ORIGINAL ARTICLE

Malaria diagnosis and treatment amongst health workers in University of Nigeria Teaching Hospital Enugu, Nigeria

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Abstract

Background: Confirmation of malaria and appropriate treatment are keys to malaria control.
Objective: To determine the practice of malaria diagnosis and treatment in a Nigerian tertiary hospital.
Materials and Methods: Retrospective review of patients' records at the Children's Clinic in UNTH.
Results: Out of 6,684 children seen within the one year reviewed period, children diagnosed with malaria were 35.8 percent. Males were 60 percent and females were 40 percent. Children under five years were 72.6 percent of the total. Folders successfully traced were 1012; in 92 percent investigations for malaria were requested while 32 percent had differential diagnosis. Out of the 931 malaria investigations requested, 30percent did the tests and positive results were 94.9 percent. Presumptive treatment was 98 percent. Majority (83.3%) received ACTs.
Conclusion: The practice of presumptive treatment was high and few cases had a differential diagnosis. Training of health workers on the need to confirm malaria cases is required.

Key words: Children, diagnosis, malaria, Nigeria, treatment

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Introduction

Malaria is caused mainly by Plasmodium falciparum[1] and causes about 2.3 million deaths globally and 90% of such mortalities are in Sub-Saharan Africa.[2,3] It causes about 300-500 million clinical cases per year.[4] In Nigeria, malaria causes about 50% of out-patient visits, 40% of hospital admissions and 30% of mortalities. This mortality is higher in complicated cases, especially in children under 5 years of age, and Nigeria has about 30 million children under the age of five years.[5] This indicates that malaria constitutes a major health constraint to the people and hinder them from day to day social activities as a result of clinic attendance, hospital admission, and days spent being sick. Malaria is a prime etiological factor that slows down economic growth in Africa as a result of loss of quality manpower and productivity, which might be expressed in terms of absenteeism from school and work when a child is taken to hospital. All these have devastating economic implications; in terms of cost of treatment,[6] retardation of economic growth[7] and loss in gross domestic product.[8]

One major factor that has sustained malaria burden is the issue of resistance of *Plasmodium falciparum* to former first line antimalarial drugs; chloroquine and sulphadoxine pyrimethamine. Recently a newer, effective and expensive Artemisinin-based combination treatments (ACTs) were introduced as first line drug for malaria treatment.[9] One of the goals of national antimalaria treatment policy is to encourage rational drug use to prevent or delay the development of antimalarial drug resistance.

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This can be achieved through confirming all presumed malaria cases through either microscopic examination of blood Smear, which remains the gold standard in malaria diagnosis[10] or use of rapid diagnostic test (RDTs) kit,[11,12] since 50% of patients clinically diagnosed with malaria have illnesses attributed to some other causes.[13] The confirmed cases of malaria will be treated with any of the ACTs. However the extent to which this is practiced especially in management of childhood malaria in tertiary health institutions has not been studied. It is critical in this period when efforts are geared towards control of malaria in many Sub-Saharan African countries, to review the existing practices of malaria diagnosis and treatment among healthcare workers with the aim of indentifying areas that need interventions, in view of the pivotal role malaria diagnosis and treatment plays in Roll Back Malaria Programs. This study aims to give an insight into the malaria diagnostic and treatment practices in a tertiary health institution in southeast of Nigeria.

Materials and Methods

Study area and population

This study was conducted in children's out-patient clinic (CHOP) of the University of Nigeria Teaching Hospital (UNTH) Ituku Ozalla, Enugu State. It was a review of all the malaria cases managed in the clinic from November 2007 to October 2008. University of Nigeria Teaching Hospital is a tertiary health facility located in Ituku Ozalla in Enugu State, South Eastern region of Nigeria. This lies within Guinea-Savanna forest belt with annual rainfall of 1520-2030 mm and temperature ranges between 22.4 and 30.8 degree Celsius.[14] The vegetation is tropical rain forest with two major seasons, namely dry (November – April) and wet (May – October). There is a high malaria transmission all year-round, with an average malaria incident rate of 15% during dry season and 35% during wet season.[15,16]

Children out-patient's clinic is run in rotation by Resident Doctors in Pediatrics Department. They make use of both the hospital main laboratory and a functional side laboratory in Children's Emergency Room for their investigations.

Study design

The study was a descriptive retrospective study to determine the practice of malaria management in CHOP, UNTH. It was deliberately chosen to be a retrospective study so that unbiased practices of both healthcare workers and care-givers response to treatment modalities would be captured.

Ethical considerations

Ethical clearance was obtained from the Ethical Committee of the University of Nigeria Teaching Hospital, Enugu. The records department sorted out the medical files of these patients. This is to ensure confidentiality and proper handling of medical records.

Data collection methods

Attendance register at CHOP was reviewed from November 2007 to October 2008, and all malaria cases managed were selected. Information on the sex and age of the patients were recorded on a proforma. Efforts were made to trace their hospital cards and from those cards traced, information on differential diagnosis; malaria investigation requested; whether the requested investigation was done; antimalarial drug prescribed and at which point during the course of managing the patient was the prescription made with reference to documentation of malaria investigation results. If a prescription was written on the same planned outline before review of investigation result, it is taken as presumptive treatment, but if after documentation of the malaria investigation result, it is regarded as a confirmed case.

Data analysis

The data were analyzed using Epi- Info version 6.04[17] and SPSS version 15.0 statistical software. The children were grouped into three age groups: One month to five years, above five years to under 10 years, and above 10 years. For the patients that had differential diagnosis, the first amongst differentials was documented. The request for malaria investigation was classified into "investigation requested" for those that had malaria investigation written in their treatment plan and "no investigation requested" for those that did not have any outline investigation request. Those in the "investigation request" group were further arranged into two groups: Those that did the investigation and those that did not. The percentages of different variables were calculated. The outcome of the malaria investigation for those that did it was classified as "positive malaria parasiteamia" and "negative malaria parasiteamia." The antimalarial drugs used were classified according to their generic names namely, Artesunate-Lumefantrine (AL), Artemether-Amodiaquine (AA), Quinimax, Monotherapy (Amodiaquine monotherapy, Artesunate monotherapy and Injection Artemether).

Results

A total of 6,684 children attended CHOP from November 2007 to October 2008. Among these out-patient visits, there were 2,394 (35.8%) malaria cases. There were 1,438 (60%) males and 956 (40%) females, with male: Female ratio of 1.5:1. The age range of the subjects was 1 month to 19 years.

Age and gender distribution of the children with presumptive diagnosis of malaria

Majority of the subjects were under 5 years of age in both male (72.7%) and female (72.4%) subjects as shown in Table 1.

Out of 2,394 cases of malaria, 1,012 case files were located and those that had malaria investigation request were 931 (92.0%). Among the 931 investigations requested, 279 (30.0%) did the investigation, out of which 265 (94.9%) were positive to malaria parasiteamia and 14 (5.1%) were negative.

Differential diagnosis made among the children with presumptive diagnosis of malaria

Table 2 shows that out of 1,012 cases of presumptive diagnosis of malaria, 324 (32%) had another diagnosis. Acute respiratory tract infection was the highest (42.6%) among the differential diagnosis made. Others were acute gastroenteritis (17.1%), sepsis (9.3%), urinary tract infection (7.8%) and anaemia (4.7%) [Table 2].

Presumptive treatment for malaria

Out of the 1,012 malaria cases, 992 (98%) received antimalarial drug prescription without prior review of malaria laboratory investigation result and 20 (2%) received antimalarial drug prescription after their malaria laboratory investigation results were reviewed.

Discussion

The results of this study offer some insight into the prevalence of malaria cases and its pattern of diagnosis and treatment in CHOP of UNTH. The prevalence of malaria cases among children that attended out-patient clinics of UNTH was high and is similar to what was reported by another study in Nigeria.[18] Malaria has continued to be the commonest cause of hospital visits, especially among children. This finding has gone further to highlight that malaria preventive measures like the use of insecticide treated bed nets[19] and the use of in-door residual spread[20] have not yielded much desired result. This is expected where only 20 percent of the households had at least one mosquito net,[21] six percent of the children under age five slept under mosquito nets[21] and only one percent slept under insecticide treated mosquito nets.[21] There is need to determine the factors that contribute to this poor output so as to improve on it to get the much desired outcome. Time is right now for the introduction of malaria vaccine, considering the fact that there is a high uptake of other vaccines in the national immunization program.

Majority of these children with diagnosis of malaria were under five years of age and is similar to what was reported by Anumudu *et al.*,[22] It has been shown that the risk of malaria disease hinges upon both the age of the host and the intensity of exposure to the parasite. Malaria is endemic in Nigeria and about 17 percent of the Nigerian population are children under five years of age.[21] Age is a significant risk factor for the prevalence and density of parasitemia.[23,24] Young children are known to have poorly developed antiparasite immunity, thus are not able to restrict the density of asexual parasitaemia. Therefore in areas of high endemicity like southeast Nigeria, with multiple infected mosquito bites, the prevalence and density of *P. falciparum* parasitaemia and the incidence of overall fevers and of malaria-associated fevers are more in children less than five years old and subsequently declines in an age-dependent manner afterwards. A study by Beadle *et al*,[23] has shown that there is a significant association between age and parasite density among children between six months and six years, with younger children more likely to have a density of 5,000 parasites/µl.

In this study, most of the children seen were treated on presumptive bases in the face of an ironically impressive request for malaria investigation by doctors. This could be a reflection of highly held notion among doctors that most cases of fever are malaria. This was also supported by the low percentage (32%) of malaria cases that had a differential diagnosis reported in this study. This means that many non-malaria cases have been treated with antimalarial drugs, contributing to drug wastage and lack of confidence on antimalarial medication when the symptoms persist after completion of wrongly used antimalarial therapy. Another possible explanation could lack of confidence and reliability on the malaria investigation results. This may be true, considering what Tagbo *et al.*,[25] and Reyburn *et al.*,[26] reported in their studies. In the study by Tagbo *et al.*,[25] in UNTH, they compared malaria results from

Table 1: Age and Gender Distribution of the Children with Presumptive Diagnosis of Malaria

Variables	Male n (%)	Female n (%)	Total n (%)
Age (years)			
Under 5	1,046 (72.7)	692 (72.4)	1,738 (76.6)
Under 5 and above 10	318 (22.1)	216 (22.6)	534 (22.3)
Above 10	74 (5.2)	48 (5)	122 (5.1)
Total	1,438 (60)	956 (40)	2,394 (100)

Table 2: Differential diagnosis made among the children with presumptive diagnosis of malaria

Differential Diagnosis	Number of cases n = 324	Percentage
Acute respiratory tract infection	138	42.6
Acute gastroenteritis	55	17.1
Sepsis	30	9.2
Urinary tract infection	25	7.8
Anemia	15	4.7
Sickle cell anemia	11	3.3
Otitis media	9	2.7
Febrile convulsion	8	2.5
Failure to Thrive	7	2.1
Conjunctivitis	6	1.9
Bronchopneumonia	5	1.5
Retro Viral Disease	4	1.2
Others*	11	3.3
Total	324	100

*: Meningitis, Congenital heart diseases, Mumps, Scabies

microscopy done in the UNTH main laboratory, concurrent RDT and later a review of the same blood smear slide by a reference laboratory. They found that using the reference laboratory (prevalence of parasitaemia of 29.2%) result as standard, the local microscopist reported high false positive parasitaemia results (prevalence of parasitaemia of 100%) and RDT reported low false negatives (prevalence of parasitaemia of 16.9%). This underscores the high false positive results obtained from local laboratories attributable to incompetence of the microscopist. Therefore there is need for routine training and re-training of microscopists, institution of frequent quality assurance mechanisms in the different laboratories and deployment of RDTs in the clinics. Furthermore another issue that can be linked to this low carrying out of requested malaria investigation could be non-compliance by the caregivers due to poverty. In Nigeria, likewise in many other low-income countries of sub-Saharan Africa, majority are below the poverty line and about 80% of healthcare expenditures by individuals and households are out-of-pocket (OOP).[27] This is so because the percentage that are enrolled with any form of social health insurance like national health insurance scheme is low.[28] This translates to inability to pay for health care services which include cost of investigation among others at the point of receiving care. Worse still when the treatment prescription has already been given by the managing doctor, they will prefer to proceed to treatment rather than spend limited resources on investigation. Therefore a reform in the healthcare financing mechanism which encompasses; introduction of community-based health insurance, national health insurance scheme, exemption from fees for malaria treatment especially for children under five years, will remove financial barriers to access to treatment.

This study showed that one-third of malaria cases had at least one differential diagnosis and two-third of these differential diagnoses was infectious illnesses. Unfortunately, efforts were not made to include or exclude these differentials before instituting antimalarial drug treatment and this seen to be a common practice.[26] This implies that two-third of the cases that had no differential diagnosis could be due to either another illness or co-morbidity and was treated as malaria. In this study, most received ACTs for malaria treatment, thus there is high possibility of mismanagement of other disease entity as malaria and when expected responds were not obtained, it will be misinterpreted as malaria not responding to treatment, when it was not malaria that was being treated at the first instance. Even in situations where there was a response that is fever subsided, it cannot be interpreted as achieving cure to disease entity since most treatment regimen contains antipyretic[29] and anti-inflammatory[29] which could mask the smoldering disease. It is important to know that by doing simple urinalysis with dipstick, that most urinary tract infection cases can be diagnosed and treated, thereby preventing possible complications like pyelonephritis, renal scaring and hypertension which will manifest later in life. Therefore healthcare workers should be encouraged to consider other possible disease entity besides malaria and make every effort to be definite with their diagnosis before proceeding to treat.

Conclusions

Presumptive diagnosis of malaria, especially among children under five years of age is high, and many had received ACTs without confirmation. Therefore there is high possibility of missing other illnesses and risk of loss of confidence on ACTs when expected responds were not achieved. Thus there is need to improve on the practice of confirmation of cases before instituting treatment and also consider other possible illnesses that can present alike a make effort to exclude or include them to able to institute appropriate therapy.

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