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RESEARCH ARTICLE

Adherence to Intermittent Preventive Treatment of Malaria in Pregnancy with Sulfadoxine–Pyrimethamine and Associated Factors: A Cross-Sectional Survey in Benin's Public Hospitals.

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Abstract:

Background:

Gestational malaria is a public health problem, thus responsible for morbidity and mortality risk to both the foetus and the mother. The intermittent preventive treatment with sulfadoxine-pyrimethamine during pregnancy (IPTp-SP) is one of the strategies recommended by the WHO to prevent this pathology and its consequences during pregnancy. In Benin, the adherence rate remains below the programmatic targets. This study aimed to identify the factors associated to the adherence to at least two IPTp-SP doses for postpartum women of the University Hospital HKM of Cotonou (CNHU-HKM) and the University Hospital for Mother and Child (CHU-MEL) of Cotonou.

Methods:

A cross-sectional hospital-based study was conducted over a 3-month-period, from July to September 2015 in the field of gynaecology and obstetrics departments of the two hospitals. All the mothers who had delivered and were still hospitalized at the time of the study were enrolled.

Results:

During their last pregnancy, 63.11% of women had taken at least two doses of IPTp-SP. Four determinants of adherence to the two IPTp-SP doses were associated to the adherence to two doses of IPTp-SP: i) adequate knowledge of the number of doses of SP to be taken during the pregnancy (p-value<0.0001), ii) participation in communication for social and behavioural change on IPTp-SP (p-value<0.0001), iii) adequate knowledge of the number of tablets per dose of SP (p-value=0.0100), and iv) comprehensive knowledge of malaria prevention measures during pregnancy (p-value=0.0200).

Conclusion:

Raising and improving women's knowledge on malaria are necessary to achieve IPTp-SP adherence. Particular emphasis should therefore be placed on communication for social and behavioural change for pregnant women, family decision-makers, community leaders and healthcare workers.

Keywords: Malaria, Intermittent preventive treatment, Pregnancy, Pregnancy, Social and behaviour change communication, IPTp-SP adherence, Postpartum women.

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1. INTRODUCTION

Malaria is a major public health problem with substantial risks for the mother, her fetus and the neonate, particularly in highly endemic countries in most of the sub-Saharan Africa. More than 90% of the total malaria deaths occur in this region [1]. In Benin, malaria is the leading cause of care-seeking, hospitalization and death, with 40.6%, 29.2% and 26% of cases recorded [2] in 2013, respectively. Pregnant women and infants are the most affected with higher mortality and morbidity. Malaria is the most frequent infection during pregnancy worldwide [3]. It remains one of the major causes of mother and infant health degradation in hyperendemic areas of *Plasmodium falciparum* transmission [4].

Since 1990, preventing malaria during pregnancy has been based on the weekly administration of chloroquine prophylaxis in sub-Saharan Africa [5]. This strategy resulted in a limited efficiency due to limited adherence to treatment outside the medical community and the development of resistance to chloroquine in *P. falciparum* [6, 7]. The World Health Organization (WHO) has therefore, developed and recommended a new strategy: Intermittent Preventive Treatment (IPTp) of Sulfadoxine-Pyrimethamine (SP) during pregnancy (IPTp-SP) to daily or weekly replace chemoprophylaxis with chloroquine for some women in pregnancy antenatal care.

IPTp-SP is an integral part of the World Health Organization's (WHO) three-pronged approach to the prevention and treatment of malaria during pregnancy, which also includes the use of Insecticide-Treated Nets (ITNs), and a rapid and effective case management [8, 9]. Until 2012, IPTp-SP consisted of administering at least two doses of SP to pregnant women spaced in time by at least a month [8]. Updated in October 2012 by the WHO, the IPTp-SP is now recommended for all pregnant women at each Planned Prenatal Consultation (PPC) from the second trimester to the delivery period, if doses are administered at least a month apart [9 - 11]. Through the National Malaria Control Program (NMCP), Benin has adopted this intervention since 2004 and the implementation has been effective since 2006 [12].

In countries where the IPT-SP has been implemented for several years, studies show that the rate of the second-dose intake was remarkably lower [8, 13 - 15]. In Benin, recent studies reported an improvement in the coverage of IPTp-SP since its adoption, ranging from 3% in 2006 [16] to 35% in 2008 [17] and to 46% in 2010 [18]. Nevertheless, the coverage of the IPT-SP is far from satisfactory, as it is still below the NMCP target of 100% of pregnant women receiving full IPTp-SP in 2015 [19]. Furthermore, Benin performance is far from the new recommendation of WHO which requests five IPT-SP doses during pregnancy. This study aimed to measure the adherence rate to IPTp-SP for mothers and identify its determinants for decision-making.

2. METHODS

2.1. Study Area

The study was conducted in two gynaecological and obstetric departments in Cotonou: the University Clinic of Gynaecology and Obstetrics (CUGO) of the National University Hospital of Cotonou (CNHU-HKM) and the Gynaecology and Obstetrics Department of the Mother and Child Lagoon Hospital (CHU-MEL). The CNHU-HKM and the CHU-MEL are the two referral centres for Gynaecology and Obstetrics in Benin.

Services offered in the facility include family planning, antenatal care, delivery, postnatal care, child welfare clinic, laboratory and pharmacy services.

2.2. Study Design

A cross-sectional hospital-survey was carried out over a period of three months from July to September 2015.

2.3. Sample Size Estimation

The sample size for the study was calculated using Schwartz's formula: $n = Z^2pq/i^2$. Where, $Z = 1.96$ at 95% confidence interval, $p = 60\%$ (IPT2 coverage in Benin in 2014) [20], $i =$ precision level of 0.05 and $q = 1 - p$. The required sample size estimated was 368.

2.4. Inclusion/exclusion criteria

All the women with the following characteristics were eligible for participation: (i) had delivered in one of the two hospitals during the study, (ii) was still hospitalized at the time of the study, (iii) have had at least one prenatal consultation conducted by a health worker at any health facility in Benin and (iv) have given free and written consent to

take part in the study. Those who had a postpartum pathology and / or complications were not included.

The dependent variable was defined as a person who took at least two doses of SP during the last pregnancy. We adopted this definition because the last WHO recommendation, requiring a dose of IPTp-SP in all consultation from the second trimester of pregnancy (a total of five doses), was not yet appropriately distributed in Benin. The independent variables were related to sociocultural and socio-demographic factors of the respondents, their obstetric history, their knowledge on malaria and IPTp-SP, the perception of the conduct of NPCs by the respondents and the awareness of the IPTp-SP and health care supply.

2.5. Data Analysis

Data were analysed using EPI INFO 7.0 version. The mean, median and standard deviation were determined for the quantitative variables. The proportions were calculated for qualitative variables. We used the Chi-square test to compare two proportions when the theoretical numbers were at least 5 and the fisher test when theoretical numbers were more than 5. To identify the factors associated to the adherence to at least two doses of SP during the last pregnancy, univariate and multivariate logistic regression analyses were performed. At the end of the bivariate analysis, the independent variables associated with the observance of IPTp-SP with a p-value less or equal to 0.20 were introduced in the logistic regression model. The Odd Ratio (OR) was used to estimate the association between the dependent variable and the independent variables. A significant threshold of 5% was considered.

3. RESULTS

3.1. Sample Description

A total of 366 women who gave birth were involved in the survey, including 48.63% at CUGO (at the CNHU-HKM) and 51.37% at CHU-MEL. The mean age of women was 28.12 ± 5.52 years. The age group 25-34 was the majority (60.93%). In terms of marital status, women in common-law unions were in the majority, accounting for 65.30% of the sample. Most of the women surveyed lived in urban areas, with 47.27% in Cotonou and 34.15% in other cities. Women in trade and craft sectors accounted for 27.05% and 24.32% of the sample, respectively. Regarding the distance between their homes and the health facilities, 54.92% of the women travelled more than 5 km. Women with no formal education on one hand and those with primary education on the other hand, each accounted for 24.59%. The ethnic groups, most represented among the women in the sample were the Fon and relatives with 38.8% and Adja and relatives with 26.23%. Concerning the religion of women, Catholics come first with 46.72% followed by Evangelicals with 29.51%, and Muslims with 11.48% of the total.

For gynaecological history, 36.07% of women were primiparous and 27.87% of the primigravida (Table 1).

Table 1. Distribution of women with infants according to their obstetric history in CNHU-HKM and CHU-MEL, 2015.

Variables	N	%
Gestation		
Primigravida	102	27.87
Secondgravida	83	22.68
Multigravida	181	49.45
Parity		
Primiparous	132	36.07
Secondiparous	79	21.58
Multiparous	155	42.35
Number of early abortion		
0	263	71.86
1	71	19.40
≥ 2	32	8.74
Number of living children		
$\delta 1$	144	39.35
2-3	156	42.62
>3	66	18.03

3.2. Adherence Rate IPTp-SP

The proportion of women taking at least two doses of SP during pregnancy was 63.11%. This rate was 62.92% and 63.30% at the CNHU-HKM and the CHU-MEL, respectively.

3.3. Determinants of Adherence to IPTp-SP

In univariate analysis, age, marital status, religion, place of residence, distance from home and health facility, level of education and customary prohibitions of medication use during pregnancy are not significantly associated with adherence to IPTp-SP. Only the need for a third-party authorization to monitor pregnancy showed a significant association with adherence to IPTp-SP, p-value = 0.0030 (Table 2). No factors related to the obstetric history of the respondents were significantly associated with adherence to IPTp-SP in this study (Table 3). Women's adequate knowledge of malaria prevention measures during pregnancy (p-value <0.0001), the number of tablets per dose of IPTp-SP (p-value <0.0001), and the number of doses of IPTp-SP to be taken during pregnancy (p-value <0.0001) were significantly associated with adherence to IPTp-SP (Table 4). Among the health-related factors, only participation in a IPTp-SP information session was significantly associated with adherence to TPIp-SP, p-value <0.0001, (Table 5).

Table 2. Association between the adherence to IPTp-SP and socio-demographic, univariate analysis in CNHU-HKM and CHU-MEL, 2015.

Variables	Non-adherence		Adherence		p-value
	n	%	n	%	
Age (years)					0.8300
< 25	34	36.17	60	63.83	
25-34	81	36.32	142	63.68	
35	20	40.82	29	59.18	
Matrimonial status					0.1300
Married	28	30.11	65	69.89	
Single	13	40.62	19	59.38	
Bachelor	92	38.49	147	61.51	
Divorcee/widower	2	100.00	0	0.00	
Place of residence					0.9000
Cotonou	62	35.84	111	64.16	
Rural area	25	36.76	43	63.24	
Peripheric	48	38.40	77	61.60	
Distance from home to health facility					0.2200
Less than 5 km	53	32.12	112	67.88	
5 to 9 km	36	41.86	50	58.14	
10 km and more	46	40.00	69	60.00	
Level of education					0.4800
None	30	33.33	60	66.67	
Primary	39	43.33	51	56.67	
Secondary (1 cycle)	22	30.56	50	69.44	
Secondary (2nd cycle)	20	37.74	33	62.26	
Higher	24	39.34	37	60.66	
Religion					0.9200
Christian	116	36.71	200	63.29	
Muslim	16	38.10	26	61.90	
Traditional	3	37.50	5	62.50	
Tablet taking in pregnancy as customary prohibition					0.9800
No	110	36.91	188	63.09	
Yes	25	36.76	43	63.24	
Person who accepts pregnancy follow-up					0.0030

(Table 2) *contd....*

Variables	Non-adherence		Adherence		p-value
	n	%	n	%	
Myself	94	32.87	192	67.13	
Others	41	51.25	39	48.75	

Table 3. Association between obstetrical history and adherence to ITPIp-SP, univariate analysis, in CNHU-HKM and CHU-MEL, 2015.

Variables	Non-adherence		Adherence		p-value
	n	%	N	%	
Gestation					0.9700
Primigeste	37	36.27	65	63.73	
Secondigeste	30	36.14	53	63.86	
Multigeste	68	37.57	113	62.43	
Parity					0.4100
Primiparous	45	34.09	87	65.91	
Secondparous	34	43.04	45	56.96	
Multiparous	56	36.13	99	63.87	
Number of stillborn					0.7800
0	98	37.26	165	62.74	
1	24	33.80	47	66.20	
2	13	40.62	19	59.38	
Number of living children					0.2200
1	52	36.11	92	63.89	
2 – 3	64	41.03	92	58.97	
> 3	19	28.79	47	71.21	
Place of birth giving					0.9400
CNHU-HKM	66	37.08	112	62.92	
CHU-MEL	69	36.70	119	63.30	

Table 4. Association between adherence to IPTp-SP and factors related to women's knowledge of malaria and IPT-SP, univariate analysis in CNHU-HKM and CHU-MEL, 2015.

Variables	Non-adherence		Adherence		p-value
	n	%	n	%	
Knowledge of Malaria transmission					0.6800
Mosquito Net	116	36.48	202	63.52	
Other responses	19	39.58	29	60.42	
Knowledge of consequences of malaria in pregnancy					0.5500
Know less	106	37.72	175	62.28	
Know better	29	34.12	56	65.88	
Knowledge of malaria prevention measures in pregnancy					<0.0001
Know less	49	25.26	145	74.74	
Know better	86	50.00	86	50.00	
Knowledge of the number of tables per dose of SP					<0.0001
Three	31	16.23	160	83.77	
Other responses	104	59.43	71	40.57	
Knowledge of the number of doses of SP to take in pregnancy					<0.0001
≥2	14	10.45	120	89.55	
Others	121	43.69	111	56.31	

Table 5. Association between adherence of IPTp-SP and factors related to health care, univariate analysis in CNHU-HKM and CHU-MEL, 2015.

Variables	Non- adherence		Adherence		p-value
	N	%	N	%	
Health worker's competence for prenatal consultations					0.5600
Doctor	48	37.80	79	62.20	
Mid-wive	77	37.75	127	62.25	
Other	10	28.57	25	71.43	
Health facility in charge of the follow-up					0.6700
CNHU-HKM	14	46.67	16	53.33	
CHU-MEL	25	34.25	48	65.75	
Zonal Hospital	3	37.50	5	62.50	
Peripheral	93	36.47	162	63.53	
Reception appreciation in the health care facility					0.1800
Bad	7	25.00	21	75.00	
Good	128	37.87	210	62.13	
Possibility of come for consultation at any day					0.7800
No	71	37.57	118	62.43	
Yes	64	36.16	113	63.84	
Waiting time appreciation					0.4200
Not long	70	33.98	136	66.02	
Long	45	41.28	64	58.72	
Too long	20	39.22	31	60.78	
Campaign session on IPTp-SP participation during prenatal consultation					<0.0001
No	119	51.97	110	48.03	
Yes	16	11.68	121	88.32	
Confidentiality in the consultation room					0.1500
No	4	20.00	16	80.00	
Yes	131	37.86	215	62.14	
Building and the maternity's yard cleanness					0.5500
Clean	132	37.29	222	62.71	
Dirty	3	25.00	9	75.00	

In multivariate analysis, four variables were selected in the final model. These four variables remained associated with adherence to the IPTp-SP adjusted to each other. The women who had adequate knowledge of the doses of IPTp-SP to be taken during pregnancy were 4.70 times more likely to respect the adherence to IPTp-SP compared to the women who did not have adequate knowledge. The variable "participation of women in an information session on the IPTp-SP during pregnancy" was 4.61 times more likely to adhere to the IPTp-SP compared to women who did not participate to an information session. Similarly, the comprehensive knowledge of the number of tablets per dose of IPTp-SP multiplies the chance of adherence by 3.32. Finally, women who had adequate knowledge of malaria prevention measures during pregnancy were 2.56 times more likely to adhere to IPTp-SP than those who did not have comprehensive knowledge (Table 6).

Table 6. Determinants of adherence to IPTp-SP in multivariate analysis in CNHU-HKM and CHU-MEL, 2015.

Variables	OR	IC to 95%	p-value
Malaria control measure			
Know less	1		
Know better	2.56	[1.17; 5.60]	0.0200
Number of tablets of IPTp-SP per dose			
Others	1		
3	3.32	[1.43; 7.68]	0.0100
Number of doses of IPTp-SP to take in pregnancy			
Others	1		

(Table 6) *contd....*

Variables	OR	IC to 95%	p-value
≥ 2	4.70	[2.12; 10.39]	<0.0001
Campaign session on IPTp-SP participation			
No	1		
Yes	4.61	[2.32; 9.17]	<0.0001

OR = Odd ratio, IC = Confidence interval

4. DISCUSSION

We obtained almost the same defiance IPTp-SP rates at the University Hospital-HKM of Cotonou and the University Hospital “Mother and Child Lagoon” (CHU-MEL) with 62.92% and 63.30%, respectively. This similarity is justified by the fact that these two places are the referral in Benin and receive women with almost the same profile. The overall adherence rate was 63.11% for the entire sample. This rate, although rather good, is far from satisfactory, as it is still far from the objective of the National Malaria Control Program (NMCP) in Benin, which is to reach a 100% coverage for the second dose of the IPTp-SP in 2015 [19].

The adherence rate to IPTp-SP was higher than those reported by the 2011-2012 Demographic Health Survey (DHS) in Benin [19] and by the WHO in 2014, based on data from 2013 [1]. The DHS 2011-2012 reported a rate of only 23% taking at least two doses of SP during pregnancy. As for the World Malaria Report published by the WHO in 2014, it reported an overall rate of 43% worldwide. This reflects an evolution of efforts to improve adherence to IPTp-SP in Benin. A lower rate of 52.5% was observed in the health zone of Pobè/Adja-Ouèrè/Kétou [21] in 2012. Earlier in 2009 [12], in a study carried out in eight maternities in Benin, the adherence to IPTp-SP that was almost similar to that of the present study (68.43%) was noted. Globally, it seemed that the adherence to IPTp-SP has increased in the health centre survey in Benin.

In a survey conducted in Tanzania in 2012 [22], the adherence rate of IPT-SP was estimated at 28.5%. In Malawi [23], however, a higher adherence rate of 72% was observed in 2009. Furthermore, in this study, only 18.03% of respondents took a minimum of three doses of IPT-SP during pregnancy. This rate is comparable to the World Malaria Report published by the WHO in 2014, which was 17%. Since it has been recommended to take a monthly consultation as from the 3rd month of pregnancy, five doses of IPTp-SP should be given to pregnant women according to the WHO recommendation. Then, Benin NMCP recommendation for IPTp-SP on pregnant women moved from two doses to tree doses since 2016. This new recommendation is not yet evaluated; however, efforts should be undertaken by the NMCP to disseminate this recommendation for better adherence.

Regarding the determinants of IPTp-SP adherence, three of the identified determinants were related to the knowledge on malaria prevention, and more specifically on IPTp-SP. This finding is in accordance with those of other authors [23 - 25] who have shown a poor knowledge of women on IPTp-SP, particularly the number of tablets per dose. In addition, they identified other factors such as low antenatal coverage and prenatal consultations in the private sector. Thus, according to one of these studies, good knowledge on the use of SP during pregnancy was significantly predictive of good adherence to IPTp-SP [25]. In 2010, in Nigeria, another study showed that women’s comprehensive knowledge of malaria including its prevention during pregnancy through the use of IPTp-SP was associated with good adherence to IPTp-SP [25]. All this confirms that adequate knowledge on IPTp-SP by pregnant women could improve their adherence. A better communication strategy for Behaviour and Social Change needs to be implemented in order to improve women's knowledge on IPTp-SP.

The participation of women in communication sessions on IPTp-SP has also been shown in our study to be a determining factor in adherence to IPTp-SP in our study population. In 2012, in Tanzania, an almost similar result was observed [22]. Indeed, the fact that informing women about the dangers of malaria during pregnancy was the main determinant of adherence to the IPTp-SP. The communication sessions, individual or collective, can improve women’s knowledge on the IPTp-SP and therefore, promote better adherence to this strategy. The lack of communication to social and behaviour change may be related to a low quality of prenatal care services, as these services are responsible to inform the pregnant woman about the IPTp-SP, and its use during pregnancy. However, more than 90% (331 of 366) of the pregnant women surveyed were followed by qualified health workers (doctor or midwife). Prenatal care providers should be more aware of the health services they addressed to women, and more specifically concerning the IPTp-SP recommendations. Mass and health facility communication for social and behaviour change are mainly concerned. The health system must develop, and ensure their implementation.

Previous studies have identified other factors associated with adherence or non-adherence to IPTp-SP. This is

evidenced by the WHO 2014 World Malaria Report [1], which found that poverty was the main determinant of non-adherence to IPTp-SP. Age below 20 years, lack of formal education, rural life and parity superior to one were also identified as negative influences on IPTp-SP adherence. On the other hand, a study carried out in Nigeria in 2010 showed that the primiparae adhered better to the IPTp-SP compared to the secundipares and the multipares [14]. In Uganda between 2008 and 2009, a cross-sectional study on 500 women who were pregnant the previous year revealed that women were more likely to observe IPTp-SP if administered during the prenatal consultation [26].

CONCLUSION

The study found that raising and improving women's knowledge on malaria are necessary to achieve IPTp-SP adherence. Particular emphasis should therefore be placed on communication for social and behavioural change on pregnant women, family decision-makers, community leaders and health workers.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was conducted in two gynaecological and obstetric departments in Cotonou: the University Clinic of Gynaecology and Obstetrics (CUGO) of the National University Hospital of Cotonou (CNHU-HKM) and the Gynaecology and Obstetrics Department of the Mother and Child Lagoon Hospital (CHU-MEL). The CNHU-HKM and the CHU-MEL are the two referral centres for Gynaecology and Obstetrics in Benin.

HUMAN AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2008.

CONSENT FOR PUBLICATION

All the women have given free and written consent to take part in the study.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

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