ISSN:2584-2706 DOI: https://doi.org/10.67317/IJMSRT26SEP107

Prevalence and Stratification of Maternal Anemia Secondary to Gestational Malaria: A Decade Retrospective Assessment

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Abstract

Background: Maternal anemia is a severe pathophysiological consequence of Plasmodium falciparum infection during pregnancy. This study determines the specific prevalence and structural distribution of maternal anemia among malaria-infected pregnant women at Plateau State Specialist Hospital (PSSH).

Methods: Utilizing data from a 10-year retrospective window (2012–2022), hematological variables—specifically Packed Cell Volume (PCV) values—were extracted from the records of n=122 confirmed gestational malaria cases within a baseline population of N=1,000. Anemia was defined as PCV <30%.

Results: Out of the total cohort, 109 women presented with clear clinical anemia, establishing a point prevalence of **10.9%** (or **11%** within the global population), meaning **89.3%** of the malaria-positive patients were concurrently anemic. Genotypic distribution among the cohort showed that 73.7% were Genotype AA, 9.0% were AS, and 17.3% were homozygous SS.

Conclusion: Severe hematological depletion is an almost universal complication among malaria-positive pregnant patients at PSSH. Protective policies, including early iron/folate therapies and aggressive intermittent preventive therapy, must be optimized.

1. Introduction

The pathogenesis of maternal anemia during gestational malaria is multi-factorial. It involves the direct mechanical destruction of parasitized erythrocytes during the asexual erythrocytic stage of the Plasmodium life cycle, the immune-mediated clearance of uninfected red blood cells by the spleen,

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and bone marrow dyserythropoiesis driven by sustained inflammatory cytokine production (e.g., Tumor Necrosis Factor-alpha and Interferon-gamma).
Maternal anemia increases risks for cardiovascular failure, postpartum hemorrhage, and maternal mortality. In malaria-endemic regions of Nigeria, evaluating the precise intersection between positive parasitemia and red cell volume deflation is essential for improving clinical pathways. This manuscript isolates the burden of anemia within the structural framework of the PSSH 10-year cohort.

2. Methodology

The methodology shares the baseline framework of the comprehensive 10-year retrospective analysis at PSSH (2012–2022). For this manuscript, focus was placed on:
Hematological Indicators: Extraction of baseline Packed Cell Volume (PCV) levels recorded at the time of positive malaria diagnosis. Anemia thresholds were set below 30% PCV.
Maternal Hemoglobin Genotypes: Stratification of patients based on electrophoresis results (AA, AS, SS) to look for underlying biological vulnerabilities. Data were summarized using descriptive statistics in SPSS version 24.

3. Results

Table 3: Hematological and Genotypic Stratification of the Cohort

Parameter	Category	Frequency (f)	Percentage (%)
Anemic Status	Anemic (PCV <30%)	109	89.3
	Non-Anemic (PCV ≥30%)	13	10.7
	Total Malaria Cohort	**122**	**100.0**
Hemoglobin Genotype	Genotype AA	90	73.7
	Genotype AS	11	9.0
	Genotype SS	21	17.3

Table 4: Total Maternal Complication Incidence Profile (N=1,000)

Complication	Number of Incidents	Percentage of Total Cohort (%)
Maternal Mortality	2	0.2%
Maternal Anemia	109	10.9%
Gestational / Cerebral Malaria	122	12.2%

4. Discussion

The findings reveal a clear link between gestational malaria and red cell depletion: **89.3%** of the patients diagnosed with malaria were also clinically anemic. On a population scale, this translates to a point prevalence of **10.9%** across all ANC registrants.
The high prevalence of the homozygous SS genotype (17.3%) within this malaria-affected subgroup suggests that sickle cell patients face elevated risks for severe malaria and rapid hemolytic crises. This matches findings by Karami et al. (2020), who highlighted sub-Saharan Africa as bearing the highest global burden of pregnancy-related anemia. These results indicate that finding a positive malaria smear during ANC should immediately trigger an assessment for secondary anemia.

AIM

Adverse Fetal Outcomes and Birth Complications Associated with Gestational Malaria: A Chi-Square Association Analysis

Study Implications.

1.Understanding the prevalence and outcome of malaria in pregnancy can inform healthcare policies and interventions
2. Identifying risk factors can help target high-risk population
3 Improving antenatal care and IPTp coverage can reduce maternal and fetal complication

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4.Policy Support: Policymakers should prioritize funding and resources for malaria control programs targeting pregnant women, including the procurement of antimalarial drugs and insecticide-treated bed nets.

Conclusion

Malaria in pregnancy poses significant risk to both mother and fetus. The findings of this retrospective study will contribute to the understanding of burden of malaria in pregnancy and inform strategies to improve maternal and fetal outcomes. Strengthening antenatal care services, increasing IPTp coverage, and promoting preventive measures can help reduce the complications associated with malaria in pregnancy.Effective interventions and policies can be developed to target high-risk populations, ultimately reducing maternal and fetal morbidity and mortality.

Recommendations for future Research

Based on the findings and limitations of this study, several areas for future research are suggested:

1. The health care providers should health educate the pregnant women on the important of routine on antenatal visit and adherence to folic acid and fesolate drugs intake
2. There is a need to health educate the pregnant women on the frequent use of ITN and it benefit in malaria prevention
3. The management of the hospital can give free mosquito net to the pregnant women it will help to curtail malaria in pregnancy
4. The management should ensure prompt and effective management of women diagnose with malaria during pregnancy
5. Government should ensure periodic campaign and sensitization on malaria in pregnancy and it complication on social media

Limitations of the Study

Several limitations should be considered when interpreting the findings of this study:

1.Retrospective Design: The retrospective nature of the study may have introduced bias and limited the availability of certain data variables.
2.Data Quality: The accuracy and completeness of medical records may vary, affecting the reliability of the study findings.
3.Single-Center Study: The study was conducted at Plateau State Specialist Hospital, which may limit the generalizability of the findings to other settings.
4.Confounding Factors: The study may not have accounted for all potential confounding factors that could influence maternal and fetal outcomes associated with malaria in pregnancy.

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