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KNOWLEDGE ON PREVENTION AND MANAGEMENT OF UNCOMPLICATED MALARIA, AMONG RESIDENTS OF A RURAL COMMUNITY IN ENUGU STATE, SOUTHEAST NIGERIA

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Abstract

Protozoan parasite, Plasmodium causes malaria. It is transmitted through the bite of Anopheles mosquito. Globally, about 3.2 billion people are at risk of getting infected with malaria. An estimated 214 million new cases of malaria, resulting in about 438,000 deaths were recorded in the year 2015, with the greatest burden being on the African continent. Malaria prevention remains a key approach towards tackling the public health challenge posed by malaria disease. Malaria case management is also key in malaria control/elimination strategy. Case management consists of early diagnosis and prompt treatment.

The research was a cross-sectional study carried out among rural dwellers who presented for a medical outreach in January 2015, at Egede town, a rural community in Udi Local Government Area of Enugu State, Southeast Nigeria.

The socio-demographic variables of the 296 respondents revealed that majority of the respondents were 50 years and above (76.7%), females (70.3%), married (83.1%), had no formal education (53.0%), and are farmers by profession (70.9%). Overall knowledge of respondents on prevention of malaria was 51.1%, while the knowledge on diagnosis and treatment was 24.5%.

The first pillar of the WHO "Global technical strategy for malaria, 2016–2030", is to "Ensure universal access to malaria prevention, diagnosis, and treatment". Implementation of this pillar requires the creation of awareness about the recommended malaria prevention interventions, diagnostic testing, and correct treatment among people residing in various communities, especially in the rural areas.

Keywords: Knowledge, Prevention, Management, Uncomplicated, Malaria.

Introduction

Malaria is caused by inoculation of a human host with protozoan parasites of Plasmodium by a female Anopheline mosquito. Four species of Plasmodium that are commonly transmitted from person to person, causing malaria are Plasmodium falciparum, Plasmodium vivax, Plasmodium oval, and Plasmodium malaria. Rare cases of infection with the monkey malaria parasite

Plasmodium knowlesi is being reported from the forest region of South-East Asia[1]. P. falciparum is commoner in Africa, while P. vivax has a wider global distribution[2]. The very rare occurrence of P. vivax malaria in the West African sub-region is attributable to the non-existence of Duffy antigen in the blood group of most people in West Africa. This antigen makes it possible for the parasite to penetrate the red blood cell of infected persons[3]. Though an estimated 214 million new cases of malaria, resulting in about 438,000 deaths were recorded in the year 2015, there is a dramatic reduction in the global malaria burden from the year 2000 when Millennium Development Goals were launched to 2015 when the implementation was concluded[2]. Globally, about 3.2 billion people are at risk of malaria, and the greatest burden is on the African continent[2].

Nigeria is one of malaria endemic countries with all year transmission, and 97% of the population being at risk of getting infected with malaria[4]. Most malaria infection in Nigeria is caused by Plasmodium falciparum (98%)[5]. It was reported in the year 2011 that in Nigeria, an estimated 132 billion Naira due to costs of treatment, transportation to the source of treatment, loss of man-hours, absenteeism from school and other indirect costs was economic loss due to malaria[5]. There is, however, an improvement in the endemicity of malaria between 2000 - 2010 period. This is due to increased interventions in malaria control activities within this period. In spite of this progress towards reducing the morbidity and mortality of malaria in Nigeria, it is still a major cause of deaths in children under five years of age and pregnant women; causing more deaths per year than HIV/AIDS[4]. Preventive and curative methods are the two primary health care approaches to control malaria[3].

Cost-effective interventions can be applied in preventing and treating malaria[2]. Globally, these interventions include; indoor residual spraying (IRS), use of long-lasting insecticidal nets (LLINs), prophylactic chemotherapy including intermittent preventive therapy in pregnant women, and early diagnosis and treatment of malaria cases[6]. Some other measures that help in preventing malaria by reducing mosquito vectors include; eliminating mosquito breeding places such as stagnant water, and reducing vegetation near houses that habour mosquito[7,8]. Malaria prevention remains a key approach towards tackling the public health challenge posed by malaria disease. This is probably one of the reasons why the United States of America Government still views malaria prevention and control as a major foreign assistance objective of the President's Malaria Initiative, with a vision of ending preventable child and maternal deaths and ending extreme poverty[9]. Better knowledge and awareness of malaria preventive methods are useful in preventing infection with the disease[10]. In the 2014 - 2020 National Malaria Elimination Programme Strategic Plan, the first objective is to ensure that at least 80% of the population practice appropriate malaria prevention and management by 2020[4].

Malaria case management is a key aspect of malaria control/elimination strategy globally. The case management consists of early diagnosis and prompt treatment[1]. In Nigeria, the main goal of malaria treatment is to cure the infected patient thereby reducing morbidity and mortality, and secondly to promote rational use of anti-malarial drugs, thus reducing the development of resistance[11]. In many African countries including Nigeria, diagnosis of malaria is usually presumptively made in patients with fever, and treatment commenced. This apparently worked well then because the available anti-malarial drugs such as Chloroquine, Amodiaquine, and Sulfadoxine/Pyrimethamine were cheap, widely available, safe, and effective[12]. Unfortunately, there is the widespread

development of resistance to Chloroquine and the other old anti-malarial drugs in the malaria endemic regions[13]. This justified the introduction in the year 2005, of Artemisinin-Based Combination therapy as the first line drug for the treatment of uncomplicated malaria. These drugs are currently the most efficacious anti-malarial drugs in use[14]. The recommendation now is that anti-malarial treatment should be administered only to patients with confirmed cases of malaria. This has the benefit of reducing drug resistance. This confirmation of malaria infection is usually done through parasitological examination of the patient's blood specimen. The parasitological diagnosis can be by microscopy, or rapid diagnostic test[1].

Prevention and treatment efforts are saving millions of dollars in healthcare costs globally. New World Health Organization estimates show that reductions in malaria cases in sub-Saharan Africa saved an estimated US $900 million over 14 years [2].

It is known that knowledge on prevention and management of malaria among community members, is important in determining their response to any control/elimination intervention[15]. In spite of introducing Artemisinin-Based combination therapy as the first-line drug for treating uncomplicated malaria in Nigeria, many still use Chloroquine and the other old generation drugs in the treatment of uncomplicated malaria. Many also use Artemisinin-Based combination drugs inappropriately[16]. Assessing the knowledge on prevention methods and management of malaria among rural dwellers will provide information on the level of knowledge on malaria that the community members have, and thus assist in guiding the development of appropriate intervention program that will adequately address malaria control/elimination needs of the community in question. The main objective of this study is to assess the level of knowledge possessed by residents of a rural community in Enugu state, southeast Nigeria; on the different methods of preventing malaria, and also the current and acceptable steps in managing the disease. Findings from this study shall be useful in developing effective malaria control/elimination programs for rural communities in developing countries.

Materials and Methods

This study was carried out in Egede town, which is a rural community in Udi Local Government of Enugu State, Southeast Nigeria. Enugu state is one of the thirty-six states that make up the Nigerian nation. The state has a land mass of 7,161 Km^2, and a population of 3,267,837 as at the year 2006, with Udi Local Government Area having a population of 238,305[17]. Udi Local Government Area is one of the seventeen Local Government Areas that make up Enugu state. These figures are however projected to have increased reasonably by this year 2016. Anambra State bounds Enugu State on the west, Kogi and Benue states on the north, Imo and Abia states on the south, while Ebonyi state is in the East [17]. Urban areas of Enugu state are inhabited mainly by the public, and civil servants, as well as industrial workers. Artisans, commercial transport operators, and small/medium enterprises workers also constitute a large proportion of urban dwellers in Enugu state. However, in the rural areas of Enugu state, you find mostly farmers, palm wine tappers, primary/secondary school teachers, petty traders, and hunters.

This research was a cross-sectional study carried out among rural dwellers who presented for a medical outreach in January 2015. During the same outreach activity, data were also collected for more studies on malaria, diabetes mellitus, and HIV/AIDS. Pretested interviewer-administered questionnaire was used for data collection. The collection was done by ten medical interns and five resident doctors in the Department of Community Medicine, Enugu state University Teaching Hospital, who

were trained for this purpose. Information was elicited from two hundred and ninety-six (296) respondents. The data were quantitatively analyzed, using SPSS version 20.0, in terms of the percentage of respondents with good knowledge on prevention and management of malaria. Scores of 50% and above were considered good.

Results and Discussion

The first of the recent World Health Organization's three pillars of global technical strategy for malaria 2016-2030 is to "Ensure universal access to malaria prevention, diagnosis, and treatment"[18]. Findings in this study provide data that would be useful in making informed decisions with respect to malaria prevention, diagnosis, and treatment in rural communities of developing countries.

Socio-demographic variables for respondents: The socio-demographic variables for the 296 respondents revealed that majority of the respondents were 50 years and above (76.7%), females (70.3%), married (83.1%), had no formal education (53.0%), and are farmers by profession (70.9%).

Table 1: Socio-demographic variables for respondents

Age range (in years)	Frequency (N = 296)	Percent (100%)
19 and below	2	0.7
20 – 29	13	4.4
30 – 39	22	7.4
40 – 49	32	10.8
50 – 59	70	23.6
60 – 69	73	24.7
70 and above	84	28.4
Sex		
Female	208	70.3
Male	88	29.7
Marital status		
Married	246	83.1
Single	14	4.7
Divorced/Separated	2	0.7
Widowed	34	11.5
Educational Status		
No formal Education	157	53.0
Primary level	88	29.7
Secondary level	37	12.5
Tertiary level	9	3.0
Postgraduate level	5	1.7
Occupation		
Farmer	210	70.9
Petty trader	38	12.8
Artisan	15	5.2
Retired	14	4.7
Civil servant/teacher	16	5.4
Unemployed/student	3	1.0

This socio-demographic picture seen among the respondents in this study, may not represent the actual socio-demographic status of the community. The majority of the respondents (76.7%) are above fifty years of age. Most of the young men and women that reside in the community are secondary school students and motorcycle riders, who

probably may not have the patience of waiting for an appreciable length of time, before being attended to by the visiting medical team. More female (70.3%) presenting for the medical outreach activity during which this study was carried out, is in keeping with the established cultural trend of more female usually presenting for illnesses since they are seen as the weaker sex. Culturally, the role of the male gender is seen as incompatible with illness, hence they usually do not seek medical attention until the illness is advanced [19].

Knowledge on common methods of preventing malaria

In addition to the three vector control activities assesses in this study for preventing malaria infection, biological control such as introducing predatory bacteria, fish, fungi, nematodes and other biological agents which can compete with Anopheles mosquitoes and so reduce the rate of the mosquito population is another vector control method of preventing malaria[3]. This biological method is not used in Enugu state, Nigeria. Chemoprophylaxis to prevent malaria infection in the most vulnerable groups is also a popular approach to preventing malaria. The current World Health Organization recommendation on this includes intermittent preventive treatment of pregnant women, intermittent preventive treatment of infants, and seasonal chemoprevention for children aged under 5 years[20-22]. Since there is no health facility in the studied community that offers Antenatal and delivery services, it was almost certain that respondents in this study would have little or no knowledge on intermittent preventive treatment in pregnancy. Again, intermittent preventive treatment of infants and seasonal chemoprevention for children aged under 5 years are not being implemented in Enugu state, Nigeria.

Table 2: Knowledge on common methods of preventing malaria

Question	Correct response	Percentage (%)
Sleeping under Long Lasting Insecticidal Nets every night helps to prevent malaria	151	51.0
Spraying insecticides inside the house helps prevent malaria	147	49.7
Destroying mosquitoes breeding places prevent malaria	156	52.7

Overall knowledge of respondents on prevention of malaria = total correct response/total possible correct response X 100% = 454/888 X 100% = 51.1% (Good knowledge)

The overall knowledge of 51.1% on common methods of preventing malaria, found in this study is good and comparable to findings in Uganda, which is also a developing country like Nigeria. However, in Uganda, people are more knowledgeable about preventing malaria by using insecticidal nets than the use of any other preventive method [23]. This might be an indication that the use of insecticidal nets for preventing malaria is more in Uganda, than Nigeria. A study among residents in rural communities in Southern Ethiopia again revealed high level of knowledge about the use of insecticidal net (95.4%), good knowledge about destroying mosquito breeding places and keeping the environment clean (54.4%), but very poor knowledge about the benefit of using insecticide spray to prevent malaria (24.0%) [24]. A similar pattern was also found in a rural community in Rwanda where the knowledge on the benefit of the insecticidal net was 96.7%, destroying mosquito breeding sites and clearing bushes (71.3%), and using insecticidal spray (28.0%)[25]. In Ado-Ekiti Local government Area of Ekiti state, Nigeria, which is also a rural area; 88% of respondents in a study knew that sleeping under insecticidal net prevents malaria, 85% knew that spraying

insecticides helps in preventing malaria, while 85% also knew that destroying mosquito breeding places prevents malaria[26]. This higher level of knowledge on malaria prevention methods could be an indication that malaria prevention activities are being implemented more in those rural areas than in our study area. This could also be the reason behind the knowledge level of 90% on the use of insecticidal nets in preventing malaria, also found among residents of Aliero rural communities in northern Nigeria[27]. The very poor knowledge about the use of insecticidal spray as malaria prevention method in Ethiopia and Rwanda, where knowledge about the benefit of the other prevention methods is very high; is surprising. We also recorded the lowest knowledge score about these prevention methods on the aspect of using the insecticidal spray as malaria prevention method (49.7%). It is possible that the content of malaria control/elimination activities in these countries is deficient in information about the use of insecticidal spray as a method of preventing malaria infection. More research work is required in this area before one can be definite about the reason for this wide disparity in knowledge about using the insecticidal spray, and the other methods for malaria prevention.

Knowledge on Diagnosis and Treatment of Uncomplicated Malaria

Only 45.9% of respondents knew that blood test for malaria diagnosis should usually be done before drug treatment of malaria, as recommended by the World Health Organization and stipulated in the national malaria treatment guidelines of Nigeria[1,5]. Studies in some other developing countries such as Kenya revealed that although community members and health workers knew that parasitological diagnosis of malaria should be made before treatment is commenced, most of them still insist that they would go ahead and treat malaria in spite of a negative blood test [28]. Few of the respondents (25.7%) knew that the quick test for malaria diagnosis is called "Rapid Diagnostic Test". This is, however, a lot better than the finding in Ugandan where though most respondents knew that malaria diagnosis should be confirmed before treatment is initiated, only 5% knew that the quick blood test for malaria is a rapid diagnostic test[29]. The higher level of RDT knowledge found in Cameroon (30.0%) could be as a result of the deliberate effort made by the government in the year 2012 to make it available in all health clinics[30].

Table 3 – Knowledge of respondents on diagnosis and treatment of uncomplicated malaria

Question	Correct response (N = 296)	Percentage(%)
Blood test for malaria should usually be done before commencing treatment of malaria	136	45.9
Quick blood test for malaria diagnosis is known as Malaria Rapid Diagnostic Test	76	25.7
It is good to use Palm kernel oil in treating convulsion during malaria	21	7.1
Chloroquine is still very effective in treating malaria	19	6.4
Artemisinin-based combination therapy is the recommended treatment for uncomplicated case of malaria	76	25.7
Malaria is now resistant to many drugs	107	36.1

Total knowledge of respondents on diagnosis and treatment of malaria= Total correct response/total possible correct response X 100% = 435/1776 X 100% = 24.5% (Very poor knowledge)

The practice of using palm kernel oil for treating convulsions in children by some mothers in Nigeria, especially in the rural areas of the Eastern Nigeria, is well known [31,32]. It is worrisome to find in this study that only 7.1% of respondent correctly knew that it is not good to smear the body of a convulsing child with palm kernel oil, and also make the child drink some quantity as is frequently practiced. Smearing the body of the child with palm kernel oil, conserves heat in the child, thus increasing the body temperature and making the child's situation worse. This use of palm kernel oil in treating convulsions requires more research work.

Very few of the respondents (6.4%) knew that Chloroquine is no more very effective in treating malaria. This implies that they probably still buy Chloroquine from the Patent Medicine Vendors and use the drug as a first-line treatment of malaria. This practice is clearly not in keeping with the WHO, and Nigeria National treatment guidelines for uncomplicated malaria. As far back as the year 2003 in a study done in a rural community in Ethiopia, 41.0% of respondents stated that Chloroquine was ineffective in treating malaria [15]. This probably could be that resistance to Chloroquine for treating malaria, developed in that part of the world earlier than was seen in our study population. The ability of malaria parasite to survive or multiply in the presence of adequate concentrations of a medicine that used to be effective in clearing the parasite means that resistance to that drug has developed. This has been observed in the use of Chloroquine in the treatment of malaria. Chloroquine resistance initially documented in South America has spread through Southeast Asia to East Africa and eventually to all endemic countries of the African continent[13]. As far back as the year 1993, Chloroquine-resistant P. falciparum was reported among 55.6% of respondents in a study in Ethiopia[33]. The resistance of malaria parasite to many of the older drugs used for treating the disease is well known [1]. However, only 36.1% of respondents in this study are aware of this very important information. This implies that a good number of persons in our study population still routinely use Chloroquine, Sulfadoxine/Pyrimethamine, and other older drugs used in the treatment of malaria.

Only 25.7% of respondents in the study population knew that Artemisinin-based combination therapy (ACT) is the recommended first-line drug for treating uncomplicated malaria. ACT was introduced and recommended as first-line treatment of malaria in Nigeria, in the year 2005; in keeping with WHO guidelines [14]. With regards to the ACT Artemeter + Lumefantrine, as many as 94.8% of respondents in a study conducted in Tanzania, in the year 2010 reported having heard about the drug, with 56.4% of them attesting that the drug is effective for treating malaria. However, only 35.3% of the respondents reported having used the drug. This lower knowledge in our study population about ACT being the drug of choice in the treatment of malaria could be a pointer to lower malaria control activities in our study population. This, however, needs further research efforts.

Conclusions

This study revealed an unimpressive knowledge level on malaria prevention methods and management among residents of a rural community in a developing country. In the WHO "**Global Technical Strategy For Malaria, 2016–2030",** the first of the three pillars of the strategy is to "**Ensure Universal Access To Malaria Prevention, Diagnosis And Treatment**"[18]. Proper implementation of this first pillar requires the adequate creation of awareness about the recommended malaria prevention interventions, diagnostic testing, and correct

treatment among people residing in various communities. A necessary step towards implementing this strategy is an assessment of the knowledge on prevention and management of malaria that members of different communities already have. This will guide the development of the content of interventions that would be implemented towards achieving the set goals of the first pillar of this global strategy.

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