	
Secondary	64 (38.3)	103(61.7)	
Tertiary	28 (23.0)	94 (77.0)	
Identity of caregiver			
Mother	140 (40.2)	208 (59.8)	$\chi^2 = 11.887$ df = 1 <i>P</i> < 0.001*
Others	3(9.4%)	29 (90.6)	
Place of domicile			
Within Owo City (urban)	89 (33.1)	180 (66.9)	$\chi^2 = 8.109$ df = 1 <i>P</i> = 0.004*
Outside Owo City (rural)	54 (48.6)	57 (51.4)	
Type of malaria			
Uncomplicated	37 (20.9)	140 (79.1)	$\chi^2 = 39.501$ df = 1 <i>P</i> < 0.001*
Complicated	106 (52.2)	97 (47.8)	
Time to start anti-malarial treatment in case of fever			
< 24 hours	102 (37)	174 (63)	$\chi^2 = 0.196$ df = 1 <i>P</i> = 0.372
≥ 24 hours	41 (39.4)	63 (60.1)	
Type of drugs used at home (<i>n</i> = 297)			
Paracetamol and antimalarial drugs used in combination	61 (35.7)	110 (64.3)	$\chi^2 = 13.524$ df = 1 <i>P</i> = < 0.001*
Paracetamol	72 (57.1)	54 (42.9)	
Total (297)	133 (44.8%)	164 (55.2%)	

Note: *P* < 0.05 as significant *

place of domicile ($\chi^2(1) = 8.109$, *P* = 0.004), type of drugs used at home ($\chi^2(1) = 13.524$, *P* < 0.001), and presence of complications ($\chi^2(1) = 39.501$, *P* < 0.001).

DISCUSSION

In our study, prevalence of home treatment of fever was 98.4%, a value higher than other studies where it was found to be between 50.0% and 90.0% [10, 20]. Probably, as past research has highlighted [21, 22] seeking hospital care is considered as a last resort by caregivers, and the use of home treatment might be because most of them could not afford hospital and needed prompt treatment. Most of the caregivers bought anti-fever drugs from patent medicine shops. Only 11.9 % of our respondents got a prescription drug from

pharmacies. In Nigeria, patent and proprietary medicine vendors (PPMVs) and their shops are usually the first point of call when people fall sick, especially in the rural areas. They are called 'doctors' by people who do not know their difference with qualified medical doctors. Indeed, it is less expensive seeking patent medicine sellers than accessing health care facilities. In both patent medicine shops and health care facilities payment are usually made out-of-the pocket, which has been showed to push households into poverty [23]. Another finding of our study was that despite a good knowledge about causes of malaria by caregivers and a prompt starting time within 24 h of medical treatment in case of fever, many children presented to the hospital fe-

brile (61.8%), tachycardic (63.7%), tachypnoic (83.9%), and almost all of them were diagnosed with malaria (98%) associated with some types of complications of malaria such as convulsion (29.6%) and anaemia (52.7%). Therefore, even if medical treatment of fever at home resulted largely practiced, it was ineffective probably because many of the children were treated with only paracetamol (45%), while a combination of antimalarial drug and paracetamol were only used by less than half of the caregivers. This finding is in agreement with prior studies [3, 24]. For instance, a study carried out in rural area of Northern Nigeria showed that caregivers had a good knowledge of both the cause and the measures of prevention of malaria, but the knowledge of proper administration of anti-malarial drugs was limited [25]. Similar findings were also reported in an urban community in south-western Nigeria [26] and in a semi-urban area of Cameroon [27]. Probably, as Webster and Beyeler et al. stated [28, 29], the caregivers and the patent medicine sellers lack effective knowledge about medical treatment and unfortunately, caregivers prefer seeking medicine vendors as the place to receive treatment, because they are easily accessible and available, despite the fact that a real knowledge of medicine calls for treating the disease's causes and not its symptoms. As a consequence, due to a wrong home-management of fever, many children of our sample were admitted to the hospital with a diagnosis of anaemia and convulsions [8]. Indeed, malarial fever is often associated with non-specific symptoms or severe complications, as past studies has showed, especially if the correct medical treatment is not promptly started within 24 h [3, 30]. Therefore, poor knowledge of correct management at home, and the role played by patent medicine sellers might have accounted for the widespread inappropriate home management of fever observed in this and other studies [19, 31, 32]. In Nigeria, owner-operated drug retail outlets, or patent and proprietary medicine vendors (PPMV) are a main source of medicine for acute condition [16]. PPMV is defined as

'a person without formal training in pharmacy who sells orthodox pharmaceutical products on a retail basis for profit' [33]. Given their numbers, market share, and presence in rural communities, PPMVs represent an important opportunity for improving the delivery of primary health-care commodities and services [28]. However, according to a recent systematic review, PPMVs have poorer knowledge of proper malaria treatment than public health facility staff and pharmacist [28]. In our study, we used the difference between 'inpatient' and 'outpatient' treatment as based on severity of illness and intensity of service. 'Outpatient' status is commonly referred to patients who typically go to an outpatient department such laboratory, radiology or to the emergency department for diagnostic services, in order to determine they need to be admitted to the hospital as a hospital patient or be discharged to go home. Urban children of more educated caregivers showed a lower level of severe forms of malaria, and a higher probability to be treated as outpatient than children from rural area of low educated mothers. In addition, children treated with antimalarial in combination with paracetamol, and without complications of malaria were also significantly treated as outpatient. Therefore, as showed by other studies [21-22, 24, 28], the accessibility to health care services is very important for good management of malaria. A Nigerian research highlighted that a correct home management of fever could extend the reach of public health services, and be more effective in areas with low or moderate levels of disease occurrence, where a widespread increase is generally observed during epidemics [34]. Increasing access to health care services is considered pivotal to improving the health of populations. Prompt access to malaria diagnosis and treatment is a key component of the Roll Back Malaria. According to a recent review of literature, key-factors include 'costs, proximity, timeliness, supplies', as well as 'the importance of health worker personalities and relationships with patients' [35]. In Sub-Saharan Africa countries like Nigeria, conversely,

poverty, negative attitude, poor access roads and transport system, are important challenges to access health facility services. According to the National Antimalarial Treatment Policy by Federal Ministry of Health, Nigeria (2005), patients with malaria should have access to appropriate and adequate treatment within 24 hours of the onset of symptoms and insecticide treated nets and other materials should be available and accessible to persons at risk of malaria, particularly pregnant women and children under 5 years of age [16]. However, according to this National report, most of malaria cases (80%) are inadequately managed at community level by the facility and home-based caregivers. More specifically, according to the 2005 Report, almost all of caregivers (96%) initiate actions within 24 hours but only 15% of their actions are appropriate due to inadequate dosage. More than half of all mothers (60%) have no knowledge of the current management of convulsions, and about 50% of them obtain drugs from Patent Medicine Vendors of which 89% of the drugs were found to be substandard and 43% of syrups unsatisfactory [16]. In a 2004 study carried out in Ado-Ota, Ogun State, Southwest Nigeria (2004), knowledge on the control and treatment of malaria amongst caregivers of under-five children was also inadequate, calling for urgent interventions to improve home management of childhood fever and consideration to the socio-economic and cultural context of antimalarial drugs use [15]. According to the World Health Organization's Guidelines (2005), under-five children presenting with fever in Sub-Saharan Africa should be treated for malaria [12, 36]. These guidelines supported recommendations for the integrated community case management (ICCM) of common childhood illnesses that included malaria, pneumonia, and diarrhea [23, 36]. Caregivers should be taught to recognise signs of severe malaria for which they must immediately bring a child to the nearest health facility. In addition, it is important using Artemisinin-based combination therapy (ACTs) for malaria correctly [16]. According to the

Roll Back Malaria Strategy (2005), training programmes should improve skills and knowledge to recognize uncomplicated malaria, danger signs and when to refer the patient; to manage malaria appropriately (recommended medications/dosages); to improve awareness of the need for prompt and early treatment, completion of the dose, and the importance of drug storage [12]. Therefore, specific training is pivotal in all these strategies. It is not sufficient to train health providers/workers at all levels of health care. Training on the cause, recognition, treatment and prevention of malaria should be extended to pregnant women, caregivers, heads of household, religious and opinion leaders and school children [16, 37-40].

Strengths and limitations

Our study has some limitations. This was a cross-sectional study, which was, therefore, carried out at one-time point (admission to the hospital) or over a short period (three months). Another limitation concerns the validity of the measurements of fever carried out by caregivers and their self-reported answers. Collecting data from untrained caregivers through surveys or interviews could not be appropriate or effective. A strength of the study was that, although using RDT could slightly underestimate the prevalence of malaria diagnosis, our study was hospital-based where the prevalence of malaria is higher than in community. Finally, our study might not have considered the role played by antimalarial drug resistance. Indeed, it is possible that in some cases severe forms of malaria showed because of antimalarial drug resistance. In Nigeria, the development of antimalarial drug resistance like Chloroquine and others has important consequences as an increase in morbidity and mortality, delay in initial therapeutic response and, an increasing cost to the community [16].

CONCLUSION

Overall, home management of malaria by caregivers of under-five children attending children out patient department and emergency

room of Federal Medical Centre, Owo, Ondo State, Nigeria was ineffective. Even though mothers and other caregivers knew causes of malaria, unfortunately, their children's subsequent medical treatment was inappropriate

and inadequate. The effectiveness of home management of malaria depends upon early diagnosis, prompt, appropriate treatment; therefore, proper health education about this disease is crucial.

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