PERCEPTIONS OF ARTEMISININ-BASED COMBINATION THERAPIES AMONG NIGERIAN WOMEN SEVEN YEARS AFTER ADOPTION AS FIRST LINE DRUGS

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Abstract

The study evaluated the perceptions of artemisinin-based combination therapies (ACTs) among women seven years after it was adopted in Nigeria. A cross-sectional survey was conducted in Maiduguri, Nigeria between February and May 2012 by interviewing 350 women. Majority (86.3%) of the women demonstrated adequate knowledge of malaria symptoms. One hundred and sixty seven (167/214, 78.0%) of 214 (61.1%) women who received ACTs previously, took it on prescriptions. Majority opted for herbs (36.0%, P = 0.022) as first drug of choice for malaria treatment. Most of the women perceived that ACTs are expensive (74.9%, P<0.000001), not readily available (72.3%, P<0.000001), not certain of the safety (43.7%, P=0.031) and felt the dosage is cumbersome (38.9%, P=0.038). Health institutions accounted for highest source of information about ACTs (57.5%, P<0.000001). However, significant proportion (73.4%, P<0.000001) opined that ACTs are effective in malaria treatment. Low level of education, resident in rural areas and previous consumption of ACTs were associated with positive perceptions. Despite long time adoption of ACTs, it is negatively perceived by Nigerian women

hence the need to increase ACTs supply and improve on awareness campaign especially among women with low level of education resident in rural areas.

Keywords: Perceptions; ACTs; Malaria; Women; Nigeria

1.0 Introduction

Malaria, an intracellular protozoan infection [1], is transmitted throughout Nigeria with 97% of the over 150 million population at risk of the infection [2]. Over 90% of the infections are due to *Plasmodium falciparum* and it accounts for 25, 30 and 11% of infant, childhood and maternal mortalities, respectively [3-7]. Chemotherapy is the main stay of malaria treatment and control [8] and various drug regimens have been recommended [9, 10].

There is wide spread of chloroquine-resistant *P. falciparum* in Nigeria [11, 12] hence the adoption of artemisinin-based combination therapies (ACTs) in February 2005 for malaria treatment [13]. ACTs consists of an artemisinin derivative and an effective non-artemisinin antimalarial drug [9, 10]. The combination therapy is intended to reduce duration of treatment, theoretically improve efficacy and reduce rate of resistance emergence. Artemether–lumefantrine (AL), artesunate–amodiaquine (AA), artesunate–sulfadoxine–pyrimethamine (ASP) and artesunate–mefloquine (AM) are the World Health Organization's (WHO) recommended ACTs

for sub-Sahara Africa [10, 14]. Various studies have previous described safety [15 – 17] and efficacy [16 – 20] of ACTs. Among the available ACTs, AL and AA are adopted as first and second line drugs, respectively in treatment of uncomplicated malaria in Nigeria [7, 13]. Studies have shown that most clinicians in Nigeria now prescribe ACTs [21] as against previous report of non-compliance during early years of adoption [22, 23]. However, single antimalarial preparations are readily available and are often consumed without doctor's prescription [24, 25].

Women have significant roles to play in malaria treatment and control as they become more susceptible to malaria during pregnancy and they are usually the first to identify ill-health of their children. They often administer medication to themselves and their wards prior to presentation in the hospital [24, 25]. In addition, home-based management of malaria (HMM), a presumptive treatment of febrile children at or near home with antimalarial drugs, is largely promoted by WHO [26, 27]. HMM puts antimalarial drugs into the hands of mothers and community based caregivers which are mostly women. Hence, it becomes absolutely essential for women to know appropriate drugs for treatment of uncomplicated malaria to minimize drug misuse and emergence of resistance. Studies related to perception of ACTs among this cohort of people in Nigeria are limited [2]. Thus, the study was conducted to assess the perceptions of ACTs among Nigerian women seven years after change of malaria treatment policy in favor of ACTs. The findings from this study could contribute to effective malaria treatment in Nigeria.

2.0   Materials and Method

2.1   Study Area

The study was conducted from February to May 2012 in Maiduguri, the capital of Borno State, Nigeria. Maiduguri has a land area of 300km^2 with a population of 732,696 (52% male and 48%

female) people who are predominantly Kanuri; other ethnic groups include Hausa, Shuwa, Babur, Bura, Marghi and Fulani among others [28]. The major economic activities of the people are farming, livestock keeping, trading, fishing, artisans and civil services; however, majority of the married women are housewives. The area has two main seasons: rainy (June – September) and dry (October – May) seasons [29]. Malaria is endemic in Maiduguri with the highest prevalence during months of rainy season, a period that coincides with the breeding cycle of mosquitoes. *P. falciparum* is responsible for over 90% of malaria cases reported in the region [3]. There are numbers of health facilities in Maiduguri ranging from primary health centers to a tertiary health institution.

2.2 Study Design and Population

A cross sectional approach was used for the study. A total of 350 consenting women aged above fourteen were enrolled between February and May, 2012 at University of Maiduguri Teaching Hospital, Nigeria. This figure consists of 268 women randomly drawn from a larger Pharmacovigilance study and 82 women who consulted Malaria Research Group, University of Maiduguri, Nigeria during the study period.

2.3 Data Collection

An interviewer-administered structured questionnaire was prepared by the investigators, pretested and administered by two of the investigators (STB and JJ) and a trained assistant. The questionnaire was written in English, Hausa and Kanuri Languages but was administered in the language the respondents understood best. The questionnaire was sectioned into three: (i) comprised questions on socio-demographic characteristics of the respondents (ii) comprised

questions on knowledge and attitude of women towards malaria identification and treatment and (iii) comprised questions on knowledge and attitude towards use of ACTs in uncomplicated malaria among women. Adequate knowledge on common symptoms suggestive of uncomplicated malaria was defined as the ability to give at least two (2) correct symptoms. Perceptions of ACTs among the women were assessed using the following parameters: the first choice of drug for uncomplicated malaria treatment, cost, safety, availability, efficacy of ACTs and number of tablets required.

2.4   Ethical Consideration

The ethical approval was obtained from the Ethics Committee, University of Maiduguri Teaching Hospital, Nigeria. Written informed consent was obtained from each respondent prior to inclusion in the study.

2.5   Data Analysis

Data entry and analysis were performed using Statistical Package for Social Sciences (SPSS) version 16.0 [30]. Descriptive statistics were carried out to measure frequencies, percentages, means and standard deviations. Bivariate analysis was done with chi-square test or Fisher's exact test to compare proportions for categorical variables. Results were considered to be significant when the 2-sided value was < 0.05.

3.0   Results

3.1.   Socio-demographic characteristics of the women

The socio-demographic characteristics of the 350 women who participated in the study are presented in Table 1. The mean age was 29.6 ± 11.4 (15.0 – 75.0) years. Significant proportion

of the women aged 21 – 25 years (28.9%, 101/350) [χ^2 = 22.5, df = 5, P = 0.00016], were married (72.3%, 253/350) [χ^2 = 216.9, df = 5, P < 0.000001] and were housewives (60.3%, 211/350) [χ^2 = 171.6, df = 5, P < 0.000001]. Majority of the women had at least primary education (85.4%, 299/350).

3.2 Knowledge of common symptoms suggestive of uncomplicated malaria

Table 2 presents the knowledge of the women on common symptoms suggestive of uncomplicated malaria. The proportion of the women with adequate knowledge of common symptoms suggestive of uncomplicated malaria is significantly higher than those with inadequate knowledge (86.3%, 302/350 *versus* 13.7%, 48/350, respectively) [P < 0.000001]. The knowledge reflects irrespective of the age, marital status, level of education, occupation or residence.

3.3 Use and Perceptions of ACTs among the women

One hundred and sixty seven (167/214, 78.0%) of the two hundred and fourteen (214/350, 61.1%) women who have received ACTs previously, took it based on prescriptions from a professional. The perceptions of the women towards use of ACTs are presented in Table 3. Significantly highest proportion (36.0%, 126/350, P = 0.022) of the women preferred herbs as their first choice of drug for treatment of uncomplicated malaria. Majority of the women opined that ACTs is expensive (74.9%, 262/350, P < 0.000001), not readily available (72.3%, 253/350, P < 0.000001), not certain of the safety (43.7%, 153/350, P = 0.031) and felt the number of tablets required to treat uncomplicated malaria is much (38.9%, 136/350, P = 0.038). However, significant proportion (73.4%, 257/350, P < 0.000001) of the women contented with the efficacy of ACTs.

Table 1. Socio-demographic characteristics of the women

Variables	Number enrolled	Percentages (%)
Total number enrolled	350	100.0
Age group (years)		
≤ 20	34	9.7
21 – 25	101	28.9
26 – 30	89	25.4
31 – 35	68	19.4
36 – 40	31	8.9
> 40	27	7.7
Marital Status		
Single	48	13.7
Married	253	72.3
Divorced	27	7.7
Separated	5	1.4
Widow	17	4.9
Level of Education		
No formal education	51	14.6
Primary	123	35.1
Secondary	114	32.6
Tertiary	62	17.7
Occupation		
Student	57	16.3
Housewife	211	60.3
Unemployed	10	2.9
Trading/farming	18	5.1
Artisan	13	3.7
Civil servant	41	11.7
Residence		
Rural	184	52.6
Urban	166	47.4

Table 2. Knowledge of the women on common *symptoms suggestive of uncomplicated malaria

Variables	Number enrolled	Adequate (%)	Inadequate (%)	P value
Total number	350	302 (86.3)	48 (13.7)	**<0.000001**
Age group (years)				
≤ 20	34	25 (73.5)	9 (26.5)	**0.0001**
21 – 25	101	86 (85.1)	15 (14.9)	**<0.000001**
26 – 30	89	74 (83.1)	15 (16.9)	**<0.000001**
31 – 35	68	61 (89.7)	7 (10.3)	**<0.000001**
36 – 40	31	30 (96.8)	1 (3.2)	**<0.000001**
> 40	27	26 (96.3)	1 (3.7)	**<0.000001**
Marital Status				
Single	48	40 (83.3)	8 (16.7)	**<0.000001**
Married	253	218 (86.2)	35 (13.8)	**<0.000001**
Divorced	27	22 (81.5)	5 (18.5)	**0.0000037**
Separated	5	5 (100.0)	0 (0.0)	-
Widow	17	17 (100.0)	0 (0.0)	-
Level of Education				
No formal education	51	45 (88.2)	6 (11.8)	**<0.000001**
Primary	123	106 (86.2)	17 (13.8)	**<0.000001**
Secondary	114	95 (83.3)	19 (16.7)	**<0.000001**
Tertiary	62	56 (90.3)	6 (9.7)	**<0.000001**
Occupation				
Student	57	51 (89.5)	6 (10.5)	**<0.000001**
Housewife	211	173 (82.0)	38 (18.0)	**<0.000001**
Unemployed	10	10 (100.0)	0 (0.0)	-
Trading/farming	18	15 (83.3)	3 (16.7)	**0.000063**
Artisan	13	13 (100.0)	0 (0.0)	-
Civil servant	41	40 (97.6)	1 (2.4)	**<0.000001**
Residence				
Rural	184	165 (89.7)	19 (10.3)	**<0.000001**
Urban	166	137 (82.5)	29 (17.5)	**<0.000001**

 *Symptoms: fever, headache, chills, nausea, vomiting, abdominal discomfort, joints pain, weakness and diarrhea

Table 3. Perceptions of artemisinin-based combination therapies among the women

Variables	Number	Percentages (%)	P value
1st choice of treatment			
ACTs	84	24.0	
CQ	61	17.4	
Herbs	126	36.0	
Other antimalarials	18	5.1	
SP	53	15.2	
Spiritual	8	2.3	**0.022**
Cost of ACTs			
Very expensive	143	40.9	
Moderate	119	34.0	
Not expensive	27	7.7	
Uncertain	61	17.4	**0.046**
Safety of ACTs			
Very safe	71	20.3	
Moderate	49	14.0	
Not safe	77	22.0	
Uncertain	153	43.7	**0.031**
Availability of ACTs			
Readily available	83	23.7	
Moderate	114	32.6	
Scarce	139	39.7	
Uncertain	14	4.0	**0.048**
Efficacy of ACTs			
Very effective	144	41.1	
Moderate	113	32.3	
Not effective	27	7.7	
Uncertain	66	18.9	**0.043**
Number of tablets*			
Much	136	38.9	
Appropriate	65	18.6	
Small	29	8.3	
Uncertain	120	34.3	**0.038**

*Based on dosage of 4 tablets twice daily for 3 days
ACTs   Artemisinin-based combination therapies
CQ   Chloroquine
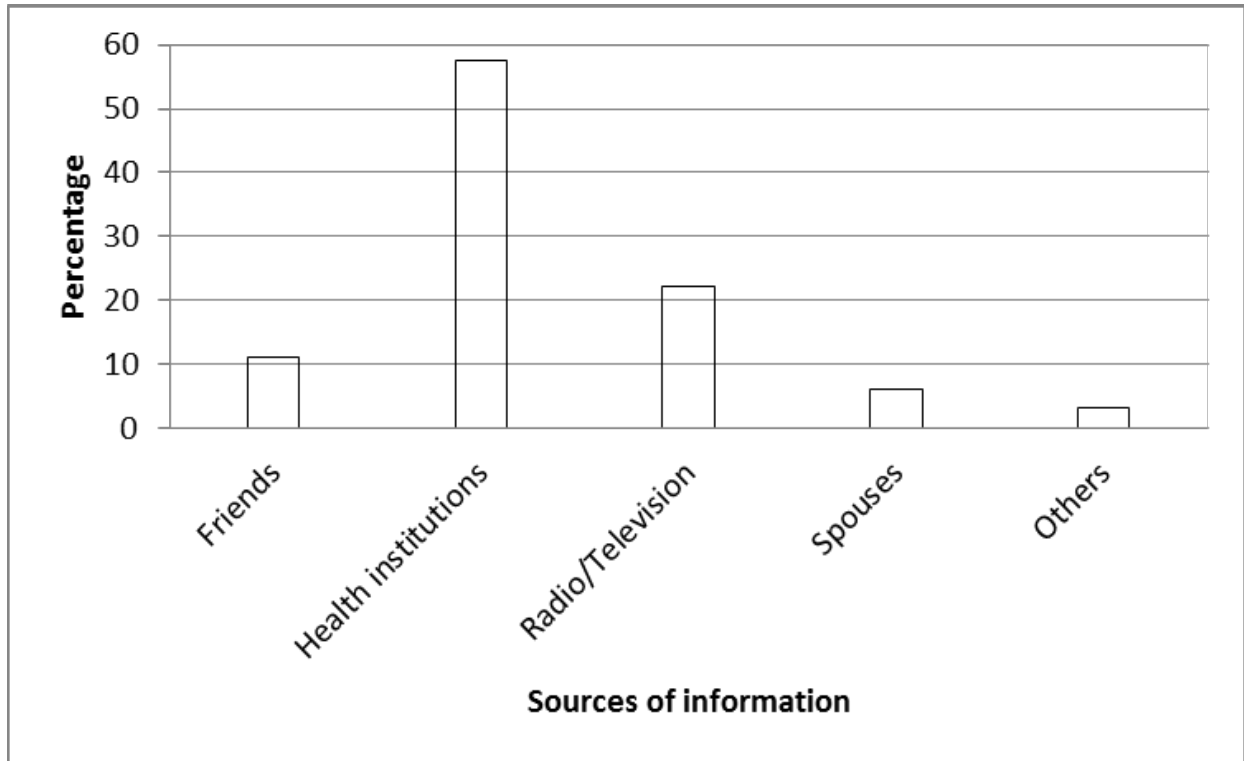SP   Sulphadoxine-pyrimethamine

Figure 1. Sources of information on treatment of uncomplicated malaria with artemisinin-based combination therapies.

3.4   Sources of information on treatment of uncomplicated malaria with ACTs

Two hundred and twenty six (226/350, 64.6%) of the respondents have previously heard about ACTs but only 18.9% (66/350) were able to identify it with the name ACTs. Majority of the women who have previously heard about ACTs are urban residents (83.7%, 139/166). The details of the sources of information about ACTs are presented in Figure 1. The sources of information varied among the women with health institutions accounting for the significantly highest proportion of 57.5% (130/226) $[\chi^2 = 122.1$, df = 4, P < 0.000001]. Other sources of information which include market, office and school accounted for the least proportion of 3.1% (7/226).

Table 4. Factors associated with positive perceptions of artemisinin-based combination therapies among the women

Variables	Number enrolled	Number with positive perceptions (%)	OR (95% CI)	P value
Age group (years)				
≤ 30	224	73 (32.6)	1.0	
> 30	126	46 (36.5)	1.2 (0.7 – 1.9)	0.458
Marital Status				
Single	48	15 (31.3)	1.0	
Married	253	86 (34.0)	1.1 (0.6 – 2.3)	0.712
Divorced	27	10 (37.0)	1.3 (0.4 – 3.9)	0.609
Separated	5	2 (40.0)	1.5 (0.2 – 12.6)	0.690
Widow	17	6 (35.3)	1.2 (0.3 – 4.4)	0.759
Level of Education				
At most primary	174	45 (25.9)	1.0	
At least secondary	176	74 (42.1)	2.1 (1.3 – 3.4)	**0.001**
Occupation				
Student	57	36 (63.2)	1.0	
Housewife	211	43 (20.4)	0.2 (0.1 – 0.3)	**<0.00001**
Unemployed	10	4 (40.0)	0.4 (0.1 – 1.8)	0.168
Trading/farming	18	4 (22.2)	0.2 (0.04 – 0.6)	**0.002**
Artisan	13	3 (23.1)	0.2 (0.03 – 0.8)	**0.009**
Civil servant	41	29 (70.7)	1.4 (0.6 – 3.7)	0.434
Residence				
Rural	184	28 (15.2)	1.0	
Urban	166	91 (54.8)	6.8 (4.0 – 11.6)	**<0.00001**
Previous consumption of ACTs	136	21 (15.4)	1.0	
Never	214	98 (45.8)	4.6 (2.6 – 8.2)	**<0.00001**
At least once				

ACTs   Artemisinin-based combination therapies
CI   Confidence interval
OR   Odd ratios

3.5   Factors associated with positive perceptions of ACTs

Table 4 presents the factors that were associated with the positive perceptions of ACTs among the women. Of the factors evaluated, level of education, residence, occupation and previous consumption of ACTs were factors associated with positive perceptions of ACTs among the women.

4.0   Discussion

ACTs were adopted in Nigeria as the recommended drugs for treatment of malaria seven years ago [13] following the wide spread resistance to chloroquine [11, 12]. With the promotion of HMM by WHO [26, 27], adequate knowledge of antimalarial drugs is required by people especially women who are major stakeholders in HMM. Thus, we evaluated the perceptions of ACTs among the women of Northeastern Nigeria seven years after adopted as drugs of choice. Findings from such study could improve malaria treatment and control programs [31].

The cornerstones of malaria control in Africa are early recognition of symptoms, diagnosis and effective treatment [32, 33]. The sound knowledge of malaria symptoms demonstrated by the majority of the women is in accordance with previous studies from other parts of the world [34 – 40]. The ability of women to recognize symptoms of malaria could contribute to the success of HMM. However, this is inadequate without the knowledge of appropriate antimalarial drugs. The study revealed negative perceptions of ACTs, especially among the women resident in the rural areas. It is not surprising that majority of the women opted for herbs as first choice of drug for uncomplicated malaria. Use of herbs in treatment of febrile illness is a common practice in Africa especially among the rural dwellers [41-44. In spite of their first choice of herbs most of

them had previously consumed ACTs based on prescriptions hence the need for doctors to adhere to malaria treatment guidelines. Oreagba and others [21] have previously reported that ACTs is commonly prescribed in hospitals in Nigeria. It could be opined that these women could have taken herbs if not for the prescriptions.

The negative perfections on cost and availability of ACTs observed in our study is in line with previous studies that showed that cost and inadequate supply of ACTs contributed to the non-adherence and negative perceptions among patients and health workers [45]. Subsidization of the price by Governments, Non-Governmental Organizations and individuals among others could improve it perceptions. Also, efforts should be directed towards ensuring adequate supply to rural areas where the burden of malaria is most devastating. The safety of ACTs has been widely described [13, 15, 16], even during early pregnancy [46, 47] when it should be taken only if there is no better option [15, 48]. The uncertainty on safety expressed by the women could be a mere expression of fear probably on number of tablets. This could be supported with the fact that most of those who have consumed the drugs before agreed that it is safe. The positive perceptions of the efficacy among the women could be a true indicator of the efficacy since previous studies have reported that ACTs are efficacious among Nigerian populace [17, 19, 20]. We also investigated the factors that are associated with positive perceptions of ACTs. Women with at least secondary education, resident in urban areas and have previously consumed ACTs have positive perceptions of the drugs. Most of the population with positive perceptions obtained their information from health institutions. Thus, the perceptions of ACTs could be improved by increase adherence with treatment policy among health workers.

5.0   Conclusions

This study revealed that seven years after adoption of ACTs Nigerian women perceived that the drugs are costly, inadequate in supply, unsafe and the drugs are efficacious. This could hinder the adherence with treatment guidelines and negate efforts to control malaria in Nigeria. It was also shown that formal education and resident in urban areas contributed to positive perceptions. Some of the issues that require attention include: (i) cost of ACTs (ii) inadequate supply of ACTs in rural areas (iii) low level of awareness on the safety among women and (iv) need to reach women with low level of education resident in rural areas. These could be addressed through: (i) provision of drug subsidy through health insurance schemes (ii) increase procurement and distribution of drugs especially to rural areas (iii) intensify awareness campaign on safety of ACTs using radio, television and village heads among others (iv) continuous education for health workers on their role in patients' adherence to treatment and (v) inclusion of malaria treatment in addition to malaria prevention campaign during ante-natal clinics.

Conflict of interest

We declare that there is no conflict of interest among the authors.

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