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■ Original Research Article

Malaria Chemoprophylaxis During Pregnancy: A Survey of Current Practice Among Antenatal Care Providers in Jos, Nigeria.

AE Edugbe [1], J Bitrus, [1] J Onyeji, [1] OC Egbodo,[2] KC Samuelson,[3] M Samaila, [1] SA Anzaku,[1] S Yohanna[1]

1. Department of Obstetrics & Gynaecology, College of Medicine and Allied Health Sciences, Bingham University & Bingham University Teaching Hospital
2. Department of Obstetrics & Gynaecology, College of Medical Sciences, University of Jos & University of Jos
3. Department of Obstetrics & Gynaecology, University of Jos Teaching Hospital;
4. Department of Family Medicine, College of Medicine and Allied Health Sciences, Bingham University & Bingham University Teaching Hospital Jos

Abstract

Background: Malaria in pregnancy is an enormous public health problem, with considerable risks to the mother, her fetus and the neonate. A good knowledge of malaria chemoprophylaxis in pregnancy and practice are required to reduce the disease burden. **Objective:** To determine the knowledge and practice of malaria chemoprophylaxis in pregnancy using sulfadoxine/pyrimethamine (SP) among antenatal care providers in Jos-North Local Government Area of Plateau State, Nigeria. **Methods:** This was a cross-sectional survey carried out among antenatal care providers (ACPs) in selected facilities in Jos-North Local Government Area. Pre-tested structured questionnaires were used to obtain information such as: cadre of ACPs, knowledge, routine provision and existence of malaria chemoprophylaxis protocol. The data were analyzed using IBM-SPSS 22.0. **Results:** Of the 314 ACPs, 276 (88.0%) had general knowledge of WHO's intermittent preventive treatment for malaria in pregnancy (IPTp), 218 (69.5%) had correct knowledge of IPTp-SP, 262 (83.4%) routinely offer IPTp, irrespective of the agents used while 122 (56.1%) had correct practice of IPTp-SP. An estimated 191 (61%) were aware of IPTp-protocols, 123 (39.0%) of ACPs either lack or were not aware of the existence of any guidelines in their centers. A significant 193 (61.4%) of ACPs co-administration of sulfadoxine/pyrimethamine and folic acid, 241 (76.6 %) commenced IPTp after the first-trimester. **Conclusion:** Despite high levels of awareness of IPTp-SP, correct practice of IPTp-SP remains far below national and global targets, indicating that there are deficiencies in delivery of IPTp-SP.

Keywords: Malaria chemoprophylaxis in pregnancy, Antenatal-health care providers, Sulfadoxine/pyrimethamine (SP), malaria in pregnancy.

Correspondence

Dr Edugbe, Adikpe Emmanuel
Department of Obst & Gyn,
College of Medicine and Allied Health Sciences,
Bingham University,
Jos Campus, Jos, Nigeria.
PMB 2238.
edugbe.adikpe@binghamuni.edu.ng
Tel: *+234 7031349294*
ORCID: https://orcid.org/0000-0002-8900-2015

Introduction

Malaria in pregnancy (MiP) is an enormous public health problem, with considerable risks to the mother, her fetus and the neonate.[1] Malaria is the most important of the parasitic diseases of human beings especially for people living in sub-Saharan Africa where about 90% of all the deaths from malaria occurs.[1,2]

Every year at least 25 million pregnancies occur among women in malaria endemic areas of Africa, yet less than 5% of pregnant women have access to effective interventions.[2] The high susceptibility of pregnant women to malaria infestation is thought to be due to the decreased immunity during pregnancy with the infestation much more common and severe during the first pregnancy[3]. In subsequent pregnancies antibodies prevent cyto-adhesion of the plasmodium infested red blood cells to the placenta.[2,3,4] Malaria in pregnancy increases the chance of maternal anemia, abortions, still birth, prematurity, intrauterine growth restriction, and infant low birth weight.[2] Low birth weight is the greatest single risk factor for death in the first month of life.[2,5] Malaria in pregnancy accounts for 11% of all maternal death in Nigeria.[1,5]

Because of these sizable effects of malaria during pregnancy the World Health Organization (WHO) in its strategic framework for prevention of malaria in pregnancy currently recommends a package of interventions in areas with stable (high) transmission of *Plasmodium falciparum* which include; intermittent preventive treatment of malaria in pregnancy using sulfadoxine/pyrimethamine (IPTp-SP), use of insecticide treated nets (ITNs) and providing rapid diagnosis and effective treatment for pregnant women.[6]

Intermittent preventive therapy with sulfadoxine/pyrimethamine or presumptive treatment during pregnancy is known to reduce the risk of malaria infestation in all pregnant women significantly and increases the birth weight of babies born to women in their first pregnancy.[3,7] It has been shown to also improve the packed cell volume in them.[7] WHO had earlier recommended the use of two doses of sulfadoxine-pyrimethamine in non-retroviral diseased women and three doses in retroviral diseased women for intermittent preventive treatment of malaria in pregnancy (IPTp) commencing after 16 weeks of gestation and avoiding the last four weeks of pregnancy .[6]

In 2012, WHO updated her recommendations and now requires that at least three doses of sulfadoxine/pyrimethamine (SP) be given to all pregnant women during scheduled antenatal care (ANC) visit starting as early as possible in the second trimester and given at one-month intervals.[8] Thus, every pregnant woman in areas with moderate to high malaria transmission in Africa is expected to receive at least three doses of SP to prevent malaria. However, during the last few years, a declining effort to scale-up IPTp-SP in a number of high-burden countries in Africa has been observed even though attendance at antenatal clinic has remain high.[9] It also stated that folic acid at a daily dose equal or above 5 mg should not be given together with SP as this counteracts its efficacy as an antimalarial.[8]

Nigeria in 2014, through the national malaria strategic plan (NMSP) adopted the updated WHO IPTp-policy of providing IPTp-SP starting as early as possible in second trimester for all pregnant women at each scheduled ANC visit until time of delivery, provided that the doses are given at least one month apart.[10] The national uptake of intermittent preventive treatment with sulfadoxine-pyrimethamine (IPTp-SP) as a preventive measure is low. Although this was scaled up from 5 to 15% from 2008 to 2013, the improvement is far below the 80% national target.[11]

To date, 39 African countries have adopted this policy. Countries reported routine health facility data from the public sector on the number of women receiving the first, second, third and fourth doses of IPTp-SP.[9] Using as the denominator annual expected pregnancies (discounted for fetal loss and stillbirths), the percentages of IPTp-1 and IPTp-2 were computed for 35 countries, and IPTp-3 for 33 countries. As of 2017, coverage of IPTp-1, IPTp-2 and IPTp-3 were 54%, 42% and 22%, respectively. Coverage was variable by country, but only Zambia had IPTp3 coverage of 50% or more.[9]

Intermittent preventive treatment for malaria in pregnancy using SP is inexpensive, easily deliverable (can be given under direct observation or supervision), safe and efficacious. It has low rate of undesirable side effects (<5%), no serious adverse events, including severe cutaneous reactions.[4,6] Many studies have suggested that IPTp prevents malaria during pregnancy and reduces the severe maternal anemia, low birth weight babies and infant mortality substantially.[1,2,12] In spite of the stated

benefits, availability and affordability of IPTp-SP, the coverage rate is not satisfactory among several endemic communities hence, the knowledge of updated WHO's IPTp-SP and its implementation by antenatal health care providers need to be assessed. It is against this backdrop that this study was carried out to assess the level of understanding and utilization of one of these three prong approach by the antenatal care providers in Jos-North Local Government Area (LGA) of Jos, plateau State, Nigeria.

Materials and Methods

Study Areas

The study was conducted in Bingham University Teaching Hospital, Jos University Teaching Hospital, Plateau State Specialist Hospital, Our Lady of Apostles (OLA) Hospital and Township Primary Health Centre. These facilities are all located in Jos North Local Government Area. Jos-North LGA has the largest population (437217) among the 17 LGAs of Plateau State.[13] It hosts 3 tertiary institutions (Bingham University Teaching Hospital, Jos University Teaching Hospital and Plateau State Specialist Hospital) and 27 secondary facilities and 30 Primary Health Care Centers. The tertiary centers were selected automatically while one secondary (OLA) and one primary health center (Township Primary Health Care center) were selected randomly using simple random sampling by balloting.

Study Design

This was a descriptive cross-sectional study conducted between November 1st, 2019, and February 10th, 2020.

Study Population

Health care providers who were providing daily obstetrics care at antenatal clinics of the aforementioned health facilities. These included obstetricians, family physicians, resident doctors, medical officers, nurse/midwives and community health officers.

Sample Size Determination

The minimum sample size for the study was obtained using the formula: $n = Z^2 pq/d^2$.

Where:

Z=1.96 (coefficient of Z statistics for normal distribution table),

p = prevalence of antenatal care providers who offered current WHO IPTp-SP in a related study (72.2%).[14]

q = 1-p, d = sampling error tolerated = 0.05,

$n= (1.96)^2 \times 0.722 \times (1-0.722) / (0.05)^2$

n = 308 ≈323 (5% was added to make up for incorrectly filled questionnaires)

Data Collection

Semi-structured pretested self-administered questionnaire designed by the researchers was administered to obstetricians, family physicians, resident doctors, medical officers, nurse/midwives and community health officers who offer antenatal care services in these centers after verbal consent was obtained. This questionnaire was developed based on the objectives of the study after extensive literature search (Cronbach's alpha reliability, α = 0.816) and was pretested on medical students of Bingham University among 10% of the estimated sample size. The questionnaire contained information such as: cadre of antenatal care providers, awareness of the current WHO IPTp guideline, whether they offer routine malaria chemoprophylaxis or not, presence or absence of a protocol for malaria chemoprophylaxis in their centers. Correct knowledge and practice of the current WHO intermittent preventive therapy guideline and the variety of chemoprophylactic agents used by the respondents. The time of commencement of chemoprophylaxis, whether or not folic acid should be given with SP and an estimate of the efficacy were assessed.

Awareness of the current WHO IPTp was defined as "respondent having heard of the use of monthly sulfadoxine/pyrimethamine from second trimester while full knowledge of all the components of the current WHO IPTp-SP which includes "ability to appropriately identify the gestational age to commence the IPTp-SP, the dose (three tablets given as one full dose), the frequency (at least four weeks apart), and the use of IPTp-SP not restricted till delivery period" was categorized as correct knowledge. The practice of the current WHO IPTp-SP recommendation by the health workers was assessed by self-report of its prescription and documentation in the case note). The knowledge of the previous WHO recommendation on IPTp-SP dosing, timing and frequency was considered general knowledge. The data were analyzed using SPSS software (IBM, Armonk, NY, USA) version 22.0.

Ethical clearances were obtained from the Research and Ethical Committees Boards of Bingham University Teaching Hospitals.

Results

A total of 323 questionnaires were administered, 9 were incompletely filled and 314 complete responses were analyzed. Table 1 shows the basic characteristics of the study participants. Of the 314 responses 140 (44.6%) were doctors, 143 (45.5%) were nurse/midwives and 31 (9.9%) were community health officers. Approximately 67% of the ANC providers had practiced antenatal care for 5 to 10 years. Table 2 shows that 276 (88.0%) of the ANC providers were aware of the World

Table 1: Baseline characteristics of health care providers

Characteristic	Frequency (n)	Percentage (%)
Cadre of ANC Provider		
Doctors	140	44.6
Nurse/midwives	138	45.5
Community health officer	30	9.9
Level of Health Care Facility		
Tertiary	240	76.6
Secondary	55	17.5
Primary	19	5.9
Duration of Obstetrics/Midwifery Practice		
< 5 years	90	28.6
5 – 10 years	209	66.5
> 10 years	15	4.9

ANC: antenatal care

Table 2: Health care providers' general knowledge and practice of WHO's IPTp

Characteristic	Frequency (n=314)	Percentage (%)
Awareness of IPTp		
Yes	276	88.0
No	37	11.7
No response	1	0.3
Routine prescription of IPTp		
Yes	262	83.4
No	52	16.6
Time of commencement of IPTp		
First trimester	3	1.0
Second trimester	241	76.6
Third trimester	10	3.2
Anytime in pregnancy	60	19.2
Dosage frequency of IPTp		
One dose	47	14.9
Two doses	147	46.8
At least 3 doses	73	23.4
Not sure	47	14.9
Routinely prescribed chemoprophylactic agents		
Sulphadoxine/pyrimethamine	233	74.1
Proguanil	13	4.2
Quinine	3	1.0
Pyrimethamine (daraprim)	20	6.5
Chloroquine	2	0.6
ACT	1	0.3
Cotrimoxazole	1	0.3
Others	41	13.0
Availability of protocol		
Yes	191	61.0
No	31	9.8
Not aware	92	29.2
Co-administration of FA with SP		
SP can be administered with FA	193	61.4
SP should not be co-administered with FA	121	38.6
Effect of combined SP and FA (n=121)		
Reduced efficacy of SP	94	77.3
Reduced efficacy of FA	14	11.8
Induction of vomiting	1	0.8
Inhibition of FA action by SP	12	10.1

IPTp: intermittent preventive treatment of malaria in pregnancy; **FA**: folic acid; **SP**: sulfadoxine/pyrimethamine

Table 3: Health care providers' knowledge and practice of current WHO's IPTp-SP

Characteristics	Frequency (n=314)	Percentage (%)
Awareness of current WHO's IPTp-SP		
Yes	232	74.0
No	82	26.0
Correct knowledge of WHO's IPTp-SP		
Yes	218	69.5
No	96	30.5
Total	**314**	**100.0**
Correct practice of current WHO's IPTp-SP (n=218)		
Yes	122	56.1
No	96	43.9
Total	**218**	**100.0**

IPTp-SP: intermittent preventive treatment in pregnancy using sulfadoxine/pyrimethamine

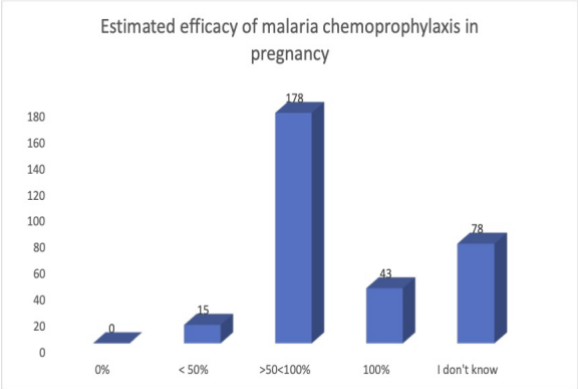

Figure 1: Attempted estimation of the efficacy of malaria chemoprophylaxis in pregnancy by health care providers

Health Organization (WHO) intermittent preventive treatment of malaria in pregnancy (IPTp) while 262 (83.4%) routinely offer IPTp, irrespective of the agents used for the chemoprophylaxis against malaria. Among those that offer IPTp, 241 (76.6%) knew the correct time for the commencement of IPTp whereas 59 (19.2%) said it could be started anytime in pregnancy. Less than one-quarter of the ANC providers prescribed the recommended minimum doses (3 doses) while majority stuck to the previous advice of 2 doses. On the average more than half (61.0%) of ANC providers admitted to having protocols for malaria chemoprophylaxis in their centers while 92 (29.2%) were not aware of

the existence of any malaria chemoprophylaxis guidelines in their facilities. Majority of the antenatal care providers co-administered folic acid with sulfadoxine/pyrimethamine.

About the updated WHO IPTp-SP policy 232 (74.0%) of ANC providers were aware of it, however, 218 (69.5%) had correct knowledge of the new recommendations. Of those with correct knowledge only 122 (56.1%) practice the current WHO IPTp-SP recommendations. Figure 1 shows the subjective estimated efficacy of sulfadoxine/pyrimethamine in malaria prevention in pregnancy with majority believing it confers 50 to 100 per cent protection.

Discussion

In the past various agents were used for malaria prophylaxis during pregnancy. However, their efficacies have continued to diminish due to the emergence of multi-resistant strains of *Plasmodium falciparum* while others are correlated with frequent adverse effects.[4,15] This study presents an important insight to the knowledge and practice of intermittent preventive treatment of malaria in pregnancy. While most of the antenatal health care providers were aware of the WHO recommendations on intermittent preventive treatment of malaria in pregnancy adequate knowledge of the various elements in the policy was rather low. This is even more worrisome with the knowledge of the updated recommendations that has been in public domain for over a decade.

It was observed that most of the antenatal care providers in the selected health facilities had the general knowledge of IPTp and practice of the recommendations. However, its implementation was not limited to the recommended SP but included other agents that were considered inefficacious. This disparity between general knowledge and correct implementation of IPTp-SP policy may be due to lack of proper understanding of policy elements by some antenatal care providers, absence of guidelines or poor sensitization. About forty percent of the ACPs lack or were ignorant of the existence of any guidelines (WHO, National or Hospital) in their centres. A significant majority still dispense only 2 doses of SP and many were not aware of the ideal time of commencement of IPTp.

With regards to the WHO updated IPTp-policy 2012, we noted that over two-thirds of ACPs knew about it and an approximated 70% understood its recommendations satisfactorily but only slightly above half of them implemented the policy correctly during antenatal consultations. This finding corroborates reports from other studies.[15-20] Most studies in sub-Saharan Africa including Nigeria documented that health care providers' inadequate knowledge as key barrier to recommendation of IPTp in both private and public health facilities.[18-21] But this is not the case in our study, because knowledge of IPTp is appreciably high, however, lack of domestication of this policy or poor sensitization in our facilities may be responsible for the suboptimal implementation. A systematic review and meta-analysis of the factors affecting the delivery, access, and use of interventions to prevent malaria in pregnancy, poor knowledge and poor administration of IPTp guidelines by health workers were identified as the most significant barriers to achieving high coverage of IPTp.[17] This is substantiated in this study in which nearly 40% of health care providers lacked IPTp guidelines in their facilities or were ignorant of the available guidelines.

Majority of the antenatal care providers' offered various agents for malaria chemoprophylaxis (irrespective of the numbers of doses administered) but most offered routinely sulfadoxine-pyrimethamine as recommended by WHO in second trimester. Some of the providers however, still administered IPTp-SP at any time in pregnancy. This may equally be due to ignorance of the updated WHO IPTp-SP guideline by a large proportion of the health care providers, poor supervision or unavailability of institutional guidelines on IPTp-SP in our facilities as observed in this study. Poor knowledge or ignorance of the guideline is further reflected in the co-administration of sulfadoxine/pyrimethamine with folic acid as being practiced by most ACP in this study in spite of the established facts; that co-administration of sulfadoxine/pyrimethamine with folic acid reduces the effectiveness of SP.[22]

The effectiveness of IPTp-SP in the prevention of malaria in pregnancy was estimated by majority of ACP to be at least 50 percent. This presupposes that the health care providers understand the benefits of IPTp. Although this was a subjective assessment, it was comparable to an objective assessment of effectiveness IPTp-SP (74%) reported in a study in Zambia.[23] The position of ACP might have been due to fewer numbers of bouts of clinical malaria they had to treat during pregnancy, incidence of anaemia and other problems associated with malaria in pregnancy.

Conclusion

Despite high levels of awareness and practice, correct practice of IPTp-SP remains far below national and global targets, indicating that there are deficiencies in delivery of IPTp-SP at antenatal clinics. Although IPTp-SP coverage had generally increased over time, the change has been rather slow and much more progress is required to reach adequate coverage levels. We therefore recommend training and retraining of health care workers and institutionalisation of the updated IPTp-SP guideline in our health care facilities.

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