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Prevalence of Risk Factors Associated with Placental Malaria in Observational Study in Kator Primary Health Center South Sudan

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Abstract

Introduction: Civil unrest, public health system fragility and community mass relocation had played major roles in development of Placental Malaria Parasitization. This study aimed to measure and identifies risk factors associated with placental malaria infections in Kator primary health center.

Methods and Materials: 115 enrolled pregnant women in cross-section survey after signing consent form using observational technique tools in one year period. ABO, peripheral blood antigen detection for malaria parasites using RDT kits and quantitative questionnaire information were obtained at recruitment phase while second peripheral blood for placental malaria parasites species applying RDT, placental weight and baby weight were measured after delivery as phase two. SPSS version 26 was applied with 0.005% P-value and CI 95%.

Results: Out of 115 recruited pregnant women only (86.0%) 99 reached delivery room. With 29 primigravidae, 23 secundigravidae and 47 multigravidae; primigravida OR 95%CI 2.4 (1.73-5.64) P-vale 0.00013 and secundigravida with OR 95% CI1.8 (1.23-2.93) P-value 0.00072 and multigravida with OR 95% CI 1.5 (0.91-3.45) P-value 0.83. untreated bed net with OR 95% CI 1.4 (1.12-3.08) P-value 0.00053 and shared bed net at night with OR 95% CI 7.4(5.18-17.32) P-value 0.00027. Low birth weight, low placental weight and blood group O were not associated with placental malaria. Overall Placental Malaria prevalent was 26.3%.

Conclusion: in this study, elevated placental malaria was recorded in Kator area of South Sudan. Doubling efforts to reduce placental malaria infections and its adverse clinical complications a new strategy to control the syndromic effects of the disease is required.

Keywords: Placental Malaria; Pregnancy; Delivery Outcomes and South Sudan

Abbreviations

CSA: Chondroitin Sulphate A; SP: Sulfadoxine-Pyrimethamine; EIR: Entomological Infected Rate; RDT: Rapid Diagnostic Tests; HRP2: Histidine-Rich Protein2; PLDH: Parasite Lactate Dehydrogenase.

Introduction

Placental Malaria is the main preventable syndromic threat to both pregnant mothers and new-born babies within the African continent, causing 10,000 maternal deaths and nearly 200,000 infant fatalities on yearly basis [1]. Plasmodium falciparum causes the highest rates of complications and deaths in both tropical and sub-tropical areas where mosquitoes' vectors are easily in contact.

Malaria in pregnancy is a global health issue. Out of 248 million pregnancies each year, 157 million pregnancies live in malaria endemic areas and 122 million women get pregnant in malaria unstable transmission areas. Furthermore, several studies indicated that at least 1 in 4 pregnant mothers develops peripheral malaria parasites that lead to placental malaria Parasitization [2]. This condition happens when the parasite-infected red blood cells sequestered in the intervillous spaces of the placenta posing great health risks for both mother and the baby such as maternal anaemia, low birth weight, prematurity and fetal death [3].

Normally, placental associates with adverse severe consequences includes anaemia and fatality for both the mother and the fetus as a result of morbid intrauterine growth retardation, miscarriage, preterm delivery and low birth weight [4,5]. In addition, there were an estimation of 1.4 million stillbirths, 33.5million induced abortions and 16.1million spontaneous abortion [6,7].

In some extreme situation, pregnant mothers may develop placental malaria Parasitization in absent of peripheral blood malaria, this form of disease presentation is more associated with maternal anaemia, physical emaciation and vaginal bleeding [1]. Furthermore, primigravidae tend to acquire placental malaria Parasitization more as compared to secundigravidae and multigravida due to Chondroitin Sulphate A (CSA) binding mechanism [8,9]. However, maternal-fetal malaria parasite transmission may occur in form of congenital malaria particularly among low immunity pregnant mothers [10].

South Sudan is a known endemic area for malaria mainly due to its equatorial climate which attracts mosquitoes vector breeding seasonality. Malaria remains a disease of public health significance in South Sudan, a major cause of illness and death, particularly among pregnant women and children under five years of age. Furthermore, South Sudan has one of the highest mother and child indicators in the world. For instance, in 2023 the maternal mortality ration was estimated at 1,223 deaths per 100,000 live births which is the highest globally [11,12]. This high maternal mortality pushes primigravidae to the highest number of deaths among other gestational age group.

Healthcare delivery system is extremely weak especially in peripheral areas of South Sudan due to continuous civil unrest and massive population migration. Central Equatoria state receives more malaria cases than any state in South Sudan simply because all secondary and tertiary medical care is based in Juba town which is the capital of the country [13]. From 2013 till 2018 South Sudan experienced waves of humanitarian crises such as political violence and seasonal flooding forcing many local communities to leave their original villages and sub-counties seeking refuge either internally or externally as refugees in neighbouring countries. Moreover, disease outbreaks including the Covid 19 pandemic further strained the already weak health system. Moreover, malaria control efforts within South Sudan faces significant challenges including the on-going humanitarian crises, limited donor funding and the potential effect of climate change on the spread of the disease to meet the SDG's. In order to meet the SDGs, the Malaria Control Program in the Ministry of Health had identified several strategies to reach its ambitious goal of reducing malaria mortality and morbidity by 80%. These selected interventions are based on evidence generated locally and include: public health interventions (indoor sprays, larvicidal sprays and health education model for pregnant women); malaria case management (blood screening & medicines prescriptions); and personal protective measures (Long lasting treated bed net, insecticide treated bed net, mosquitoes' repellents) and finally regular distribution of Sulfadoxine-pyrimethamine (SP) during routine ANC visits.

In 2022 placental malaria accounted for 29.3% in Juba town alone with daily malaria cases consultations reaching up to 35% nationwide [12]. This study was initiated to explore the risk factors associated with placental malaria Parasitization and its unwanted delivery outcomes among South Sudanese population from Central Equatoria state in Juba.

Methods and Materials

Study Site

This observational descriptive survey was healthcare facility-based cross-sectional technique targeting Antenatal clinic services for pregnant women attending regularly at Kator primary health center from June 2017 September

2018 covering all active and non-active seasons for mosquitoes. Juba town lies between latitude and longitude 4^0,51,'0" N/31^0, 36', 0" N with average rainfall between 1200-1600mm annually. Furthermore, South Sudan has recorded fertility rate 4.47 per woman and birth rate of 33.406 births per 1000 people in 202315. The local area hosts 7% of total population are pregnant women. There are no convincing records on Entomological Infected Rate (EIR) on annual basis which could give a clue on daily human biting rate within Juba town.

Kator primary health located South Juba town with a population of 73,000 inhabitants both rural and urban [8]. Furthermore, malaria caseload per year is between 20-40% of daily health facility visits and 30% account for malaria hospital admissions.

Sample Size

By applying Yamane formula with margin error 0.05 and population of pregnant women 7% out of 73,000 inhabitants.
The formula: $n=N/\{1+N \times (e)^2\}$
Where:
n= proposed sample size
N = known local population census
e = Margin of error, e = 0.05 according to study research
finally, = 5,110/26 = 196

Inclusion Criteria

All South Sudanese confirmed pregnant women are eligible while attending ANC services in regular bases except those who had been diagnosed with severe medical disease such as HIV/AIDS, Obstetric complication or high-risk pregnancy, refused to sign consent form or has intention to drop or default from the study before reaching the delivery phase.

Sampling Techniques

The study was an observational follow-up research project with two phases of recruiting pregnant women including ANC enrollment and delivery room enrolment by using random sampling among weekly ANC visitors at Kator primary health center.

Sample Data Collection

Pregnant women were enrolled after active explanation on the study objectives and risks may encounter. Four health professionals were trained for 3 days on the study protocol at South Sudan college of Midwifery then a pilot study was done in another primary health to test the research questions and the Rapid Diagnostic Tests (RDT) kits reading and application exercises. Moreover, obtaining a signed consent form before conducting any research activities was mandatory. All pregnant women accepted to participate were recruited regardless of their age, education, socio-economic profile and religious background.

In phase one at the ANC a structural questionnaire was filled by each pregnant followed by withdrawal of 2ml of capillary in the left index for peripheral malaria antigen detection using HRP2 (Histidine-Rich Protein2) using RDT kits and finally 3ml of blood for ABO antigens for both blood group and blood type. while in phase two at the delivery room a second consent form for second check for peripheral malaria, placental malaria parasites species identification using PLDH (parasite lactate dehydrogenase), baby weight and placental weight. All positive malaria cases at ANC and delivery were given recommended antimalaria therapy immediately without delays.

Quality Assurance

All dried blood samples RDT were checked by public health laboratory experts' team in Juba for second cross checking on how qualitative RDT reading for both invalid and wrong reading a month before data analysis.

Ethical Clearance

The study protocol project plan was initially granted approval by South Sudan ministry of health under directorate of planning and research dated 21/June/2015 and final approval for data publication with Ref MOH/RERB/P/003/202.

Data Analysis

The study applied SPSS software version 26 for data analysis where two measures of statistics were used include measure of statistic stability 95% CI and measure of association odd ratio and mean different. Chi-square test was applied to check the different between frequencies observed and the expected frequencies; P-value < 0.05 was used to test significance while T-test was used to compare means of two independent or unrelated groups together with Fleiss multirater Kappa to rule data bias and the level response variable agreement. Moreover, univariate analysis helped in checking assumption of normality in two variables; logistic regression was used to examine the association of independent variables and dependent variables. Furthermore, variables with P-value <0.1 in bivariate analysis were further underwent multivariate analysis to rule out confounding effects. The prevalence of placental malaria infection was done by positive placental malaria parasites/study population x 100%.

Results

Study Population Characteristics

A total of 99 out of 115 pregnant women were followed from the first day of pregnancy confirmation till delivery using study protocol criteria of inclusion and exclusion to assess the data cleaning and validity before final analysis phase. 99 new delivered mothers filled and signed the second consent to allow 99 babies to be weighted together their placentae too in separate digital weighting scale. The mean (SD) of the age was 15.6 (6.6) years with 29(29.3%) primigravidae, 23 (23.2%) secundigravidae and 47 (47.4%) multigravidae. 71(71.3%) aged below 25 years old and 28(28.7%) aged above 25 years old, 54 (54.5%) reported as local residents and 45 (45.5%) declared as forceful displaced persons. 90 (90.9%) reported formal primary school education and above while 9 (9.1%) declared never attended formal school, 68 (68.7%) reported possess mosquito treated bed net and 31 (31.3%) reported not possessing mosquito treated bed net.

Demographic Factor Associated with Placental Malaria

Out of 71 new delivered women with age below <25 years only 15 had positive placental malaria with OR 2.3 (1.8-3.21) P-value 0.0016 using univariate analysis and OR 1.6 (1.24-2.89) P-vale 0.00047 using logistic regression, 29 primigravidae only 10 had positive placental malaria with OR 3.1 95% (2.8-6.91) P-value 0.009568 reported untreated bed 17 had positive placental malaria; those who reported to possess mosquito treated bed net had 17 (68%) cases of positive placental malaria parasites and those who reported to sleep in a shared bed net had 25 (96%) cases of placental malaria as indicated in the below Table 1.

Demographic Risk Factors Associated with Placental Malaria using Both Univariate and Logistic Regression Analysis							
S/N	**Characteristics**	**Total N**	**Placental Malaria N%**	**Univariate analysis OR CI 95%**	**P-Value**	**Logistic Regression analysis OR CI 95%**	**P-Value**
1	**Age**						
	<25	71	15 (57.6)	2.3 (1.8-3.21)	0.0016	1.6 (1.24-2.89)	0.00047
	>25	28	11 (42.4)	1.2 (1.3-2.45)	0.0021	1.1 (1.06-1.95)	0.00051
2	**Parity**						
	Primigravida	29	10 (38.4)	3.1 (2.8-6.91)	0.0095	2.4 (1.73-5.64)	0.00013
	Secundigravida	23	9 (34.6)	2.7 (1.24-3.46)	0.0054	1.8 (1.23-2.93)	0.00072
	Multigravida	47	7 (26.9)	0.1 (1.3-0.79)	0.177	1.5 (0.91-3.45)	0.853
3	**Participants**						
	Local residents	54	16 (61.5)	4.2 (1.9-3.83)	0.0019	3.01 (1.46-2.77)	0.00058
	Forceful displaced	45	10 (38.5)	1.8 (1.91-4.56)	0.0003	1.5 (1.37-2.81)	0.00021
4	**Education**						
	Primary and above	90	23 (88.5)	3.2 (2.74-5.18)	0.0045	1.7 (1.38-3.22)	0.00093
	Never attended	9	3 (11.5)	0.1 (0.72-1.087)	0.13	2.7 (0.66-3.19)	0.337
5	**Type of bed net**						
	Treated bed net	68	17 (65.4)	5.4 (2.01-6.23)	0.0001	3.7 (1.95-5.28)	0.00044
	Untreated bed net	31	9 (34.6)	1.7(1.91-4.97)	0.0037	1.4 (1.12-3.08)	0.00053
6	**Net occupants**						
	Shared bed net	91	25 (96.2)	11.6 (6.08-20.1)	0.0048	7.4(5.1-17.32)	0.00027
	Non-shared bed net	8	1 (3.8)	0.4 (0.11-3.01)	0.016	0.7 (0.01-1.29)	0.381

Table 1: demographic factors associated with placental malaria.

Public Healthcare System Factors Associated with Placental Malaria

17 out 80 study participants reported to attend health educations sessions during ANC services had positive placental malaria with OR 2.9 CI 95% (1.7-3.21) ,P-value 0.0013 using univariate analysis and OR 2.2, CI 95% (1.4-3.19) ,P-value 0.0 0063 applying logistic regression analysis .19 out of 52 who claimed they were knowledgeable about existence of placental malaria during pregnancy with devastating effects on both mother and new-born had placental malaria OR 2.7 CI 95% (2.2-3.46), P-value 0.0054 with univariate analysis and OR 1.6 CI 95% (1.6-1.3-2.95), P-value 0.00076 as indicated in the Table 2 below

Public Healthcare System Factors Associated with Placental Malaria							
S/N	**Characteristics**	**Total N**	**Placental Malaria N%**	**Univariate analysis OR CI 95%**	**P-Value**	**Logistic Regression analysis OR CI 95%**	**P-Value**
1	**Health Education**						
	Attended	80	17 (65.4)	2.9 (1.-3.21)	0.0013	2.2 (1.4-3.19)	0.00063
	Not attended	19	9 (34.6)	1.7 (1.3-2.45)	0.0021	1.2 (1.1-2.27)	0.00041
2	**Placental Malaria Knowledge**						
	Sure	52	19(73.0)	2.7 (2.2-3.46)	0.0054	1.6 (1.3-2.95)	0.00076
	Not sure	47	7 (27.0)	0.1 (1.3-0.79)	0.078	1.4 (0.2-3.08)	0.089
3	**Mosquito net type**						
	Treated	68	17(65.4)	4.2 (1.9-3.83)	0.0019	3.7 (1.5-2.67)	0.00025
	Untreated	31	9 (34.6)	1.37 (1.9-4.56)	0.0003	1.6 (1.3-3.23)	0.00012
4	**Indoor Sprays**						
	Received regular	51	18 (69.2)	2.2 (1.7-4.18)	0.0045	1.7 (1.8-3.09)	0.00045
	Not received	48	8(30.8)	0.33 (1.0-0.41)	0.0111	2.0 (0.19-5.03)	0.0198
5	**SP Distribution**						
	Taken & completed	68	17 (65.4)	5.4 (2.0-6.23)	0.0001	4.7 (1.5-5.88)	0.00082
	Never Taken	31	9 (34.6)	1.72 (1.9-4.97)	0.0037	1.6 (1.1-3.03)	0.00057
6	**Placental weight**						
	>500g	78	19 (73.1)	5.8 (1.9-3.71)	0.00031	3.9 (1.4-2.77)	0.00028
	<500g	21	7 (26.9)	1.7 (0.2-3.04)	0.813	1.2 (0.9-2.45)	0.0166
7	**Baby weight**						
	>2500g	75	20 (76.9)	6.1 (2.5-9.03)	0.00094	5.1 (1.7-6.09)	0.00074
	<2500g	24	6 (23.1)	0.21 (0.2-1.83)	0.121	2.4 (0.8-2.35)	0.187
8	**Domestic animals**						
	Yes	42	12 (46.2)	1.9 (1.4-3.28)	0.00035	1.3 (1.5-2.88)	0.00033
	No	57	14 (53.8)	2.3 (1.9-4.11)	0.00012	2.0 (1.1-3.06)	0.00059
N Number, OR Odd Ratio, CI Confidence Interval, N% Number with percentage using SPSS Version26							

Table 2: public health system factors associated with Placental malaria.

Blood Screening Parameters Associated with Placental Malaria

15 out of 74 with negative peripheral malaria at the enrollment during ANC services had placental malaria with OR 3.6 CI 95% (1.9-5.21) P-value 0.00096 on univariate analysis and OR 2.9 CI 95% (1.3-4.95), P-value 0.000271, as per below Table 3.

Blood Screening Parameters Associated with Placental Malaria							
S/N	**Characteristics**	**Total N**	**Placental Malaria N%**	**Univariate analysis OR CI 95%**	**P-Value**	**Logistic Regression analysis OR CI 95%**	**P-Value**
1	**Enrollment BFFM**						
	Negative	74	15 (57.6)	3.6 (1.9-5.21)	0.00096	2.9(1.3-4.95)	0.000271
	Positive	26	11 (42.4)	2.1 (1.3-4.15)	0.00072	1.8(1.13-3.57)	0.000138
2	**Delivery BFFM**						
	Negative	69	17 (65.3)	4.0(2.1-8.35)	0.00028	3.21(1.52-6.75)	0.000195
	Positive	30	9 (34.7)	1.5(1.06-3.78)	0.00013	1.47(1.17-2.23)	0.000731
3	**ABO**						
	O Blood group	35	8 (30.8)	1.4 (0.9-3.83)	0.0119	1.12(0.08-2.78)	0.0367
	Other blood group	64	18 (69.2)	1.37 (1.91-4.56)	0.0003	1.39(1.11-3.01)	0.00088
N Number , OR Odd Ratio, CI Confident interval, N% Number with percentage using SPSS Version 26							

Table 3: Blood screening parameters associated with placental malaria.

Descriptive Statistics on Main Significance Variables

The main selected independent and dependent variables of significance influence on the development of placental malaria Parasitization within the study population using mean different distribution as per Table 4 below

Posterior Distribution Characterization for One-Sample Mean						
	N	**Posterior**			**95% CI**	
		Mode	**Mean**	**Variance**	**Lower Bond**	**Upper Bound**
Parity	99	1.71	1.71	0.002	1.61	1.8
Abortions	99	1.89	1.89	0.001	1.83	1.95
Placental Parasites	99	1.26	1.26	0.002	1.17	1.35
RDT Recruit	99	1.27	1.27	0.002	1.18	1.36
RDT Del	99	1.3	1.3	0.002	1.21	1.4
Prior on Variance: Diffuse. Prior on Mean: Diffuse.						

Table 4: selected dependent & independent variables for mean different significance for placental malaria.

Descriptive Distribution of Placental Plasmodium Parasites Species

There were 26/99 different plasmodium species detected in this study through applying pLDH (parasite lactate dehydrogenase) RDT kit Multigravidae had reported (6)six with St. D 0.661 P. Falciparum, Secundigravidae received 5 (five) with St. D 1.034 P. Falciparum and Primigravidae detected (4) four with St. D 0.867 P. Falciparum as indicated Table 5 below.

Placental Parasites Distribution among Parities Group									
Placental Parasitesa		B	Std. Error	Wald	N	Sig.	OR	95% Confidence Interval for OR	
								Lower Bound	Upper Bound
P. Falciparum	Parity	-1.576	0.448	12.341		0			
	Primigravida	-0.129	0.705	0.034	5	0.855	0.879	0.221	3.497
	Secundigravida	0.276	0.643	0.185	3	0.667	1.318	0.374	4.647
	Multigravida	0b	.	.	4	.	.	.	.
P. Malariae	Parity	-3.367	1.017	10.961		0.001			
	Primigravida	0.276	1.442	0.037	2	0.848	1.318	0.078	22.263
	Secundigravida	0.969	1.257	0.595	2	0.441	2.636	0.224	30.969
	Multigravida	0b	.	.	1	.	.	.	.
P.Vivax	Parity	-3.367	1.017	10.961		0.001			
	Primigravida	0.969	1.257	0.595	2	0.441	2.636	0.224	30.969
	Secundigravida	0.969	1.257	0.595	2	0.441	2.636	0.224	30.969
	Multigravida	0b	.	.	1	.	.	.	.
P.Ovale	Parity	-22.366	9990.74	0		0.998			
	Primigravida	0.035	0	.	1	.	1.035	1.035	1.035
	Secundigravida	19.275	9990.74	0	2	0.998	2.00E+08	0	.c
	Multigravida	0b	.	.	1	.	.	.	.

Table 5: plasmodium parasites distribution among parity group.

Discussion

These results recorded placental malaria prevalence at the delivery room at the Kator primary health center to be 26.3%. This is the low compared to 29.3% prevalence of placental malaria at other primary centers within Juba town. Some neighbouring Countries to South Sudan reported high prevalence of placental malaria within all gestational age groups or parities such as 58.9% of prevalent of placental malaria in Sudan, Kenya reported placental malaria prevalence 27% and Uganda recorded 39% [14]. These conflicting reports within East African region alone could be due to several factors include acquired immunity status, mosquito vector biting, malaria parasite transmission, and animal husbandry [15]. Furthermore, National Malaria Control programs through international donors made more efforts to address issues related to regular distributions of treated mosquito bed nets, availability of antimalarial medicines for prophylactic and therapeutics indications still 63% of outpatient consultations are attributed to malaria in many tropical countries within African continent [3,8].

These study findings had encountered some geographical and social challenges that might affect interpretations such as inaccessibility of the health facility to many pregnant women specially those who stay at peripheries of Juba Town, lower socio-economic background, high cost for mobility to receive free medical services, poor hosing constructions and high illiteracy rate among pregnant mothers.

Several studies around the globe recorded, pregnant women dissatisfaction to repeat use of intermittent preventive treatment during ANC services on monthly visits [11]. Others, reported compliance issues regarding use of Sulfadoxine pyrimethamine preventive therapy such as the medication taste, size and others [16]. Within East African region, some studies revealed mosquito bed and sleeping time linked to placental malaria specially sleeping in late hours from 11:00pm [4]. Furthermore, transmission pattern, individual acquired immunity status, malaria vector inoculation rate and public health system fragility are main factors for malaria endemicity in both tropic and sub-tropic countries. Moreover, mosquito treated bet net alone doesn't reduce the prevalence of placental malaria except other component of preventive strategies are also in place such as regular peripheral blood surveillance for malaria during pregnancy [14].

Interestingly, these findings had revealed elevated prevalence of placental malaria Parasitization with plasmodium parasite density in maternal age below 25 years, parity, failure to use Sulphadoxine-pyrimethamine oral therapy and failure to apply insecticide treated bed nets. This study recorded some significance factors associated with placental malaria to be shared with National Malaria programs for implementation to safeguard smooth pregnancy at endemic areas.

Other studies reported SP therapy doesn't cure placental malaria; this raises questions on malaria parasites resistant proteins could be developed by mutated plasmodium parasites in recent years [16,17]. This study results recommended that negative peripheral malaria parasites test during gestational period; contribute significantly to placental malaria parasites. Mosquito bed net use and non-compliance intermittent presumptive treatment was associated more specifically placental Malaria parasites during delivery.

This study didn't address pathological classifications of placental tissue to determine the time of malaria parasites infections, nor measure haemoglobin level to check on anaemic status of each study participant. Moreover, the study protocol didn't check on some blood protective parameters such as HLA, Glucos-6 phosphate dehydrogenase deficiency and sickle cell trait. In addition to, the study didn't apply PCR to check placental malaria as the gold standard for parasitic identification.

Conclusion

This cross-sectional prevalence survey revealed that, placental malaria still a public health threat the lower the age of the pregnant woman, the more likely she will receive placental malaria in the study population within South Sudan. Moreover, negative peripheral blood for malaria was a risk factor for placental malaria in Kator primary health center in Juba.

Recommendations

Interestingly this study shared some findings as follows: (I)There was high prevalence of Placental Malaria Parasitization during both pregnancy and delivering rooms in the study participants in Juba, South Sudan. (II)Prevalence of circulating Plasmodium antigen is significantly associated with Plasmodium Falciparum infection during pregnancy and delivering among internal displaced women origin. (III)The study significantly observed the high prevalence of asymptomatic peripheral Malaria infections at both ANC and DRs; Taken together, these observations are quite indicative and emphasize the need for active malaria case management during ANC visit in the areas of stable transmission. Additionally, in view of the sizable population at risk in this malaria endemic region of South Sudan, study is suggesting few priority practice amendments and reorientation of policies for Placental Malaria prevention strategies: (a)There is an urgent request to speed up insecticide treat bed availability, use, and awareness both in pregnant women community and health workers. (b)Distribution of insecticide treated bed nets at first ANC visit will be promotive approach for placental malaria control strategy. (c) Health policymakers must pick up early malaria case investigation and management for all asymptomatic presentations during pregnancy by building up the importance of active and passive malaria surveillance strategy in endemic settings. (d) In view of the asymptomatic prevalence of Plasmodium Vivax, there is a dire need to move ahead in strengthening and emphasizing the drastic malaria screening exercises, daily therapeutic intervention when required, and safe medical facilities at the community primary health care centres levels.

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Competing of Interest

The authors had declared, that there wasn't any conflicting interest behind this study

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