



Nana O. Wilson^{1,2}, Fatou Ceesay², Samuel A.Obed³, Andrew A. Adjei⁴, Richard K. Gyasi⁴, Patricia Rodney², Winston A. Anderson⁵, Naomi W. Lucchi⁶, Jonathan K. Stiles¹ ¹Department of Microbiology, Biochemistry, and Immunology, Morehouse School of Medicine, Atlanta, Georgia ²Department of Community Health and Preventive Medicine, Morehouse School of Medicine, Atlanta, Georgia ³Department of Obstetrics & Gynecology, University of Ghana, Korle-Bu, Accra, Ghana ⁴Department of Pathology, University of Ghana, Korle-Bu, Accra, Ghana ⁵Department of Biology, Howard University, Washington DC ⁶Malaria Branch, Division of Parasitic Diseases, Center for Global Health, CDC, Atlanta, Georgia

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 nonpregnant women from the same area². Maternal anemia and low birth weight babies (LBW) are two important consequences of malaria in pregnancy³. Malariaassociated 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 malaria⁵. 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.

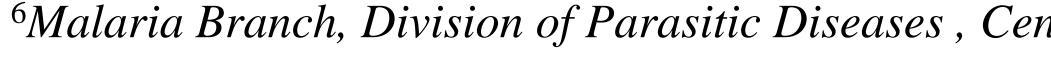
The World Health Organization (WHO) recommends intermittent preventive treatment of malaria in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP)⁷ as standard of care. IPTp involves presumptive treatment of pregnant women for malaria with curative doses of effective anti-malarials at predefined intervals 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.

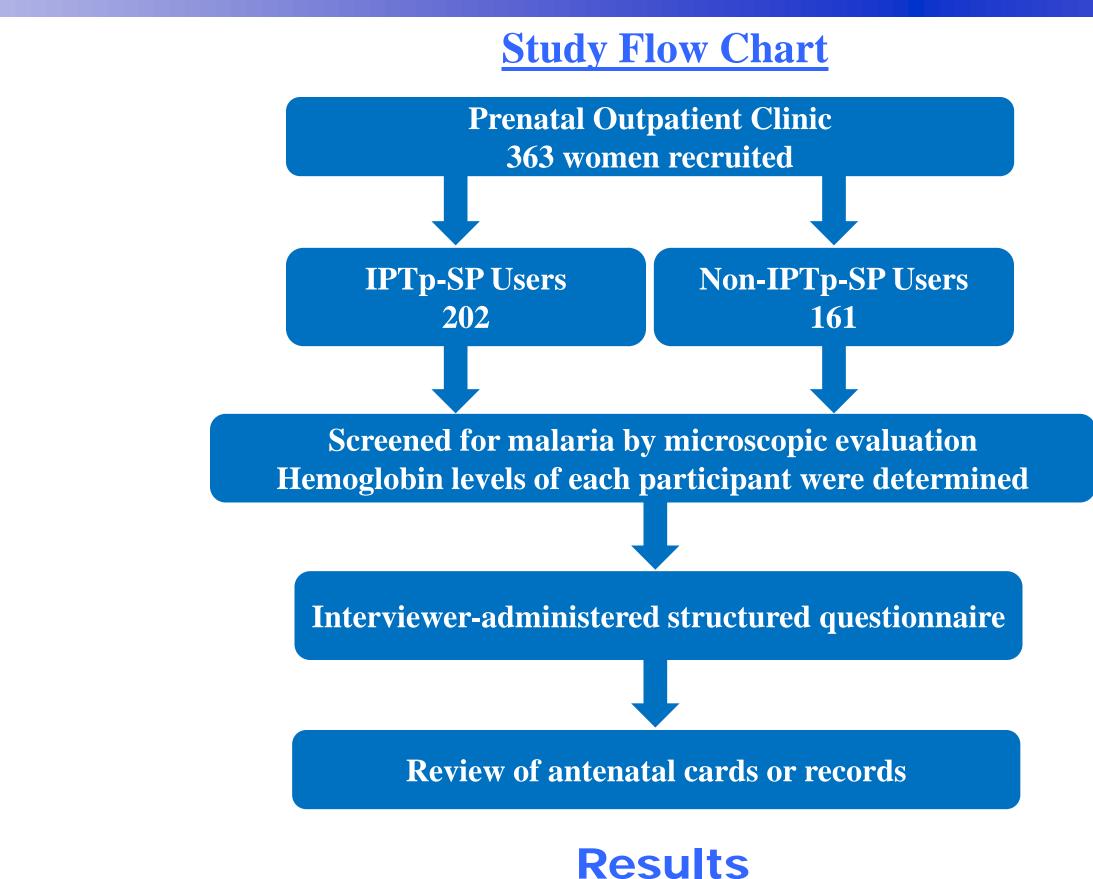
Methods

Study Area

- \succ 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

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





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	Study Flow	<u>Chart</u>		Table 3. Effect of i	intermittent	preventive tr	eatment w	ith SP on anemia	a	
Prenatal Outpatient Clinic 363 women recruited				- IPTp-SP Variables			SP Users = 202)	P Users Non-IPTp-SP Use		le
ТРТ	n-SP Users N	on-IPTp-SP Users		Hemoglobin (g/dl)		X				
IPTp-SP UsersNon-IPTp-SP Users202161				Mean SD	11.6 1.6		9.7 1.8	< 0.00	1	
Screened for malaria by microscopic evaluation Hemoglobin levels of each participant were determined				Anemia (Hb < 11.0	46 (22.8%) 7 (3.5%)		94 (58.4 %	(b) < 0.00	< 0.001	
				Severe Anemia (H			20 (12.4%	o) < 0.00	1	
				Hb ≥ 11.0 g/dl	149 (73.7%)		47 (29.2%) < 0.00	1	
Intervie	wer-administered stru	ctured questionnaire		Table 4. Logisticpregnant women a	0	v	contributo	ory factors for	malaria amo	ng
				Variables	8	Odds Rati	0	95% CI	p-Value	
	Review of antenatal car	rds or records		Age		1.15		0.82 - 1.61	0.425	
Results				Gestation		1.75		0.65 - 4.68	0.272	
Study Population				Gravidae		1.08		0.61 - 1.90	0.793	
> 94.2% of the wome	n were in their 3 rd tri	mester		Parity	1.11 0.26 0.33		0.70 - 1.77	0.652		
➢ About 43% are eithed				IPTp-SP			0.15 - 0.44	<0.001		
		C	tive for sickle cell	Marital Status			0.07 - 1.55	0.158		
Most of the women had normal G6PD (93.1%) and were negative for sickle cell disease (90.3%)				Education		0.64		0.43 - 0.94	0.024	
Helminth co-infecti among the women r		observed in 5 (3.1%)	of 161 individuals	Malaria Prevention N	Aethod	0.92		0.70 - 1.19	0.530	
		otoriation of progra		Table 5. Logistic regrewomen attending anten	•		outory fac	tors for anemia	among the p	pregnant
attending antenatal		cteristics of pregn	ant women	Variables		Anemia		Se	vere Anemia	
				variables	Odds Ratio	95% CI	p-Value	Odds Ratio	95% CI	p-Valu
Socio-demographic	•	Non-IPTp-SP user	s p-Value	Age	1.03	0.72 - 1.48	0.869	0.78	0.40 - 1.51	0.454
characteristics	(N = 202)	(N = 161)	P varae	Gestation	0.63	0.20 - 1.98	0.433	0.31	0.03 - 3.19	0.323
Age (Years)				Gravidae	1.19	0.65 - 2.21	0.567	2.96	0.95 - 9.22	0.061
Mean Age SD	33.8 5.2	32.4 5.8	0.013	Parity	1.07	0.61 -1.85	0.825	1.25	0.40 - 3.94	0.698
18-24	4 (1.9%)	13 (8.1%)		IPTp-SP	0.19	0.11 - 0.34	<0.001	0.15	0.05 - 0.44	0.001
25-29	46 (22.8%)	46 (28.6%)		Malaria Infection	5.19	2.77 - 9.74	<0.001	11.03	3.81 - 26.32	<0.001
30-34	46 (22.8%)	36 (22.4%)	0.013	Helminth Infection	1.08	0.29 - 4.02	0.909	1.31	0.16 - 10.99	0.801
≥35	106 (52.5%)	66 (40.9%)		Marital Status	0.52	0.12 - 2.28	0.389	0.26	0.16 - 4.21	0.342
Marital Status	100 (32.370)	00(40.270)		Education Malaria Prevention Method	1.03 1 1.10	0.69 - 1.53 0.83 - 1.45	0.886 0.512	$\begin{array}{c} 0.76 \\ 0.72 \end{array}$	0.35 - 1.64 0.44 - 1.18	0.485 0.191
Single	5(250/)	7 (4.3%)				0.05 1.15	0.012	0.72	0.11 1.10	0.171
	5 (2.5%) 197 (97.5%)	154 (95.7%)	0.486		Disc	ussion &	Conclus	sion		
Married Education	197 (97.370)	134 (93.770)		➢ First study evaluating the e	effectiveness of	f IPTp-SP at K	BTH.			
	20(14.40/)	(25, 50)		>IPTp-SP is effective in redu	ucing the incid	lence of malari	a and reduc	ing the anemia or	severe anemia i	n pregnai
No Education	29 (14.4%)	41 (25.5%)		in endemic areas.	1 1 1 / 1	. 1 • 1	1• 1	11 1/1 1	1 1 •	, .
Primary	57 (28.2%)	61 (37.9%)	< 0.001	 Finding provides evidenced-based template on which policymakers and health workers may develop inter 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. 						nterventio
Secondary	64 (31.7%)	48 (29.8%)								
Tertiary	52 (25.7%)	11 (6.8%)		•Ensuring availability of e	L	1	improve qu	anty of care at the		
Employment Grade				•Involving health workers	•		improve use	e of other healthcar	e services in ad	dition to
Professional	28 (13.9%)	10 (6.2%)		malaria treatment and prev			c	_		
Clerical	59 (29.2%)	35 (21.7%)		>IPTp-SP is an effective practical strategy to reduce risk of malaria and anemia among pregnant women l					n living in	
Skilled	68 (33.7%)	57 (35.4%)	0.004	malaria endemic areas such as	s Ghana.					
Unskilled	45 (22.3%)	51 (31.7%)				Recomme	endatio	า		
Unemployed	2 (0.9%)	8 (5.0%)		≻Further studies to assess eff					and placental r	oarasitem
Socioeconomic Statu	15			is measured.	•		~		1 I	
Low Income	127 (62.9%)	129 (80.1%)	~ 0 001	► Evaluation of other drug co		▲	1			
Middle Income	75 (37.1%)	32 (19.9%)	< 0.001	► Evaluate and monitor effect		▲		Ŭ		•
Table 2. Effect of interview	ermittent preventiv	e treatment with SP	on malaria	 Continuing education and the pregnancy and in particular II Supervise activities of healt 	PTp strategy a	nd DOT schem	е.			
Variables	IPTp-SP Users $(N = 202)$	Non-IPTp-SP Users $(N = 161)$	p-Value	Funding Support CDC Reproductive Epidemiological Grant to MSM						
Malaria	·	·		Minority International H NIH Grants – NIH-RCM	-		U	ý U		v
Positive	31 (15.3%)*	72 (44.7%)		NIH Grants – NIH-RCM	1 (KKUJUJ4),	INTERINT GIVI-IVI	DR2 (200)	GIVIU0240) & INIE	1-FIC (K211W	vv0 ð 04-U
Negative	31 (15.3%) ** 171 (84.7%)	89 (55.3%)	< 0.001	References 1. World Health Organization, 2004.			7. World Heal	Ith Organization, UNICEF	F, 2003. Africa Malaria	a Report.
				 Brabin B, 1997. Afr. Health 19: 19 Desai et al., 2007. Lancet Infect D 	9-20		8. Parise et al	., 1998. Am J Trop Med H al., 1999. Lancet 353: 63	yg 59: 813-822	-
*Resistance to SP among p Journal of Infectious Disea	• • • • • • • • • • • • • • • • • • •	asi was 73% - Mockenha	upt et al., 2008	 Jesar et al., 2007. Lancer Inject D Steketee et al., 2001. Am J Trop M Gomez P, Kinzie B, 2002. Section Geelhoed et al., 2001. Int J Gynae 	Ied Hyg 64: 28-35 n Two: Antenatal Cat		 Kayentao e Salihu et al 	al., 1999. Lancet 353: 03 et al., 2005. J Infect Dis 19 ., 2002. Trop Med Int Hea al., 2005. Trop.Med.Int H	91: 109-116 alth 7: 29-34	

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