



Intermittent Preventive Treatment (IPT) in Prevention of Malaria and Anemia in Pregnancy

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Abstract

Intermittent preventive treatment with Sulphadoxine-Pyrimethamine (IPTp-SP) is currently the recommended regimen for prevention of malaria in pregnancy in endemic areas. However, the effectiveness of this approach in preventing malaria and anemia in pregnant women is unclear. The objective of the study was to evaluate the effectiveness of IPTp-SP in preventing malaria and anemia among pregnant women attending antenatal clinic (ANC) at Korle-Bu Teaching Hospital (KBTH), Accra, Ghana. A cross-sectional study comparing malaria and anemia incidence among pregnant women using IPTp-SP with those not using IPTp was conducted. A total of 363 pregnant women were recruited of which 202 were using IPTp and 161 were IPTp non-users. Malaria parasites and hemoglobin levels (Hb < 11g/dl) were determined. Thirty-one (15.3%) women using IPTp had malaria compared to 72 (44.7%) of women who did not use IPTp (protective efficacy 74%, $p < 0.001$). The number of anemic women not utilizing IPTp was significantly higher (58.4%, 94/161) than women using IPTp (22.8%, 46/202), $p < 0.001$ (protective efficacy 81%, $p < 0.001$). Controlling for age and other variables, the difference in the incidence of malaria (odds ratio = 0.26, 95% confidence interval = 0.15 - 0.44, $p < 0.001$) and anemia (odds ratio = 0.19, 95% confidence interval = 0.11 - 0.34, $p < 0.001$) remained significant. The IPTp-SP regime is effective in preventing malaria and anemia among pregnant women visiting ANC at KBTH. The implementation of the IPTp-SP strategy holds great promise for reducing the burden of malaria and anemia in pregnancy in Ghana.

Introduction

Malaria in pregnancy is an immense public health problem affecting approximately 50 million women in malaria endemic areas¹. Pregnant women, especially primigravidae and secundigravidae, are particularly vulnerable to malaria than non-pregnant women from the same area². Maternal anemia and low birth weight babies (LBW) are two important consequences of malaria in pregnancy³. Malaria-associated anemia puts pregnant women at greater risk of other morbidities including placental abruption, placenta previa, premature labor, and maternal death⁴ and LBW babies are at an increased risk for early childhood mortality.

In Ghana, malaria mortality in children is 4/hr two of which are <5yr old⁵. 13.8% of pregnant women have malaria⁶. In Ghana chloroquine chemoprophylaxis is recommended during pregnancy and six weeks post-partum⁶. However, compliance is low at 11.6%⁵ due to unfounded fear of abortion of fetuses and unpleasant itching, bitter taste, and the need to swallow tablets of chloroquine. This low compliance rate reduces effectiveness of malaria prevention among this group⁵.

The World Health Organization (WHO) recommends intermittent preventive treatment of malaria in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP)⁷ as standard of care. IPTp involves presumptive treatment of pregnant women for malaria with curative doses of effective anti-malarials at predefined intervals during pregnancy⁷. IPTp-SP reduces malaria episodes, malaria related anemia, and incidence of LBW⁸⁻¹¹. IPTp-SP is attractive because of its single dose therapy, which lends itself to supervised administration and ensures compliance. A recent study indicated that one dose of IPTp-SP in the first two trimesters of pregnancy decreased the risk for malaria by 85% and anemia by 59%⁹. Although this preventive strategy has been implemented in some hospitals in Ghana such as Korle-Bu Teaching Hospital (KBTH), there has been little assessment of its effectiveness in preventing maternal malaria and anemia in Africa¹². Examining correlation between IPTp-SP use and incidence of maternal malaria and anemia may provide insight into its effectiveness in control of malaria and anemia in pregnancy. In this study, the effectiveness of IPTp-SP in preventing maternal malaria and anemia among pregnant women attending antenatal clinic (ANC) at KBTH was assessed.

Methods

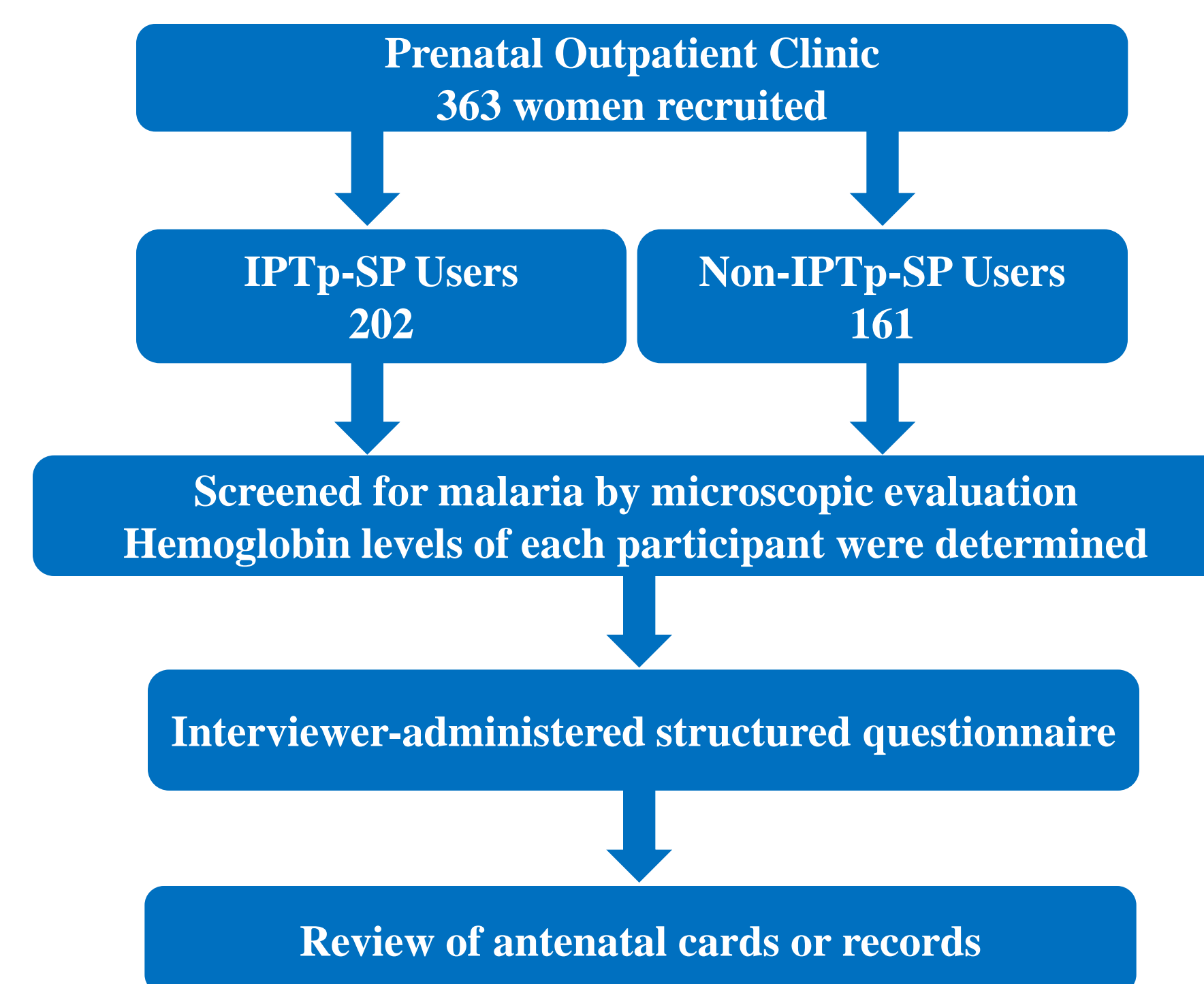
Study Area

- Cross-sectional study
 - June and August 2009
- Korle-Bu Teaching Hospital (KBTH)
 - Southwestern Accra, Ghana
 - Ultimate referral institution for patients from all over the country
- OBGYN Dept. has prenatal outpatient clinic that provides antenatal care for more than 200 patients each day

Recruitment

- Informed consent from the prenatal outpatient clinic
 - MSM IRB & Ghana Health Service's ethical review committee standard
- Inclusion criteria
 - Pregnant women with a gestational age of 26 weeks or greater
 - 18 years of age or older
 - Received at least one dose of IPTp-SP during the first two trimesters (experimental group)
 - Have not received IPTp-SP during the first two trimesters (Control)
- Exclusion criteria
 - Pregnant women with a gestational age less than 26 weeks
 - Less than 18 years of age
 - Those with severe complications such as hemorrhages, sepsis and other infections other than malaria
 - Those taking malaria prophylaxis other than IPTp-SP

Study Flow Chart



Results

Study Population

- 94.2% of the women were in their 3rd trimester
- About 43% are either primigravidae or secundigravidae
- Most of the women had normal G6PD (93.1%) and were negative for sickle cell disease (90.3%)
- Helminth co-infection with malaria was observed in 5 (3.1%) of 161 individuals among the women not using IPTp

Table 1. Socio-Demographic characteristics of pregnant women attending antenatal care at KBTH

Socio-demographic characteristics	IPTp-SP Users (N = 202)	Non-IPTp-SP users (N = 161)	p-Value
Age (Years)			
Mean Age SD	33.8 5.2	32.4 5.8	0.013
18-24	4 (1.9%)	13 (8.1%)	
25-29	46 (22.8%)	46 (28.6%)	0.013
30-34	46 (22.8%)	36 (22.4%)	
≥35	106 (52.5%)	66 (40.9%)	
Marital Status			
Single	5 (2.5%)	7 (4.3%)	0.486
Married	197 (97.5%)	154 (95.7%)	
Education			
No Education	29 (14.4%)	41 (25.5%)	
Primary	57 (28.2%)	61 (37.9%)	< 0.001
Secondary	64 (31.7%)	48 (29.8%)	
Tertiary	52 (25.7%)	11 (6.8%)	
Employment Grade			
Professional	28 (13.9%)	10 (6.2%)	
Clerical	59 (29.2%)	35 (21.7%)	0.004
Skilled	68 (33.7%)	57 (35.4%)	
Unskilled	45 (22.3%)	51 (31.7%)	
Unemployed	2 (0.9%)	8 (5.0%)	
Socioeconomic Status			
Low Income	127 (62.9%)	129 (80.1%)	< 0.001
Middle Income	75 (37.1%)	32 (19.9%)	

Table 2. Effect of intermittent preventive treatment with SP on malaria

Variables	IPTp-SP Users (N = 202)	Non-IPTp-SP Users (N = 161)	p-Value
Malaria			
Positive	31 (15.3%)*	72 (44.7%)	< 0.001
Negative	171 (84.7%)	89 (55.3%)	

*Resistance to SP among pregnant women in Kumasi was 73% - Mockenhaupt et al., 2008 Journal of Infectious Disease

Table 3. Effect of intermittent preventive treatment with SP on anemia

Variables	IPTp-SP Users (N = 202)	Non-IPTp-SP Users (N = 161)	p-Value
Hemoglobin (g/dl)			
Mean SD	11.6 1.6	9.7 1.8	< 0.001
Anemia (Hb < 11.0g/dl)	46 (22.8%)	94 (58.4%)	< 0.001
Severe Anemia (Hb < 7.0g/dl)	7 (3.5%)	20 (12.4%)	< 0.001
Hb ≥ 11.0g/dl	149 (73.7%)	47 (29.2%)	< 0.001

Table 4. Logistic regression analyses of contributory factors for malaria among pregnant women attending ANC at KBTH

Variables	Odds Ratio	95% CI	p-Value
Age	1.15	0.82 - 1.61	0.425
Gestation	1.75	0.65 - 4.68	0.272
Gravidae	1.08	0.61 - 1.90	0.793
Parity	1.11	0.70 - 1.77	0.652
IPTp-SP	0.26	0.15 - 0.44	< 0.001
Marital Status	0.33	0.07 - 1.55	0.158
Education	0.64	0.43 - 0.94	0.024
Malaria Prevention Method	0.92	0.70 - 1.19	0.530

Table 5. Logistic regression analyses of contributory factors for anemia among the pregnant women attending antenatal care at KBTH

Variables	Anemia			Severe Anemia		
	Odds Ratio	95% CI	p-Value	Odds Ratio	95% CI	p-Value
Age	1.03	0.72 - 1.48	0.869	0.78	0.40 - 1.51	0.454
Gestation	0.63	0.20 - 1.98	0.433	0.31	0.03 - 3.19	0.323
Gravidae	1.19	0.65 - 2.21	0.567	2.96	0.95 - 9.22	0.061
Parity	1.07	0.61 - 1.85	0.825	1.25	0.40 - 3.94	0.698
IPTp-SP	0.19	0.11 - 0.34	< 0.001	0.15	0.05 - 0.44	0.001
Malaria Infection	5.19	2.77 - 9.74	< 0.001	11.03	3.81 - 26.32	< 0.001
Helminth Infection	1.08	0.29 - 4.02	0.909	1.31	0.16 - 10.99	0.801
Marital Status	0.52	0.12 - 2.28	0.389	0.26	0.16 - 4.21	0.342
Education	1.03	0.69 - 1.53	0.886	0.76	0.35 - 1.64	0.485
Malaria Prevention Method	1.10	0.83 - 1.45	0.512	0.72	0.44 - 1.18	0.191

Discussion & Conclusion

- First study evaluating the effectiveness of IPTp-SP at KBTH.
- IPTp-SP is effective in reducing the incidence of malaria and reducing the anemia or severe anemia in pregnancy in endemic areas.
- Finding provides evidenced-based template on which policymakers and health workers may develop interventions to reduce maternal mortality due to malaria and anemia in pregnancy.
- Provides insight into which policies can be developed to improve quality of care at KBTH.
 - Ensuring availability of essential drugs supplies.
 - Involving health workers in the promotion of IPTp to improve use of other healthcare services in addition to malaria treatment and prevention.
- IPTp-SP is an effective practical strategy to reduce risk of malaria and anemia among pregnant women living in malaria endemic areas such as Ghana.

Recommendation

- Further studies to assess efficacy of SP in pregnancy in the clinical setting where LBW and placental parasitemia is measured.
- Evaluation of other drug combinations for malaria prevention in pregnancy.
- Evaluate and monitor effectiveness of SP for IPTp since resistance to this drug is on the increase.
- Continuing education and training required for health workers to improve knowledge about malaria during pregnancy and in particular IPTp strategy and DOT scheme.
- Supervise activities of health workers operating the ANC to ensure effectiveness of the DOT scheme of the IPTp.

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