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PHYSICIANS PRESCRIBING PATTERN OF ANTIMALARIALS IN PREGNANT WOMEN AND CHILDREN UNDER AGE 5 IN SELECTED SECONDARY HEALTH-CARE FACILITIES IN DELTA STATE, NIGERIA

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ABSTRACT

Introduction: Children under five years and pregnant women are the most vulnerable to malaria attack. While Sulfadoxine-Pyrimethamine (SP) is recommended for malaria prophylaxis in pregnancy, oral quinine and clindamycin (or quinine monotherapy if clindamycin is unavailable) and Artemisinin Combination Therapy (ACT) are recommended as first and second/third trimester drugs for malaria chemotherapy in pregnancy respectively. On the other hand, children under five have ACTs recommended for malaria chemotherapy while quinine/intravenous Artesunate/intramuscular Artemether are solely for severe malaria. **Objective:** To evaluate the prescription pattern of antimalarials by physicians for pregnant women and children under five years in three selected secondary health facilities; as well as to evaluate the rational use of drugs according to WHO standards and National Antimalarial Treatment Policy. **Method:** The study was carried out between May and mid-September, 2015 in Delta State, Nigeria. A total of 100 respondents participated in the study. Data was collected using structured pre-

tested questionnaire. Information gathered were sociodemographics, knowledge of physicians on the diagnosis of malaria infection for pregnant women and children under five years, choice of antimalarial drugs in treating the infection and their level of awareness of the Federal Government National Antimalarial Treatment guideline on the policy change to ACTs and WHO Standard Treatment Guideline. **Result:** Of the 100 questionnaires analyzed, 58% of physicians prescribed SP for malaria prevention while 50% of physicians prescribed quinine and 84% of physicians prescribed ACTs for malaria chemotherapy in the first and second/third trimesters in pregnancy. On the other hand, children under five had ACT (97%) and Quinine (49%) prescribed for uncomplicated malaria and severe malaria respectively. Average number of drugs was 1.68 and 2.22 for pregnant women and children respectively. Drugs were mostly prescribed by their generic names. Most physicians preferred oral route for drug administration in pregnant women while majority of physicians preferred syrups and tablets for children under five. **Conclusion:** The study showed that the pattern of treatment of uncomplicated malaria in pregnant women and children under five years reflected high compliance with the WHO guidelines and National Antimalarial Treatment Policy. Though, there were incomplete prescriptions and wrong prescriptions for malaria prophylaxis in pregnancy and uncomplicated/severe malaria in children under five respectively.

KEYWORDS: Antimalarial, physicians, pregnant women, children under five, Prescription.

INTRODUCTION

Nigeria accounts for a quarter of all deaths and illness from malaria in Africa. Almost everyone in Nigeria is at risk from contracting malaria sickness, but it is particularly dangerous for pregnant women and under-fives.[1] Over 400 million cases of malaria occur each year; in terms of socio-economic impact, it is the most important of the transmissible parasitic diseases.[2] The disease, especially when caused by *Plasmodium falciparum*, kills three out of every ten children under the age of five, and one out of every ten women especially during their first pregnancies.[3] These children are vulnerable because they have not developed immunity to malaria yet. Pregnant women are also at risk because their immunity has been decreased by pregnancy. Malaria in pregnancy (MiP) can have serious health consequences for both the mother and infant. MiP increases the chances of foetal death, prematurity, intrauterine growth restriction, low birth weight (LBW) and maternal anaemia.[4] The major effect on the foetus is LBW due to the presence of malaria parasite in the placenta. LBW is responsible for higher infant mortality and impaired child development.

Studies in some health care institutions in Africa showed that malaria constitutes 20-60% of all outpatients' consultations and 10% of hospital admissions.[5] In addition, out of 96% of caregivers who treat malaria promptly within 24 hours, only 14.3% treat correctly.[2]

This study was conducted to evaluate the prescription pattern of antimalarial drugs that are prescribed by physicians for pregnant women and children under 5 years in three secondary health facilities; as well as to evaluate the rational use of antimalarial drugs according to WHO standards and National Antimalarial Treatment Policy.

METHODS

Study Design

The study was a prospective cross sectional survey to assess physicians prescribing pattern, knowledge and adherence to World Health Organization Standard Treatment Guidelines for Nigeria and National Antimalarial Treatment Policy for uncomplicated malaria in children under five years and pregnant women.

Study Area

The study was undertaken in Delta State, South-South Nigeria. The respondents (consisting of physicians) were drawn from three public secondary health-care institutions selected from Delta metropolis by stratified random sampling using senatorial district as a stratum. The hospitals selected were Central Hospital, Ughelli (Delta Central), General Hospital, Okwe-Asaba (Delta North) and General Hospital, Ozoro (Delta South).

Central Hospital, Ughelli comprises of both out-patients and in-patients, with over 300 bed capacity. The wards are situated at various locations within the hospital and consist of the Male Medical Ward, Male Surgical Ward, Female Medical Ward, Female Surgical Ward, Accident and Emergency Unit, Obstetrics and Gynaecology Ward, Paediatric Ward, Chest ward. There are also a Pharmacy department, Radiology department, Administration block, Family Medicine department, Nursing service, Accounts department, Public relations, Medical Records, Chaplaincy, Maintenance department, security and a hospital laboratory. The facility is acredited for training of house officers, Pharmacy interns, medical laboratory scientists and Physiotherapy interns. The hospital has a Pharmacy department which has a total of five pharmacists, eight pharmacy interns, two pharmacy technicians, one Pharmacy store keeper and three health assistants, as at the time of this study. There are 50 doctors in the hospital, 5 consultants, 38 medical officers and 7 house officers.

General Hospital, Okwe-Asaba is a government-owned secondary health facility comprising of 200 bed spaces and 7 different wards. There are over 50 nurses, 15 pharmacists and 36 doctors comprising of 3 consultants, 28 medical officers and 5 house officers.

General Hospital, Ozoro is a government owned secondary health facility comprising of 120 bed spaces; 6 wards; 36 nurses, 8 pharmacists and 24 doctors comprising of 2 consultants, 19 medical officers and 3 house officers.

Study Population

The population used in this study was physicians from three selected secondary health facilities in Delta State.

Sample selection

Inclusion criteria

Physicians who treated pregnant women and children under five years.

Exclusion criteria

Lay public, pharmacists, nurses, etc.

Instrumentation

The study instrument was a pre-tested questionnaire for physicians who treated pregnant women and children under five years. The questionnaire consisted of three sections- A, B and C and had 38 questions in all. Section A comprised of items centred on sociodemographics. Section B comprised of items centred on knowledge of physicians on the diagnosis of malaria infection for pregnant women, choice antimalarial drugs in treating the infection, as well as their level of awareness of the Federal Government National Antimalarial Treatment guideline on the policy change to ACTs and WHO Standard Treatment Guideline. Section C comprised of items centred on knowledge of physicians on the diagnosis of malaria infection for children under five years, choice antimalarial drugs in treating the infection, as well as their level of awareness of the Federal Government National Antimalarial Treatment guideline on the policy change to ACTs and WHO Standard Treatment Guideline. Close and open-ended questions were used. The questionnaires were collected within a 4 (four) month period.

Data Analysis

For the questionnaires, serial numbers were given to each for ease of sorting and identification and they were coded to ensure correct entry of variables for analysis. They were also edited to ensure that responses were in agreement with each question item in the questionnaire. Analysis was carried out using computer software, Microsoft excel, simple frequency tables and cross tabulations were generated to check for levels of statistical significance.

Ethical Consideration

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

RESULTS

A total of 110 questionnaires were administered. Out of which 100 (43 from Central Hospital, Ughelli, 33 from General Hospital, Okwe-Asaba and 24 from General Hospital, Ozoro) were returned and analysed. The remaining 10 could not be retrieved.

Sociodemographic Characteristics

The sociodemographic characteristics of the respondents are summarized in Table 1 below:

Table 1: Sociodemographic characteristics of Respondents.

Sociodemographic characteristics of Respondents	Frequency (n)	Percentage (%)
Gender		
Male	78	78
Female	22	22
Total	**100**	**100**
Age of Respondents (years)		
20-29	29	29
30-39	33	33
40-49	25	25
≥50	13	13
Total	**100**	**100**
Position		
Medical officer	58	58
Senior Medical Officer	16	16
Principal medical officer	16	16
Consultant	10	10
Others	0	0
Total	**100**	**100**

Duration of Practice (years)		
≤10	65	65
11-20	19	19
21-30	10	10
31-40	6	6
>40	0	0
Total	**100**	**100**

Physicians' Prescribing Patterns of Antimalarials in Pregnant Women and Children under Five

Respondents were able to answer a number of questions according to their prescription pattern of antimalarials for pregnant women and children under five. The numbers of responses by respondents are instantiated and summarized in Tables 3.2.1 and 3.2.2 below.

Table 2a: Drug of choice for malaria prevention/chemotherapy in pregnancy.

Drug	**Frequency(n)**	**Percentage (%)**
Drug of choice for malaria prevention in pregnancy		
Weekly pyrimethamine	6	6
Weekly chloroquine (300mg) throughout pregnancy	0	0
Oral chloroquine, four tablets immediately then 300mg monthly throughout pregnancy	3	3
Intermittent SP given as three tablets at starting in second and third trimester	58	58
Low dose quinine	10	10
I don't prescribe	13	13
Others	10	10
Total	**100**	**100**
Drug of choice for malaria chemotherapy in the first trimester		
Chloroquine	12	12
Sulfadoxine-Pyrimethamine (SP)	0	0
Halofantrine	0	0
Quinine plus clindamycin	0	0
Artemisinin Combination Therapy (ACT)	19	19
Low dose quinine	50	50
Paludrine and Quinine	3	3
Others (Artesunate)	16	16
Total	**100**	**100**
Drug of choice for malaria chemotherapy in the second and third trimester		
Chloroquine	0	0
Sulfadoxine-Pyrimethamine (SP)	13	13
Halofantrine	0	0
Quinine plus clindamycin	3	3
Artemisinin Combination Therapy (ACT)	84	84
Others	0	0
Total	**100**	**100**

Route of administration of antimalarial during pregnancy		
Oral	90	90
Intramuscular/subcutaneous	3	3
Intramuscular route followed by oral route	0	0
Others	0	0
No response	7	7
Total	**100**	**100**
Table 2b: Drug of choice for malaria prevention/chemotherapy in pregnancy		
Diagnosis of malaria during pregnancy		
Clinical signs and symptoms	42	42
Prompt parasitological confirmation by microscopy	16	16
Prompt parasitological confirmation by Rapid Diagnostic Test	7	7
Clinical signs and symptoms & prompt parasitological confirmation by microscopy	26	26
Clinical signs and symptoms & prompt parasitological confirmation by Rapid Diagnostic Test	3	3
Clinical signs and symptoms, prompt parasitological confirmation by microscopy & prompt parasitological confirmation by Rapid Diagnostic Test	4	4
Others	0	0
None	2	2
Total	**100**	**100**
Quantity of drugs prescribed for pregnant women at a sitting		
1	32	32
2	45	45
3	2	2
4	2	2
5	0	0
Others (variable)	6	6
None	13	13
Total	**100**	**100**
Factors that guides physicians' prescription pattern of antimalarials in pregnancy		
The antimalarial in stock	6	6
WHO guideline	39	39
National Antimalarial Treatment Policy	16	16
WHO guideline, National Antimalarial Treatment Policy & the efficacy of the antimalarial	3	3
The antimalarial in stock, WHO guideline, National Antimalarial Treatment Policy & the efficacy of the antimalarial	7	7
National Antimalarial Treatment Policy & the efficacy of the antimalarial	10	10
The antimalarial in stock, WHO guideline & the efficacy of the antimalarial	3	3
The antimalarial in stock & National Antimalarial Treatment Policy	7	7
WHO guideline & National antimalarial Treatment Policy	3	3
The antimalarial in stock, WHO guideline & National Antimalarial		

Treatment Policy	3	3
WHO guideline, others (trimester of pregnancy)	3	3
Total	**100**	**100**

Table 3a: Choice antimalarials for children under five years by physicians in secondary health-care facilities

Drug	Frequency (n)	Percentage (%)
Drug of choice for uncomplicated malaria chemotherapy in children under five		
Artemisinin Combination Therapy (ACT)	97	97
Quinine	0	0
Sulfadoxine-pyrimethamine (SP)	0	0
Chloroquine	0	0
Artemisinin derivative plus chloroquine	0	0
Artemisinin derivative plus SP	3	3
Other s	0	0
Total	**100**	**100**
Drug of choice for severe malaria chemotherapy in children under five		
Halofantrine	10	10
Amodiaquine	6	6
SP and Mefloquine	0	0
Quinine	49	49
Chloroquine	6	6
Artemether	19	19
Others (Artesunate)	7	7
None	3	3
Total	**100**	**100**
Dosage forms of antimalarials prescribed for children under five years		
Syrup only	19	19
Tablet only	0	0
Injection only	3	3
Injection and syrup	28	28
Syrup and tablet	32	32
Injection and tablet	3	3
Others (syrup, tablet & injection)	12	12
None	3	3
Total	**100**	**100**
Quantity of drugs prescribed for children under five years with malaria at a sitting		
1	38	38
2	19	19
3	13	13
4	6	6
5	0	0
None	16	16
Others (variable)	8	8
Total	**100**	**100**

Table 3b: Choice antimalarials for children under five years by physicians in secondary health-care facilities		
List of drugs prescribed for children under five years		
Antimalarials	29	29
Antimalarial & analgesic	7	7
Antipyretics & multivitamins	4	4
Antimalarial & multivitamins	4	4
Antimalarial, analgesic & multivitamins	16	16
Antimalarial, haematinics, antibiotics & antipyretics	7	7
None	33	33
Total	**100**	**100**
Diagnosis of malaria in children under five years		[
Clinical signs and symptoms	38	38
Prompt parasitological confirmation by microscopy	10	10
Clinical signs and symptoms & prompt parasitological confirmation by microscopy	26	26
Clinical signs and symptoms & prompt parasitological confirmation by Rapid Diagnostic Test	10	10
Clinical signs and symptoms, prompt parasitological confirmation by microscopy & prompt parasitological confirmation by Rapid Diagnostic Test	13	13
None	3	3
Others	0	0
Total	**100**	**100**
Factors that guide Physicians' prescribing pattern of antimalarials in children under five years		
The antimalarial in stock	10	10
WHO guideline	39	39
National Antimalarial Treatment Policy	13	13
The efficacy of the antimalarial	0	0
Antimalarial in stock & National Antimalarial Treatment Policy	3	3
WHO guideline & the efficacy of the antimalarial	4	4
National Antimalarial Treatment Policy & the efficacy of the antimalarial	7	7
The antimalarial in stock, WHO guideline & National Antimalarial Treatment Policy	4	4
The antimalarial in stock, WHO guideline & the efficacy of the antimalarial	3	3
Antimalarial in stock, National Antimalarial Treatment Policy & the efficacy of the antimalarial	3	3
WHO guideline, National Antimalarial Treatment Policy & the efficacy of the antimalarial	4	4
The antimalarial in stock, WHO guideline, National Antimalarial Treatment Policy & the efficacy of the antimalarial	10	10
Others	0	0
Total	**100**	**100**

Rationale behind Physicians' Prescription of Antimalarials

Respondents were also questioned on the rationale behind drugs prescribed for malaria chemoprophylaxis and chemotherapy in pregnancy, as well as that of uncomplicated and severe malaria chemotherapy in children under five years. The numbers of responses by respondents are instantiated and summarized in Tables 4 to 7 below.

Table 4: Rationale behind physicians' prescription of antimalarial for malaria prevention in pregnant women

	Drugs prescribed for malaria prevention in pregnant women							
Rationale	**P(%)**	**WCQ(%)**	**OCQ(%)**	**SP(%)**	**Q(%)**	**DP(%)**	**O(%)**	**TOTAL(%)**
Safe	3(3)	0(0)	3(3)	16(16)	4(4)	0(0)	0(0)	26(26)
Efficient	3(3)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	3(3)
Standard	0(0)	0(0)	0(0)	23(23)	3(3)	0(0)	0(0)	26(26)
Safe & efficient	0(0)	0(0)	0(0)	3(3)	3(3)	0(0)	7(7)	13(13)
Safe & standard	0(0)	0(0)	0(0)	3(3)	0(0)	0(0)	0(0)	3(3)
Safe, efficient & standard	0(0)	0(0)	0(0)	3(3)	0(0)	0(0)	0(0)	3(3)
Benefit outweighed risk	0(0)	0(0)	0(0)	7(7)	0(0)	0(0)	3(3)	10(10)
I don't prescribe	0(0)	0(0)	0(0)	0(0)	0(0)	13(13)	0(0)	13(13)
None	0(0)	0(0)	0(0)	3(3)	0(0)	0(0)	0(0)	3(3)
Total	**6(6)**	**0(0)**	**3(3)**	**58(58)**	**10(10)**	**13(13)**	**10(10)**	**100(100)**

P- Weekly pyrimethamine, WCQ- Weekly chloroquine (300mg) throughout pregnancy, OCQ- Oral chloroquine four tablets immediately then 300mg monthly throughout pregnancy, SP- Intermittent SP given as three tablets at starting in second and early third trimesters; Q- Low dose quinine; DP- I don't prescribe; O- others

Table 5: Rationale behind physicians' prescription of malaria chemotherapy for pregnant women in first trimester.

Drugs prescribed for malaria chemotherapy in first trimester									
Rationale	**CQ(%)**	**SP(%)**	**H(%)**	**QC(%)**	**ACT(%)**	**Q(%)**	**PQ(%)**	**0(%)**	**TOTAL(%)**
It was necessary	6(6)	0(0)	0(0)	0(0)	13(13)	23(23)	0(0)	6(6)	48(48)
Benefit outweighed the risk	6(6)	0(0)	0(0)	0(0)	6(6)	23(23)	3(3)	10(10)	48(48)
I don't prescribe	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Others	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
None	0(0)	0(0)	0(0)	0(0)	0(0)	4(4)	0(0)	0(0)	4(4)
Total	**12(12)**	**0(0)**	**0(0)**	**0(0)**	**19(19)**	**50(50)**	**3(3)**	**16(16)**	**100(100)**

CQ- Chloroquine; SP- Sulfadoxine- Pyrimethamine; H- Halofantrine; QC- Quinine plus Clindamycin; ACT- Artemisinin Combination Therapy; Q- Low dose Quinine, PQ- Paludrine and Quinine; O- Others.

Table 6: Rationale behind physicians' prescription of antimalarial for treatment of uncomplicated malaria in children under five.

	Antimalarial for treatment of uncomplicated malaria in children under five							
Rationale	**ACT(%)**	**Q(%)**	**SP(%)**	**CQ(%)**	**ACQ(%)**	**ASP(%)**	**O(%)**	**TOTAL(%)**
Resistance to available drugs	13(13)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	13(13)
Low cost	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Availability	19(19)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	19(19)
Early onset of action	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Effectiveness of ACT	52(52)	0(0)	0(0)	0(0)	0(0)	3(3)	0(0)	55(55)
Resistance to available drugs & effectiveness	3(3)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	3(3)
Low cost, availability & effectiveness of ACT	7(7)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	7(7)
Others	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
None	3(3)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	3(3)
Total	**97(97)**	**0(0)**	**0(0)**	**0(0)**	**0(0)**	**3(3)**	**0(0)**	**100(100)**

ACT- Artemisinin Combination Therapy; Q- Quinine; SP- Sulfadoxine-Pyrimethamine; CQ- Chloroquine; ACQ- Artemisinin derivative plus Chloroquine; ASP- Artemisinin derivative plus SP; O- Others.

Table 7: Rationale behind physicians' prescription of antimalarial for treatment of severe malaria in children under five

	Antimalarial for treatment of severe malaria in children under five									
Rationale	**SP(%)**	**H(%)**	**AM(%)**	**SPM(%)**	**Q(%)**	**CQ(%)**	**A(%)**	**O(%)**	**NONE(%)**	**TOTAL(%)**
Ease & readiness of availability	0(0)	0(0)	0(0)	0(0)	10	0(0)	10(10)	0(0)	0(0)	20(20)
Palatability	0(0)	6(6)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	2(2)
Rapid relief	0(0)	4(4)	3(3)	3(3)	13(13)	6(6)	3(3)	3(3)	0(0)	11(11)
Compliance & ease & readiness of availability	0(0)	0(0)	0(0)	0(0)	7(7)	0(0)	3(3)	0(0)	0(0)	3(3)
Ease & readiness of availability & rapid relief	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Others	0(0)	0(0)	0(0)	0(0)	13(13)	0(0)	0(0)	4(4)	0(0)	5(5)
None	0(0)	0(0)	0(0)	0(0)	6(6)	0(0)	3(3)	0(0)	3(3)	4(4)
Total	**0(0)**	**10(10)**	**3(3)**	**3(3)**	**49(49)**	**6(6)**	**19(19)**	**7(7)**	**3(3)**	**100(100)**

SP- Sulfadoxine-Pyrimethamine; H- Halofantrine; AM- Amodiaquine; SPM- SP and Mefloquine; Q- Quinine; CQ- Chloroquine; A- Artemether; O- Other.

Physicians awareness to WHO guidelines and National Antimalarial Treatment Policy

Physicians were also questioned on their awareness to WHO guidelines and National Antimalarial Treatment Policy as regards pregnant women and children under five years. The numbers of responses by respondents are instantiated and summarized in Tables 8 to 10 below.

Table 8: Physicians' awareness to WHO guidelines and National Antimalarial Treatment Policy

Physicians' response to National Antimalarial Policy change from chloroquine to ACT as first-line treatment antimalarial in pregnancy	**Frequency (n)**	**Percentage (%)**
Agree	87	87
Disagree	10	10
Others (Depends)	3	3
Total	**100**	**100**
Physicians' response to monotherapy with Artemisinin derivative for pregnant women		
Yes, I would prescribe	23	23
No, I would not prescribe	74	74
Neither	3	3
Total	**100**	**100**
Quantity of drugs prescribed for pregnant women at a sitting		
1	32	32
2	45	45
3	2	2
4	2	2
5	0	0
Other s (variable)	6	6
None	13	13
Total	**100**	**100**
Quantity of drugs prescribed for children under five years with malaria at a sitting		
1	38	38
2	19	19
3	13	13
4	6	6
5	0	0
None	16	16
Others (variable)	8	8
Total	**100**	**100**
Physicians' response to monotherapy with Artemisinin derivative for children under five		
Yes, I would prescribe	16	16
No, I would not prescribe	81	81
Neither	3	3
Total	**100**	**100**

Table 9: Prescriptions of antimalarials in pregnant women and children under five

DRUGS	C (%)	I (%)	W (%)	N (%)	T (%)
Drugs for malaria prevention in pregnancy	32(32)	39(39)	10(10)	19(19)	100(100)
Drugs for malaria chemotherapy in first trimester	58(58)	19(19)	10(10)	13(13)	100(100)
Drugs for malaria chemotherapy in second/third trimester	52(52)	25(25)	13(13)	10(10)	100(100)
Antimalarial for uncomplicated malaria in children under five	36(36)	16(16)	35(35)	13(13)	100(100)
Antimalarial for severe malaria in children under five	39(39)	6(6)	29(29)	26(26)	100(100)

C-Correct prescription, I-Incomplete prescription, W-Wrong prescription, N-None, T-Total.

Table 10: Forms of antimalarial prescription in pregnant women and children under five

DRUGS	G (%)	T (%)	N (%)	S (%)
Drugs for malaria prevention in pregnancy	68(68)	13(13)	19(19)	100(100)
Drugs for malaria chemotherapy in first trimester	81(81)	6(6)	13(13)	100(100)
Drugs for malaria chemotherapy in second/third trimester	61(61)	29(29)	10(10)	100(100)
Antimalarial for uncomplicated malaria in children under five	58(58)	29(29)	13(13)	100(100)
Antimalarial for severe malaria in children under five	74(74)	0(0)	26(26)	100(100)

G-Generic name, T-Trade name, N-None, S-Sum total.

DISCUSSION

In this prospective cross-sectional study on physicians prescribing pattern of antimalarials in treating pregnant women and children under five in three selected secondary health facilities in Delta State, Nigeria, it was observed that more than half of the respondents (58%) still used Intermittent SP as chemoprophylaxis in pregnancy. This according to the respondents was because SP was a standard, safe, efficient and the benefit of its usage outweighed the risk. An earlier study[6] obtained similar data.

In the first trimester of pregnancy, majority of the respondents used quinine as the first-line antimalarial for the treatment of pregnant women with uncomplicated malaria. Physicians who prescribed quinine as first-line antimalarial in the first trimester gave necessity and benefit outweighing the risk as reasons. This deviated from that of an earlier study in which majority of respondents prescribed chloroquine.[7]

Furthermore, ACT was prescribed by most respondents for pregnant women in the second and third trimester. This corresponded to that of an earlier study in which majority of physicians prescribed ACT as chemotherapy in the second trimester[6] and also with the National Antimalarial Treatment Policy.[8]

A great number of physicians preferred oral route of administration to other routes. Intramuscular/subcutaneous route was used by very few respondents. Generally, tablets are the most prescribed drug formulation because they are easy to administer. Antimalarials in tablet formulations are almost completely absorbed by the gastrointestinal tract.[9]

There has been an existing relationship between irrational use of antimalarials and the development of antimalarial resistance. Less than half of respondents (42%) made diagnosis by clinical signs and symptoms only, the remaining respondents (56%) had one or more laboratory tests carried out before antimalarials were prescribed. This was because treatment was required immediately, laboratory apparatus were inadequate, Rapid Diagnostic Test may not detect low parasitaemia and delay in receiving laboratory result.

Over 70% of physicians prescribed at most two antimalarials. Others who prescribed more than 2 drugs argued that patients who visit hospitals usually present with co-morbidities. The WHO discourages large numbers of drugs prescribed per encounter and irrational co-prescription of drugs with artemisinin-based combination therapy.[10] WHO guidelines on rational use of drugs recommend the average number of drugs prescribed per encounter as two.[5, 11] It is expected that patients who visit hospitals with co-morbidities such as anaemia, malnutrition, respiratory and other systemic infections often would require a higher number of drugs. However, as the number of drug increase, the possibility of drug interactions increases and patient compliance is reduced. In this study, the average number of drugs prescribed per encounter was 1.68.

Very few respondents based their prescribing pattern on the antimalarial in stock while the rest engaged the use of one guideline or the other. From the prescriptions written for malaria prevention during pregnancy, the number of incomplete prescriptions was greater than that of correct prescriptions but lesser than wrong ones. However, majority of the physicians prescribed the first and second/third trimester drugs for malaria chemotherapy in pregnancy correctly. This was consistent with findings obtained from previous studies in Ghana (57.8%)[12] and Yemen (54.5%)[13]; but significantly lower (94.5%) than another study in Ghana.[14] Success of WHO and or National Antimalarial Treatment Policy would depend on the adherence of healthcare providers and patients to these treatment recommendations.[15, 16] The use of sub-therapeutic doses or non-completion of prescribed antimalarial doses has contributed to the emergence and spread of resistant strains of *Plasmodium falciparum*.[17] However, several studies on antimalarial prescription patterns or use in Ghana, Nigeria,

Central African Republic, and Uganda are silent on the percentage of prescriptions adhering to WHO guidelines for artemisinin combination treatment.[18, 19]

Generic prescribing was higher than that of trade names for both prevention and first and second/third trimester chemotherapy drugs. This was in contrast with the findings of an earlier study in which prescriptions were done mostly with trade names[6] but similar to the findings of a previous study.[14] WHO recommends that all drugs be prescribed by generic names.[5] Further analysis revealed that majority of ACTs prescribed by brand names was Coartem (manufactured by Novartis). The high use of Coartem observed could be due to the fact that it was the first reputable ACT combination marketed after the introduction of the new antimalarial policy. Furthermore, the drug is readily available despite its relatively high cost. According to the concept of essential drugs, it is rational practice to prescribe drugs by their generic names. The proportion of drugs prescribed by brand names could be a result of pharmaceutical promotion by some drug companies, of prescribers not being quite sure about the efficacy of some generic antimalarial brands of ACTs available, or of increased reports of fake antimalarial drugs in the sub region. Another reason could be that prescribers may want to minimize recrudescence, which occurs when patients purchase cheap, substandard ACTs.
Majority of physicians agreed with the National Antimalarial Treatment Policy change from chloroquine to ACT as first line treatment antimalarial in pregnancy, 10% disagreed while 3% said it depends on who it was administered on. Those who disagreed gave reasons ranging from presence of resistance to ACT, absence of clinical reports on safety of ACT during early pregnancy to ACT not being a blood schizontocide. The policy change from chloroquine to Artemisinin-based combined therapy (ACT) was initiated in February, 2005 while the combination of artemether + lumefantrine (Coartem ®) was officially adopted as the first line antimalarial.[8]

The former governor of Delta State, Dr. Emmanuel Ewetan Uduaghan during his administration created free malaria treatment for pregnant women and children under five in secondary health facilities in November, 2007.[20] The programme was aimed at providing free antenatal care for pregnant women including free caesarean operation, free immunization for both mothers and children and free medical treatment for children from conception until they turn five. Physicians were questioned on this. Majority of respondents stated that it was free while the remaining 29% claimed otherwise. This may be due to the fact that those who claimed otherwise were unaware of its existence.

Few physicians responded that they would prescribe a derivative of Artemisinin as monotherapy for pregnant women, while a great majority said they wouldn't prescribe. Those who said they would prescribe gave the following as their reasons: safer, if combination drug was not available and in case of moderately severe malaria and for easy administration. Studies have revealed that use of non-ACTs and monotherapy in the management of malaria could increase the risk of recrudescence, and increase drug resistance, complications, and deaths.[21, 22]

Physicians were also tested on their knowledge of conditions in which pregnant women were exempted from being administered SP. No particular physician selected all eight conditions but majority of the physicians were aware of some of these conditions.

In children under five, most of the respondents prescribed ACT as their drug of choice for uncomplicated malaria; the remaining used Artemisinin derivative plus SP. This was consistent with previous findings.[23] The main reasons adduced by the majority of respondents for their choice of antimalarial for uncomplicated malaria were resistance to available drugs, effectiveness of ACTs, availability, resistance to available drugs and low cost.

The preference of PMPs (public medical practitioners) for antimalarials for severe malaria in children under five was mainly Quinine (49%); this was followed by Artemether and Artesunate. This was in contrast to a previous study in which majority of physicians prescribed SP.[7] The reasons for the choice antimalarials by respondents included rapid relief, compliance, the ease and readiness of availability, effectiveness, WHO guideline and conditions of resistance and severity.

From the prescriptions written for uncomplicated malaria and severe malaria chemotherapy for children under five, less than half of the respondents (36%) and (39%) wrote prescriptions correctly. A small number of physicians wrote incomplete prescriptions. The quantity of wrong prescriptions was of almost same quantity as that of correctly written prescriptions. The values were in line with an earlier study.[23] The percentage of incorrect antimalarials prescriptions was very low compared to the results of earlier study which showed a higher percentage (65%) of incorrect prescriptions.[21]

Majority of physicians wrote prescriptions in generic name for children under five years than in trade names. This was in accordance with rational drug use and WHO guidelines.[5]

Less than half of the respondents advocated for the use of syrups and tablets (32%) for children under five years. This was in contrast to an earlier study in which majority of physicians prescribed syrups only.[23] The Federal Ministry of Health advocates the use of oral medications; parenterals are allowed only when the patient cannot take oral and this is replaced with oral medications once the patient can tolerate oral medications.[8]

More than half of respondents prescribed at most 2 drugs. The number of physicians who prescribed antimalarials and another drug were more than those who prescribed antimalarial alone. This may be due to the fact that malaria patients often bring complaints like aches, cough, reduced appetite and palour which accounts for the unnecessary inclusion of one or more vitamin preparations and antibiotics in the prescriptions. Poly pharmacy is unacceptable because of the possibility of adverse drug reactions, the incidences of which increases with the number of drugs. Also the most important medicines may be missed out during purchases because of high cost. The average number of drug per encounter was 2.22 which was a slight deviation from WHO recommendation of 2.0 [11]. The findings of this study were considerably lesser than that of a previous study carried out in Kano.[23]

More than half of physicians (59%) made diagnosis of malaria by one or more laboratory tests while 38% made diagnosis by clinical signs and symptoms only. This was in contrast to findings from previous studies in which clinical signs and symptoms and Malaria Parasite Test had equal values and were both mostly used [23]. The need for immediate treatment and inaccessibility of parasitological confirmation was their reason for diagnosis by clinical signs and symptoms only.

Most of the physicians conceded to the fact that antimalarials for children under five was free in agreement to Dr. Emmanuel Uduaghan's free medical treatment for children till they turn five.[20]

Majority of physicians made prescriptions based on one or more treatment guideline while very few made prescriptions by only the antimalarial in stock. This showed that physicians in the facility were aware of WHO guidelines and National Antimalarial Treatment Policy.

A great number of physicians stated that they would not prescribe other Artemisinin derivatives for monotherapy while few physicians (16%) stated that they would. Monotherapy with dihydroartemisinin or other Artemisinin derivative is not recommended.[8] There is a possibility that physicians who had conceded to make such prescriptions were unaware of the stand of the Standard Treatment Guidelines on this, or were either house officers or corpers.

CONCLUSION

In this study, majority of respondents prescribed Sulfadoxine-Pyrimethamine for malaria chemoprophylaxis in pregnant women while Quinine and Artemisinin Combination Therapy were prescribed as malaria chemotherapy for first and second/third trimesters respectively. On the other hand, Artemisinin Combination Therapy and Quinine were the most prescribed drugs for uncomplicated malaria and severe malaria chemotherapy respectively in children under five. These were in line with WHO guidelines and National Antimalarial Treatment Policy. The prescriptions were mostly correct but there were some which were incomplete; leaving the pharmacist or pharmacist technician, as the case maybe, the duty of deciphering the dose of drugs to dispense.

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