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Antimalarial Drug Use in the Paediatric Wards at Bingham University Teaching Hospital, Nigeria

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ABSTRACT

The pattern of drug-use in cases of malaria infection either on prescription basis or self-medication can result in high incidence of resistant strain and therapeutic failure. The present study evaluates the pattern of antimalarial drug use in children in a tertiary hospital. A prospective study of medical case files of paediatrics that were prescribed antimalarial drugs for four months period in 2015 was undertaken. Patient records of 446 were selected, 227 (50.9%) were males, 55.2% were between 1-5yrs of age. 72.2% were treated for uncomplicated malaria, 49.6% were prescribed ACT , antimalarial drug tablets had the highest dosage forms (60.2%), and had highest administration in the month of September (16.7%) and 81.6% of these drugs were prescribed in trade name. Periodic monitoring of antimalarial drug use pattern is important to prevent the early emergence of resistance to the highly effective anti-malarial drugs presently in use.

INTRODUCTION

Malaria remains a major public health problem in Nigeria and Africa at large. It has been estimated that out of the over one million deaths caused by malaria worldwide, 90% occur in sub-Saharan Africa [1]. Malaria kills one child every 30 seconds; it kills 3,000 children per day under 5 years of age [2.] Fatally affected children often die less than 72 hrs after developing symptoms and those children who survive the attack are drained of vital nutrients, impairing their physical and intellectual development [3].

Artemisinin Combination Therapy (ACT) is antimalarial combination therapy with artemisinin derivative as one component of the combination; this involves combining of one of these drugs with a longer half- life partner antimalarial drug to allow a reduction in the duration of antimalarial treatment while at the same time enhancing efficacy and reducing the likelihood of resistance development[4].

WHO has recommended ACT as first-line therapy for the treatment of uncomplicated malaria in response to widespread resistance to older antimalarials[5]. The emergence of resistance to antimalarials has been shown to influence prescription practices; therefore the success of a new treatment policy would depend on the adherence of health providers and patients to treatment recommendations [6].

Antimalarial drug use studies are important to address the challenges of malaria since it will help to determine the compliance of healthcare professionals to theNational strategy[7].

The objective of this study is to assess the pattern of antimalarial drug use in children admitted in this teaching hospital and thereby providing information that can be used to improve the prescribing practices of clinicians.

MATERIALS AND METHODS

Study design

The prospective cross-sectional antimalarial study was conducted from July to October 2015 in Bingham University Teaching Hospital, a missionary hospital situated in Jos, Plateau State.

Data collection

Patient's name, age, sex, date of admission and the antimalarial drug prescribed (trade, generic name, frequency of dosing, route of administration, and duration of therapy) and severity of the malaria were retrieved from the patient's medical record and entered into data collecting form.Patients with incomplete information were excluded from this study.

Ethical clearance was obtained from the Ethics and Research Committee of the hospital before the commencement of the study.

Data analysis

Data were analyzed by using percentage and 2-tailed test of significance was done by bivariate analysis using Pearson correlation coefficient.

RESULTS

A total of 451 patient medical records were analyzed. 5 were discarded due to lack of information. About 50.9% were males and 55.2% of the patients were within the age group of 1 to 5 years. The age group distribution is shown in Table1; there was a significant correlation between age and gender at 0.01 levels.

Table 1: Age and sex distribution of the patients

Age (yrs)	Male	Female
> 1yr	30 (6.7%)	26 (5.8%)
1-5yrs	135 (30.3%)	111 (24.9%)
6-10yrs	62 (13.9%)	82 (18.4%)

**. Correlation is significant at the 0.01 level (2-tailed).

Antimalarial drug prescription for malaria is shown in Figure1. Majority of the patients had uncomplicated malaria 72.7%,26.8% had severe malaria while 0.5% had cerebral malaria. ACT had the highest prescription (49.6%), followed by arteether(19.5%),combination therapies of Arteether+Proguanil (A+P), Arteether+Proguanil+ACT (A+P+ACT), Artesunate+Arteether+ACT (A+B+ACT) and SP (Sulphadoxine- Pyrimethamine) had the least (0.2%).

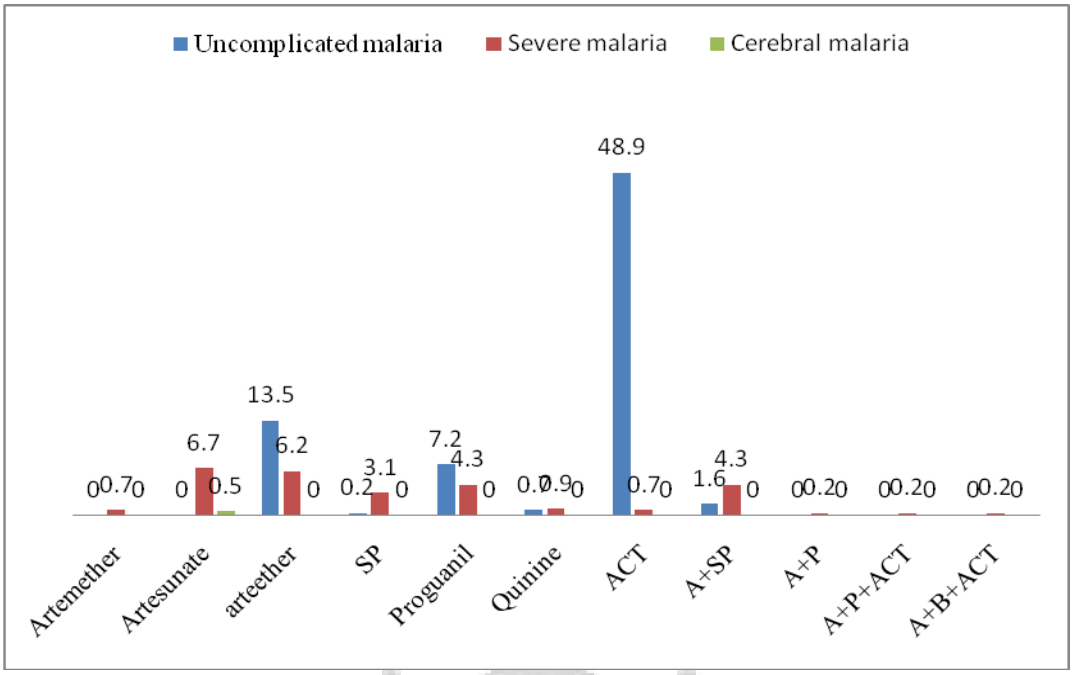

Figure 1: Severity of malaria according to antimalarial drug prescription

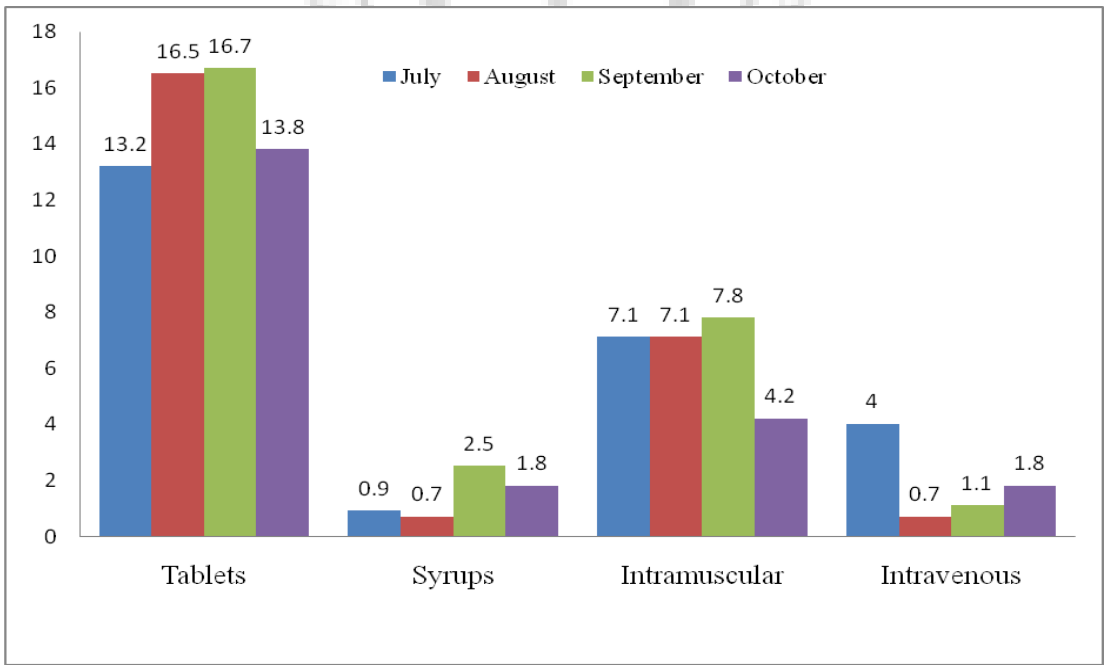

Figure 2: Distribution of antimalarial drug dosage forms.

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Figure2 indicates different types of antimalarial drug dosage forms administered to the patients. 66.1% of the patients were placed on oral antimalarial drug dosage forms, 16.7% were administered solid antimalarial drug during the month of September. Intravenous antimalarial drugs were prescribed for 0.7% of the patients. There was a significant correlation between the antimalarial drug dosage form and the month of admission at 0.01 and 0.05 levels.

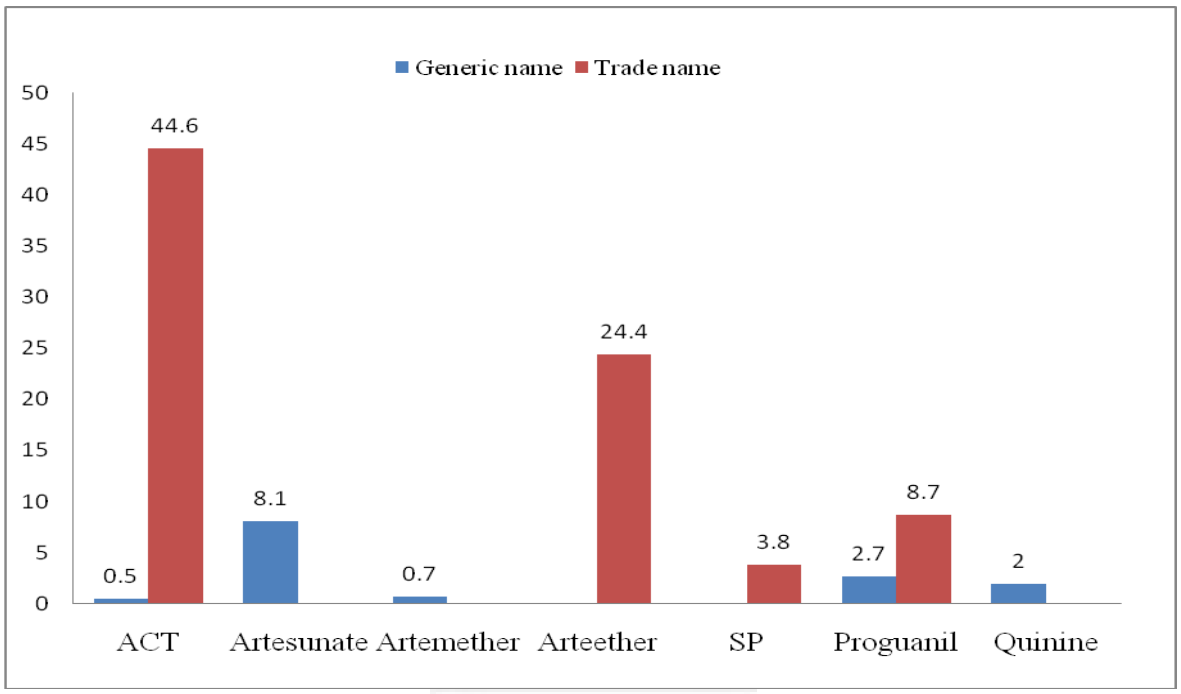

Figure 3: Distribution of antimalarial drugs by name

**. Correlation is significant at the 0.01 level (2-tailed).

81.5% of the antimalarial drugs were prescribed in trade name, artesunate, artemether and quinine were the only drugs prescribed in generic name, and there was a significant correlation between generic name and trade name at 0.01 levels as shown in Figure3.

DISCUSSION

Informal use of antimalarials could increase the risk of under-dosage, over- dosage or incorrect dosing, treatment failure, resistance to antimalarial drugs, occurrence of adverse drug reaction and drug interactions which could impact negatively on antimalarial treatment safely [8].

The analysis of our study indicates a higher incidence of malaria infection among the male patients. Malaria is not known to be associated with any sex preference but several studies have reported a higher incidence in male [9,10]. The correlation between age and gender was significant. This means that age of children treated for malaria was dependent on gender.

Malaria kills3,000 children per day under 5 years of age [2], research has also shown that infectious diseases are the leading causes of hospital admissions especially in children under the age of five years with severe malaria as the commonest reason for admission [11]. Infant and childhood mortality are the consequences of delayed or poorly treated malaria in children of ages 1 to 5 years. Therefore in this study majority of the patients treated with malaria constituted this category [12].

Children less 1 year of age had least cases of malaria; neonatal malaria is rare and largely asymptomatic or mild [13]. It is common within the first three to four weeks of life as a result of increased immunity, thus implying that majority of the cases were mosquito-borne[10]. WHO has recommended Artemisinin Combination Therapy (ACTs) as first line therapy for the treatment of uncomplicated malaria[5], therefore ACT dominated the antimalarial drug for the treatment of this type of malaria. The findings from this study are consistent with previous reports that prescribers in tertiary institution tend to adhere more to national treatment guidelines [5, 14]. ACT is antimalarial combination therapy with artemisinin derivative as one component of the combination. Artemisinin derivatives have very short half-lives and so their use as monotherapy requires doses over a period of 7 days. Combination of one of these drugs with a longer half- life partner antimalarial drug allows a reduction in the duration of antimalarial treatment while at the same time enhancing efficacy and reducing the likelihood of resistance development [15].

Arteether is an ethyl ether derivative of dihydroartemisinin. It is used in combination therapy for cases of uncomplicated resistant *P.falciparum*[16], therefore almost all the children were treated with combination therapy with arteether . Proguanil was used in combination with artemisinin derivative as well as artemisinin combination therapy for the treatment of severe malaria. This type of malaria occurs when *P. falciparum* infections are complicated by serious organ failures or abnormalities in the patient's blood [17]. Artesunate was also used in combination therapy with Arteether and ACT, Artesunate is a hemisuccinate derivative of the active metabolite dihydroartemisinin. Currently it is the most frequently used of all the artemisinin type drugs. Its

only effect is mediated through a reduction in the gametocyte transmission. It is used in combination therapy and is effective in cases of all types of malaria [18].

Oral antimalarial drug dosage forms dominated the prescriptions. Pharmacokinetics and clinical trials indicated that oral forms of drugs are effective as injections, with oral medications more cost effective and also increase the risk of blood borne infections [19]. Research has shown that in far north, there is marked difference between the high transmission rate (the short wet season) and low transmission rate (the long dry season). The variations in occurrence are due to rainfall, altitude and temperature. High rainfall is associated with high incidence malaria while places with high altitude and low temperature tend to be associated with lower rates of transmission [20], Therefore in our study the highest peak malaria transmission is between the month of August and September. The correlation between the antimalarial drug dosage form and month of admission was/ significant; this indicates that the antimalarial drug preparations administered to the children were dependent on their month of admission

The naming of antimalarial drugs was dominated by trade name, the correlation between the component of antimalarial drugs and name of drug was significant. The shows that the active ingredient of antimalarial drug is based on the name of the antimalarial drug, however this is similar to studies conducted by [21]in which most of the antimalarial drugs were prescribed by generic name. Pressure from pharmaceutical companies may be one of the reasons for writing trade name, as some of these antimalarial drugs are sold in the market in trade names, therefore prescribers do not have much option in this regard [22].

CONCLUSION

This study shows complete adherence to current WHO guidelines for malaria treatment, however ensuring continuous supply of good quality and improving provision of ACTs at subsidized costs in Nigeria will go a long way in improving malaria treatment services. Effort should also be made on educating physicians on importance of generic prescribing.

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