



Comparative Analysis of Malaria Awareness among Parturients on Intermittent Preventive Treatment with Sulphadoxine–Pyrimethamine (IPT-SP) Against Malaria in Pregnancy and Their Controls at Owerri Nigeria

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ABSTRACT

Background: The emphasis placed on malaria prevention during pregnancy especially in malaria endemic areas need not be overemphasized. For this reason, the World Health Organization (WHO) introduced the Intermittent Preventive Treatment with Sulphadoxine Pyrimethamine (IPT-SP). The introduction and adequate uptake are aimed at reducing malaria in pregnancy (MIP) and its attendant problems. Preterm labours, low birth weight, small for date babies and anaemias are some of the problems of MIP etc. To help the IPT-SP program work, pregnant women and their care givers require adequate awareness, knowledge, attitude and practice of this IPT-SP. Clear and directed public health Campaigns and on-site Antenatal lecturers are required to ensure correct practices and uptake of the recommended regimen. By so doing, the IPT-SP will help pregnant women enjoy uneventful pregnancies as well as avert most complications of MIP including preterm births, neonatal anaemias, intrauterine growth retardations (IUGR), increased admissions into special care baby units (SCBU) and even neonatal deaths.

Objectives: We comparatively analyzed the awareness of malaria in pregnancy among parturients on intermittent preventive treatment with sulphadoxine–pyrimethamine against malaria in pregnancy and their controls.

Method: The study was done at the Federal Medical Centre (FMC) Owerri, a region whose malaria endemicity is typical of that of Sub-Saharan Africa. The ethics committee of the health facility approved the Ethical clearance enabling commencement of a longitudinal recruitment of participants after adequate counseling and informed consent involving both groups. The study involved antenatal clinic recruitment, assessment of the awareness, knowledge, attitude and practice of IPT-SP among the participants. The recruited 296 participants of both groups satisfied the inclusion criteria for either the study or control groups as allotted. Follow up of the participants throughout their entire antenatal course till delivery was done.

Data analysis: Analysis and computation of the data obtained was done using the computer Software Package for Social Sciences (SPSS) version 20.0 (SPSS, Inc, 2007, Chicago) while descriptive statistics (mean, standard deviation, range, percentages etc.) were determined for continuous variables. P-value less than (<0.05) at 95% confidence interval was considered statistically significant.

Result: All the studied women knew about malaria infection in the past. While almost all the women in both groups have suffered malaria in the past, only one woman (0.7%) in the control group responded negatively. All participants usually experience malaria symptoms. Most of them in both groups usually present with **Fever:** study (85.1%); and control (89.9%); **Headache:** study (77.0%) and control (76.4%) etc.

Majority identified mosquito bites as the mode of transmission of malaria: 87.2% (study) and 79.1% (control) groups. On malaria awareness of the participating women, 91.9% (study) and 93.9% (control) groups knew other problems of malaria in Pregnancy (MIP): miscarriage (study= 63.5%, control= 66.2%), shortage of blood (study = 64.2%, control = 68.2%), severe malaria (study = 65.5%, control= 72.3%). On the preventive drugs for MIP: SP (fansidar) recorded the highest response of 90.5% among the study group while for the control group fairly had 69.6%. On assessment of IPT-SP awareness of the women only (14.9%) of the study/treatment group were not aware of it which is relatively low compared to 45 (30.4%) gotten from the control group. On the drug type used for IPT, 81% of the study group responded correctly, Sulphadoxine-Pyrimethamine alone as against 54.7% from the control.

Keywords: Awareness, Antenatal course, Knowledge, Malaria endemicity, Malaria in pregnancy, Sulphadoxine-Pyrimethamine.



INTRODUCTION

Malaria is said to be caused by five species of a single-celled eukaryotic Plasmodium parasites especially Plasmodium falciparum and Plasmodium vivax. They are transmitted by the bite of female Anopheles mosquitoes. Till date, it remains one of the most serious infectious diseases known to man. Half of the world's population faces the threats of malaria disease. A disease that led to hundreds of thousands of deaths in 2015, predominantly among African children. Clinical management of malaria is achieved with a combination of vector control approaches (indoor residual spraying (IRS) and the use of insecticide-treated bed nets (ITN) and drugs for both treatment and prevention. The current use of Artemisinin-based combination (ACT) therapies has substantially contributed to the decline in the number of malaria-related deaths. Unfortunately, the emergence of resistance to the ACT's is threatening the already achieved progress (Margaret Phillips et al., 2017).

Malaria infection is of major public health importance having afflicted several humans, the world over. The malaria endemic areas of the world like the Sub-Saharan Africa (SSA), feels the menace of its infection the more. Malaria is a significant cause of morbidity and mortality especially among our pregnant mothers, their fetuses, neonates as well as young children and the elderly. Malaria is known to constitute enormous social and economic burdens. Although it may be relatively uncommon in developed countries, it occurs among travelers on return from endemic regions and remains one of the most prevalent infections of humans worldwide (Chukwu et al, 2023; WHO International Travel and Health, 2018; Kathrine et al, 2014).

Current efforts to control malaria focuses on reducing attributable morbidity and mortality. While we note the critical roles played by the Center for Disease Control and Prevention (CDC, 2017), in eliminating malaria from the United States over 60 years ago, malaria disease remains a parasitic infection that is transmitted by mosquitoes. The disease has afflicted humans over the millennia (CDC, 2017; Kathryn et al., 2014).

In areas with moderate to high disease transmission, most malaria infections in pregnant women are asymptomatic hence, infected women do not present for treatment. In such areas, the World Health Organization (WHO) recommended a combination of interventions to prevent malaria in pregnancy including the use of insecticide-treated bed nets (ITNs), intermittent preventive treatment in pregnancy (IPT) and effective case treatment and management of malaria (<http://www.malariajournal.com/content> or Andrew, Vallely, John, Brain & Daniel, 2007; WHO, 2004; Nalen, 2000).

There are up to 800,000 infantile mortalities and a substantial number of miscarriages and very low birth weight (VLBW) babies per year due to the disease (WHO Malaria Guidelines, 2006).

Every hour about 720 Nigerian women becomes pregnant while an estimated 25 million pregnancies are believed to occur annually in malarious areas of the sub-Saharan Africa (Issa, 2012; Falade et al., 2007).

Nigeria is said to suffer the greatest malaria burden in the world, with approximately 51 million cases and 207,000 deaths reported annually representing an approximate of 30 % of Africa's total malaria burden, while 173 million of her total population, an approximate of 97% are at risk of infection (Salwa et al., 2016). All these women are predisposed to the dangers of malaria in pregnancy (asymptomatic/undetected/untreated). 11% of maternal deaths are due to malaria disease (Isah, 2012; FIGO, 2010 [<https://www.figo.org/news-maternal>]).

The most severe forms of malaria are caused by the P. falciparum specie. Variable clinical features include fever, chills, headache, diarrhoea, vomiting, cough, muscular weakness and abdominal pains. Other symptoms related to organ failure may supervene. They may include acute renal failure, pulmonary oedema, generalized convulsions, circulatory collapse, followed by coma and death. The initial symptoms, which may be mild and non-specific, may not easily be recognize as being due to malaria (WHO Intl Travel and Health, 2018). Chukwu and co studied the pattern and respective prevalence of malaria symptoms and signs. Their conclusion on the percentage occurrences of malaria symptoms was as follows: fever 92%; body weakness 90%; headache 85%; malaise 80%; loss of appetite 80%; nausea 72%; vomiting 70%; abdominal pains 50% (Chukwu, Agbasi & Unekwe, 2019).

MATERIAL AND METHODS

Study Setting

Federal Medical Centre (FMC) Owerri served as the center for this study. The centre is located on the Amakohia / Orlu Road Owerri, the capital city of Imo State. Owerri is a malaria endemic area and is equally densely populated. Most of the pregnant women patronizing the hospital usually present with malaria, a disease that usually account for its substantial out-patient's visits.

The study participant population included pregnant women who patronized the hospital for antenatal care in their current pregnancies during the course of this very research. They were seen to have satisfied the inclusion criteria and were then recruited longitudinally using a "Purposive Sampling Technique". The consented recruited pregnant women must have witnessed quickening (first fetal movements in-utero) usually from about the 16th week of pregnancy gestation depending on their parities. They had no symptoms nor signs of malaria (clinical diagnosis), neither did they have laboratory diagnosis of malaria (parasitological diagnosis). To qualify for recruitment, consenting pregnant woman without symptoms nor signs of malaria disease were to be resident in Owerri or its suburbs for both groups. This is to encourage adequate follow up and the willingness to deliver at FMC Owerri and formed a major basis for inclusion. Such consenting pregnant women ought to accept IPT-SP as directly observed treatment (DOT) for the study group and should not have taken any antimalarial drug 2 weeks prior to recruitment (both groups).

On the other hand, the control group consisted of parturients who only presented for delivery (unbooked) or those who registered very late for antenatal care (last month of pregnancy / late booking). Parturients with known allergies to Sulphadoxine-Pyrimethamine (SP) were also recruited into the control group.

For exclusion, the following parturients were excluded from the study: Women who had taken antimalarial drugs at least 2 weeks before recruitment, parturients known to have allergies to any component of the drug combination, SP (these were included in the control group if they satisfied other criteria). Excluded also were women who reside far from study base in Owerri since that might discourage effective follow-up and subsequent delivery in the hospital. Also excluded were symptomatic pregnant women with malaria infection as evidenced by the symptoms, signs as well as laboratory evidence of malaria. Women having Haemoglobin AS and those with coexisting medical conditions like hypertension, nephrosis, diabetes mellitus, human immune deficiency virus (HIV) infection, congestive cardiac failure (CCF), sickle cell disease (SCD) were also excluded. Equally excluded were pregnant women with conditions / co-morbidities suspected to be able to affect the results of the study see also (Chukwu et al, 2023).

Ethical certificate was applied for and obtained from the Ethics committee of FMC, Owerri prior to patient recruitment. Following adequate counseling and informed consent, a total of 296 participants were recruited for this prospective Cohort study, 148 for each of study and control groups. Equally, a semi – structured interview-based questionnaire was used as Study instrument.

Further, the study instrument was used to ascertain the women's knowledge, attitude and overall awareness of malaria and use of Intermittent Preventive Treatment with Sulphadoxine Pyrimethamine in pregnancy. These included their knowledge of malaria and the presenting features of malaria in pregnancy (MIP), their experiences about MIP including: their knowledge about mosquito bites, mode of transmission of Plasmodium parasites, overall problems / complications of MIP, knowledge of malaria drugs for the treatment of malaria well as means of prevention of malaria especially in pregnancy.

Data Analysis

The results from this study were subsequently presented as mean $\pm$ std. deviation. The mean, standard deviation, range, percentages (Descriptive statistics) were determined for continuous variables while independent Sample t-test was used to compare the means of continuous variables for the two groups under study. Also, Computer Software Package for Social Science (SPSS) version 20.0 was used to analyze the results (SPSS, Inc, 2007, Chicago). The results obtained were presented as tables, bar charts, histograms and

box plots as seen in the next section while P-value less than 0.05 at 95% confidence interval was considered to be statistically significant.

RESULTS

Table 1: All the studied women knew about malaria infection in the past. Almost all the women in the both groups had suffered malaria in the past. Only one woman (**0.7%**) in the control group responded negatively. All participants do experience malaria symptoms during any bout.

Table 2: Most women in both groups usually present with Fever during malaria infection: study (**85.1%**); and control (**89.9%**); closely following fever is Headache: study (**77.0%**) and control (**76.4%**). Slightly, more women in the treatment (study) group do experience Weakness as a symptom of malaria (**65.5%**) than in the control (**62.2%**). Other recorded symptoms of interest were: Cough, Rashes, Jaundice and Upper Respiratory Tract Infection (URTI). These symptoms were recorded only among the control group as follows: **Cough (1.4%), Rashes (0.7%), Jaundice (0.7%) and Upper Respiratory Tract Infection (0.7%).**

Table 3: Showed further malaria experience among the participating women. Majority identified mosquito bite as the mode of transmission of malaria: 87.2% (study) and 79.1% (control) groups. Up to 1.4% of the study and another 10% of the control groups responded that it was by mosquito bite along with fatty meal. Most participants have had malaria in pregnancy (MIP) in the past, 82.4% of the study and 93.2% of control groups. However, among study group women that responded ‘yes’ to MIP, 5.7% of them had problems during delivery compared to 25.4% of the control in the past. The smaller percentage among the study group may depict benefits of IPT-SP in their past pregnancies.

Table 4a: showed the malaria awareness among the participating women in which 91.9% of the study and 93.9% of the control groups knew other problems of malaria in Pregnancy (MIP): miscarriage (study = 63.5%, control 66.2%), shortage of blood (study = 64.2%, control 68.2%), severe malaria (study = 65.5%, control 72.3%). Their knowledge of drugs used for MIP showed: study group 80.4% for SP, followed by artesunate/lumefantrine 39.9%. The response in favour of SP (fansidar) was (67.6%) for the control, followed by artesunate/lumefantrine at 49.3%.

Table 1: Malaria Experience in the Participating Women (Knowledge about Malaria)

		Study		Control	
		n	%	n	%
Knowing about Malaria					
	No	0	0	0	0
	Yes	148	100	148	100
	Total	148	100	148	100
Suffered malaria infection in the past					
	No	0	0	1	0.7
	Yes	148	100	147	99.3
	Total	148	100	148	100
Usually present with symptoms suggestive of Malaria infection					
	No	0	0	0	0
	Yes	148	100	148	100
	Total	148	100	148	100

Key For Table 1: (n= number; %= percentage).

Table 2: Malaria Symptoms participants do present with:

	Study			Control		
	Total	number	%	Total	Number	%
Fever	148	126	85.1	148	133	89.9
Headache	148	114	77	148	113	76.4
Weakness	148	97	65.5	148	92	62.2
Malaise	148	34	23	148	66	44.6
Abdominal Pain	148	13	8.8	148	19	12.8
Chills	148	60	40.5	148	62	41.9
Rigor	148	55	37.2	148	49	33.1
Nausea	148	31	20.9	148	40	27
Vomiting	148	40	27	148	48	32.4
Cough	148	0	0	148	2	1.4
Bitter Taste	148	52	35.1	148	17	11.5
Joint pain	148	4	2.7	148	16	10.8
Dizziness	148	2	1.4	148	1	0.7
Rashes	0	0	0	148	1	0.7
Jaundice	0	0	0	148	1	0.7
Upper Respiratory Tract Infection (URTI).	0	0	0	148	1	0.7

Table 3: Further Malaria Experience in the Participating Women

Mode of transmission	Total	Study	%	Control	%
Dirty environment	8	6	4	2	1.4
Fatty meal	9	4	2.8	5	3.4
Mosquito bite	246	129	87.2	117	79.1
Mosquito bite, stress	2	0	0	2	1.4
Mosquito bite, dirty environment	11	4	2.7	7	4.7
Mosquito bite, fatty meal	17	2	1.4	15	10.1
Unknown	3	3	2	0	0
Total	296	148	100	148	100
Have you had any malaria infection while pregnant					
No	36	26	17.6	10	6.8
Yes	260	122	82.4	138	93.2
Total	296	148	100	148	100
If yes, did you have any problems during that pregnancy					
No	218	115	94.3	103	74.6
Yes	42	7	5.7	35	25.4
Total	260	122	100	138	100

Table 4a: Malaria Awareness of the Participating Women

A	Malaria Awareness	Study			Control		
	Aware of other problems of Malaria in Pregnancy (MIP)?	Total	number	%	Total	Number	%
	No	21	12	8.1	9	6.1	
	Yes	275	136	91.9	139	93.9	
	Total	296	148	100	148	100	
B	Other problems did your doctor nurse say can happen during the time in pregnancy						
	Miscarriage	148	94	63.5	148	98	66.2
	Shortage of blood	148	95	64.2	148	101	68.2
	Severe malaria	148	97	65.5	148	107	72.3
	Others e.g. Low Birth weight, neonatal jaundice, preterm birth, etc.	148	42	28.4	148	40	27
C	Malaria drugs respondents know that are used to treat MIP						
	Chloroquine	148	24	16.2	148	24	16.2
	Fansidar (SP)	148	119	80.4	148	100	67.6
	Proguanil	148	7	4.7	148	12	8.1
	Artesunate	148	57	38.5	148	43	29.1
	Quinine	148	10	6.8	148	7	4.7
	artesunate/lumefantrine	148	59	39.9	148	73	49.3
	artesunate/amodiaquine	148	34	23	148	36	24.3

Table 4b: assessed the last time the participants took anti-malaria medicine prior to the study. The respondents in both groups responded that it was more than 2 weeks.

Table 4c: Most of the women knew bed nets as a measure of preventing malaria (84.5%, study, and 82.4%, control). A slightly larger proportion (59.5%) of the control group knew drug prophylaxis as a control measure compared to 47.3% of study. See also bar chart; 4.1.

Table 4d: On the drugs for prevention of malaria in pregnancy: SP (fansidar) recorded the highest response of 90.5% among the study group. The response for SP in the control group was only fair (69.6%). Artesunate response was same in both groups (18.2%). See also bar chart; 4.2.

Table 5a: Assessed the IPT-SP awareness of the Participating women. Only (14.9%) of the study/treatment group were not aware of it. This response was more favourable when compared to the 45 (30.4%) obtained from the control group. On the drug type uses for IPT, 81% of the study group responded correctly, Sulphadoxine-Pyrimethamine alone as against 54.7% in the control. In terms of been introduced to IPT in previous confinements, 135 (91.2%) of the study group responded “yes” while only 44 (29.7%) of the control responded the same.

Table 5b: Assessed further the IPT-SP Awareness of the Participating parturients. Among those that took IPT in the past, 45.3% received it for 2 times; 27.7% had it once while only 2% took it 4 times. Majority of the study women (70.4%) knew that MIP could be prevented with the combination of IPT with anti-vector. The response from the control arm was only 41.9%. The responses for the use of IPT only were respectively 29.8% in the study group and 15.5% in the control. For the current pregnancies, the entire study group had started IPT-SP. Similarly, all the study group women responded “yes” to IPT uptake while the reverse was the case in the control.

Table 4b: Malaria Awareness of the Participating Women Continue

		Total	Study	%	Control	%
D	When last did you take antimalaria?					
	< 2 weeks	0	0	0	0	0
	>2weeks	296	148	100	148	100
	Total	296	100	148	148	100
E	Do you know any malaria preventive measures?					
	No	4	0	0	4	2.7
	Yes	292	148	100	144	97.3
	Total	296	148	100	148	100

Table 4c: Malaria Awareness of the Participating Women (Measures of malaria Prevention)

F	Measures of malaria Prevention known	Study			Control		
		Total	number	%	Total	Number	%
	Bed nets	148	125	84.5	148	122	82.4
	Bush clearing	148	109	73.6	148	69	46.6
	Insecticides	148	90	60.8	148	63	42.6
	Covering the body	148	60	40.5	148	82	55.4
	drug prophylaxis	148	70	47.3	148	88	59.5
	Drying up gutters & stagnant waters	148	94	63.5	148	96	64.9
	Others	148	7	4.7	148	9	6.1

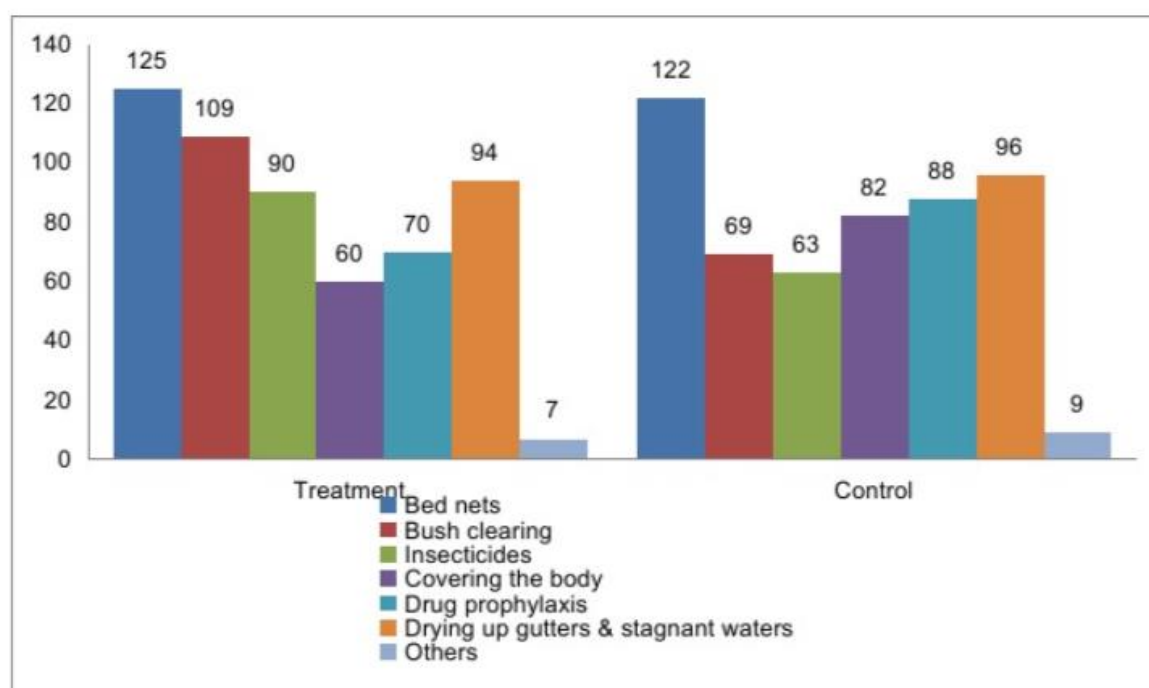


Figure 1 (Bar chart 1): Malaria Awareness of the Participating Women (Measures of malaria Prevention).

Table 4d: Malaria Awareness of the Participating Women (Preventive Drugs for MIP)

G	What preventive drugs for malaria in pregnancy do you know?		Study			Control	
	Chloroquine	148	10	6.8	148	8	5.4
	Fansidar	148	134	90.5	148	103	69.6
	Artesunate	148	27	18.2	148	27	18.2
	Proguanil	148	14	9.5	148	3	2
	Sunday-Sunday medicine	148	9	6.1	148	23	15.5
	Quinine	148	0	0	148	6	4.1
	Unknown	148	9	6.1	148	32	21.6
	Others	148	2	1.4	148	9	6.1

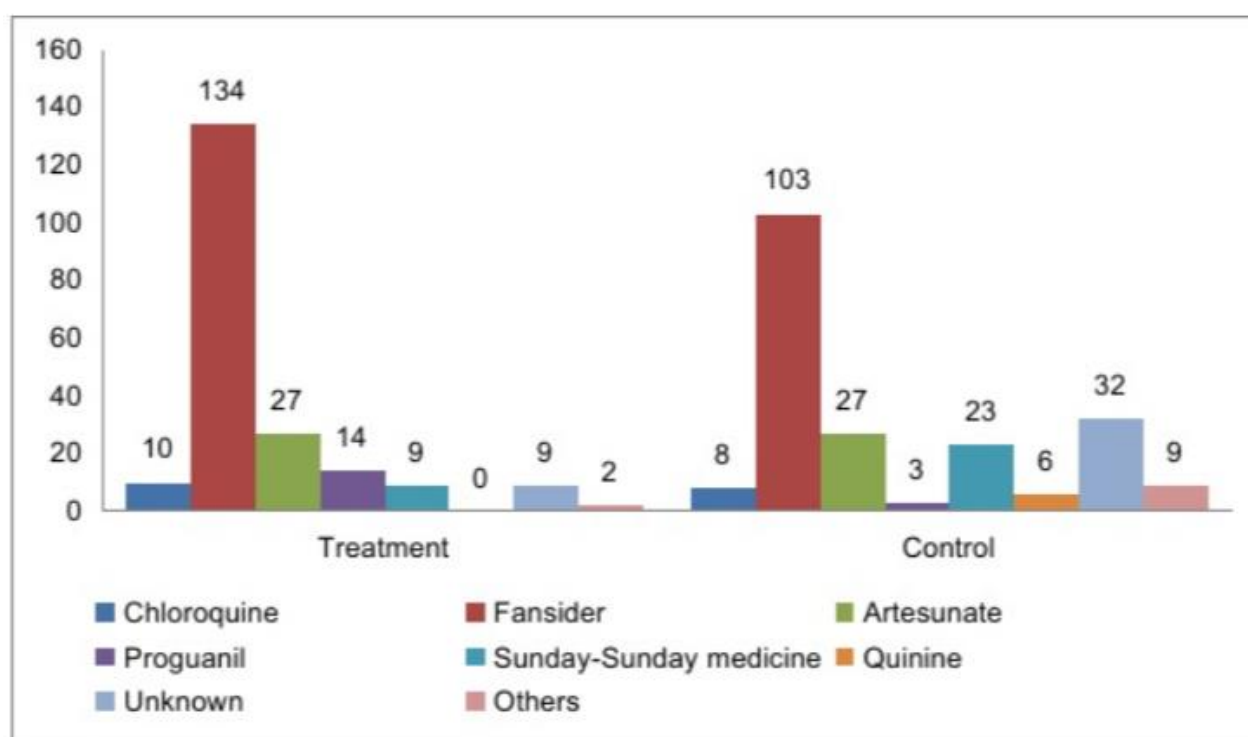


Figure 4.2 (Bar chart 2): Malaria Awareness of the Participating Women (Preventive Drugs for MIP).

DISCUSSION

Almost all our participating mothers knew very well about malaria and had presented with malaria symptoms in the past. The only exception is one woman (0.7%) in the control group who declared that she was yet to suffer from malaria in pregnancy. Owerri as well as Nigeria in general, are located in Sub Saharan Africa, where malaria is highly endemic. An Ethiopia study had reported that 74.3% of the pregnant women had a good knowledge while the remaining 25.7 % of the mothers had poor knowledge about malaria (Fuge et al. 2015). This is not comparable to the results obtained in this index study. In another Ugandan study that assessed the knowledge and misconceptions about malaria among pregnant women in a post-conflict internally displaced persons' (IDP) camp, out of the 769 respondents, 85% had ever heard about malaria and 47% of these people heard about malaria for the first time from the health centre (Obol, Lagoro & Garimoi, 2011).

The importance of symptoms and signs as diagnostic and monitoring tools for malaria disease cannot be overemphasized. This was observed in the results of this study where majority of the participants usually experience malaria symptoms when down with malaria. Fever, headache and weakness were the most reported



malaria symptoms among the study and control groups. Dizziness was only reported by 2 persons (1.4%) among the cases. Among the control women, 1 person (0.7%) reported each of these symptoms: dizziness, rashes, jaundice, and symptoms of upper respiratory tract infection. ***Other Nigerian studies had reported comparable malaria symptoms among participants in their studies as follows; Fever (92%), body weakness (90%) and headache (85%). The authors concluded that the non-specificity of malaria symptoms and signs could be seen from their patterns of presentation (Chukwu et al. 2019; Chukwu and Uneke, 2009).*** The knowledge about malaria signs and symptoms were fairly distributed, though not comparable to those of this study. In another study cited above where 146 (20%) of the respondents cited feeling cold, 141 (19%) fever, 66 (9%) mentioned they did not know (Obol et al. 2011).

Majority of the participants correctly identified mosquito bite as the mode of malaria transmission. Since a clear knowledge of the mode of transmission of a disease might be a window to the prevention and possible treatment of same, it is rather unfortunate that about 1.4% and 10% of the study and control participants respectively still posited that malaria was transmitted via too much fatty meal, a myth that now belong to the Dark ages (past). This calls for more public health awareness/campaigns to help enlighten the public towards better attitudes to, awareness and practices of malaria prevention and treatments. All the same, the overall knowledge about malaria transmission was far better among this study population since only a fair comparison existed with that in another study where only 66% of the study participants knew the correct mode of transmission of malaria in which 43.7% of them believed that malaria could be transmitted from person to person through the bite of mosquitoes (Wakgari, Ahmed & Fikre, 2004). It is still worse in another study population where only 15.6 % of the mothers associated mosquito bite with malaria transmission and majority of them, 65.6 % responded that it was transmitted due to poor personal hygiene and environmental sanitation (Fuge et al. 2015). Meanwhile, a comparable and correct knowledge of the transmission mode of malaria was reported in another Ethiopian study 98.2%, (Ayalew, 2010). Though the very population studied might contribute to the quality of results gotten from these studies, the poor knowledge of the exact malaria transmission mode requires that all hands must be on deck to help spread the correct messages about malaria.

Majority of our participants had suffered malaria infection during pregnancy, leaving only 17.6% of IPT-SP and 6.8% of the non IPT-SP women who were yet to experience that. The difference in favour of the IPT group underscores the protective roles of IPT-SP in the prevention of malaria in pregnancy (MIP). Further deduction from the study findings was that the non IPT-SP women, who had MIP were more likely to develop problems during their pregnancy courses (25.4% as against 5.7%). In a related study, amongst women using both IPT-SP and ITN, malaria prevalence among the cases was the least (7.2 %) while those with no intervention had higher malaria prevalence of 18.6% ($\chi^2 = 6.188$; $P = 0.103$). Of the women with malaria, 12.73% were using ITN and had taken at least one dose of SP, 38.18% had taken at least one dose IPT-SP only, 10.91% were using only ITN and 38.18 % were not using any preventive measure. Pregnant women using both interventions were less associated with malaria (OR = 0.341, 95% CI = 0.138–0.841) compared to those using only one control method (Fokam, Ngimu, Anchang-Kimbi & Wanji, 2016).

In both groups, majority of our respondents were aware of the problems of MIP. Such problems enlisted were miscarriages, anaemia and even severe malaria. The positive responses were slightly higher in the control arm. A comparable response was gotten from another study where the majority of the respondents 362 (91 %) were aware of the consequences of untreated malaria and 326 (81.9 %) of them mentioned ITNs as one of malaria prevention methods (Fuge et al. 2015).

On the malaria drugs used for the treatment of MIP, majority of our respondents in both groups cited Sulphadoxine Pyrimethamine (fansidar) followed by Artesunate/Lumefantrine. Proquanil and quinine were the least in the both arms, 47% each. ***A major lesson from this study is the need to fashion out better ways of properly enlightening our patients and other health clients on the right malaria drug (Antimalaria drug) choices especially when no health personnels are available (for first aid measures).*** In another study, the use of modern drugs for treating malaria was high (92%) including Chloroquine (73.5%) and Sulphadoxine-Pyrimethamine (60.6%). Chloroquine was believed to be effective for the treatment of malaria by 59% of the respondents, while the rest reported that it was ineffective. 400 (63.8%) respondents reported that Sulfadoxine-Pyrimethamine is the most effective antimalarial drug for the treatment of malaria (Wakgari et al. 2004). It is a



pity that these responses are coming after over 20 years after the WHO recommendation of ACT's and member countries adoption of same, for the treatment of uncomplicated malaria in endemic countries especially in our Sub-Saharan Africa. A lot of public health campaigns still need to be done.

The WHO recommendations for the prevention of malaria and its complications in pregnancy remains a three-pronged approach targeted at helping to eradicate the menace of MIP in endemic countries of the world. These approaches included: the use of intermittent preventive treatment for malaria in pregnancy (IPT-SP), the use of insecticide treated bed nets (ITNs) and effective case management of malaria if detected (Focam et al. 2016). The first two measures were aimed at preventing MIP.

Many of the case/study patients were aware of as well as used drug prophylaxis which as recommended, was the use of IPT-SP, the main basis for this study. Ayalew (2010) investigated the Knowledge and Practice of Malaria Preventive methods in Southern Ethiopia and reported the products used in the past 12 months by respondents or other household members. The percentage that used mosquito nets (treated/untreated) was fairly comparable to the results obtained from this study. The respondents that used indoor residual spraying (IRS) were very small and did not compare to the results of this study (13%). Surprisingly, about 11.2% of them used smoke as a means of malaria prevention (Ayalew, 2010). In another study alike, malaria was thought to be preventable by 85.7% respondents. In that study, 62.4% reported chemoprophylaxis (drug prophylaxis), 39.6% mentioned indoor residual spraying while 25% indicated eliminating breeding sites as preventive methods (Wakgari et al. 2004).

A larger majority of the respondents in this study, particularly the case/study group (90.5%) knew fansidar (SP) as the drug for the prevention of MIP. An appreciable response was also gotten from the control arm (69.6%), but far lower than that from the study group (90.5%). This difference is statistically significant. Some of the respondents cited Artesunate while still far lower percentage of the participants (6.1% and 15.5%) mentioned Pyrimethamine (Daraprim) in the study and control groups respectively. This demonstrated a low knowledge and practice of IPT-SP program among these women. It calls for more public health campaigns/awareness by the government and health authorities to continue the massive enlightenment programs aimed at educating the mothers on the importance of using the recommended IPT regimen, that is SP and other MIP prevention methods during pregnancy. Meanwhile, a Ghanaian researcher, Evans studied the knowledge and utilization of IPT for Malaria Control in Ghana and documented with strong evidence that the proportion between women without IPT knowledge and those with IPT knowledge was highly significant since zero (0) was not contained in the interval in testing the difference between the two proportions ($P_1 - P_2 \neq 0$). This meant that at 95% confidence interval, the knowledge level of those who did not use IPT and those who did was highly significant (Evans, 2017). It can be noted that the awareness of IPT-SP among our participants was highly appreciable especially among the study group. Also, a Tanzanian study reported a comparably high level IPT-SP awareness, but despite this high level of awareness and knowledge of IPT-SP, the acceptability and uptake of SP among pregnant women was still low for various reasons (Mdetele and Winifrida, 2017). On the contrary, a low IPT-SP awareness was reported in Uyo, South-South Nigeria 40.8% ($p = <0.001$) with only 12.0% receiving the drugs under IPT (Abasiattai, Etukumana & Umoiyoho, 2009).

Majority of our participants knew SP as the choice drug used for IPT, study group (81%) and control (54.7%). This is exemplified by the fact that only 29.7% of the women in the control arm were just been introduced to IPT-SP. **“Another major deduction from this aspect of our study is that: the introduction to IPT-SP in previous confinements are positively related to better IPT uptake in future pregnancies”.**

While chemoprophylaxis was noted to be highly effective in reducing malaria induced morbidity and mortality in children and pregnant women in malaria endemic areas, it is difficult to sustain since some studies had reported impaired development of naturally acquired immunity. Sulphadoxine-Pyrimethamine (SP) is the drug that has been most widely used for IPT in both vulnerable groups, but it is not known whether IPT achieves its effect primarily by elimination of already present parasites or through the long-acting, prophylactic effect of SP. (<https://malariaconsortium.org/pages/114.htm>).

However, Intermittent preventive treatment (IPT) describes the administration of a full therapeutic course of an



anti-malarial to “at-risk subjects” at specified times regardless of whether they are infected or not and differs from chemoprophylaxis, which aims at sustaining blood levels above the mean inhibitory concentration for a prolonged period, in producing protective drug concentrations for only short periods of time separated by periods when drug concentrations are below the level necessary to inhibit parasite growth (<https://malariaconsortium.org/pages/114.htm>).

Majority of the IPT women in the study group received the 2 doses of IPT-SP regimen. They were followed by those that received only one dose. **Also, among the study group, introduction to IPT and IPT-SP uptake was total (100%).** Results from another study noted that 98.5% of pregnant women received at least one dose of SP while approximately 91% of pregnant women received at least 2 doses of SP and 71% received 3 or more doses of SP. The national target for IPT-SP uptake at the time of this study was 100% of at least two doses of SP. The coverage of 91% of at least IPT2 suggested that although IPT-SP usage is high, it is still below the national target for Ghana (Ibrahim et al., 2017). The 91% IPT2 coverage fairly compared with the findings of this, study though a little below. Mdetele and Winifred reported an uptake of 54% for 1 dose IPT-SP in women 30 to 40 week’s gestation and 34% uptake for 2 doses (Mdetele and Winifrida, 2017). This did not compare with the findings of this study.

The results of IPT-SP uptake in another study did not also compare with the results obtained from this study since uptake of at least one dose of prescribed IPT-SP was 72.1% (367/516). Yet of the 367 who took prescribed IPT, adherence to second doses of IPT was 59.7% (219/367), and only 4.9% (18/367) took a third dose (Onyebuchi, Lawani, Iyoke, Onoh & Okeke, 2014).

RECOMMENDATIONS

This study recommends the following:

1. That all pregnant women be made to books for antenatal care (ANC) early
2. That the coverage and implementation of IPT-SP should be taken seriously as well as improved upon to enable all pregnant women key into it.
3. That efforts should be made to ensure that all pregnant women receive at least 2 doses of the recommended IPT-SP before delivery.

CONTRIBUTIONS TO KNOELEDGE

1. A major deduction from this study is the need to fashion ways of properly enlightening our patients and other health clients on the right malaria drugs (Antimalaria drugs) choices especially when no health personnels are available (for first aid measures).
2. Another major deduction from this study is that: the introduction to IPT-SP in previous confinements are positively related to better IPT uptake in future pregnancies”.

CONFLICT OF INTERESTS

The authors hereby declare that there was no conflict of interest as far as this study is concerned.

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