

Malaria in the New-born as Seen at the University of Port Harcourt Teaching Hospital: A Retrospective Review

Yaguo-Ide Lucy Eberechukwu¹, Awopeju Abimbola Temitayo Oluwajenyo²

¹Department of Paediatrics and Child Health, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

²Department of Medical Microbiology and Parasitology, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

Email address:

lucyaguolucy@gmail.com (Yaguo-Ide L. E.), drawopeju@yahoo.co.uk (Awopeju A. T. O.)

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Abstract: Malaria has continued to be an endemic disease of the tropics and subtropics. Malaria in the newborn is a global public health challenge with a high mortality rate in developing countries. A descriptive retrospective study over a 5 years period (2006-2011) conducted at the University of Port Harcourt Teaching Hospital. Information on Socio-demographic data, malaria parasite laboratory result and clinical information were retrieved from the medical microbiology departmental result registry. There was an overall 61% prevalence of malaria in neonates over the five years period with severe malaria occurring in 2.94% of them. Yearly Prevalence of malaria from 2006 to 2008 was 87.66%, 43.83%, and 70.74% respectively. There was about twelve percent decline in prevalence of malaria between 2009 and 2011 from 69.62% to 57.78%. The study demonstrated a high prevalence of malaria in newborn in southern Nigeria, necessitating a need for high index of suspicion, early diagnosis, prompt and appropriate treatment to prevent neonatal mortality.

Keywords: Newborn, Neonate Malaria Parasitemia Prevalence, Severity, Preventive, Port Harcourt

1. Introduction

Malaria is the most important disease caused by protozoa in the tropics. [1] It is caused by the parasite *Plasmodium* sp. In most cases the parasites are introduced into its host through a bite of an infected female anopheles mosquito. Less commonly the disease is acquired congenitally through the placenta, through an infected blood transfusion, Perinatally due to mingling of blood during birth and through needle prick injuries. [1] Globally there are over 270 million new cases of malaria every year. [1] Over 80% of these are in Africa south of the Sahara. Annually there are 1.5-3million deaths from malaria and over 80% of these deaths are in Africa. [1] *P. falciparum* is responsible for 80%-90% of the malaria infections either alone or in combination with other species. [1] Repeated infections with the plasmodium results in development of natural immunity against the parasites. In the neonate, there is a passively acquired immunity from transplacental transfer of IgG from the mother to her fetus and this acquired immunity protects the newborn in the first

few months of life. [1] Infection with *Plasmodium* sp is characterized by common symptoms such as headaches, fever, joint pains and vomiting. [2, 3] In the newborn asexual malaria parasite detected in the cord blood or peripheral blood during the first week of life is termed congenital malaria and is due to transmission from the mother through placenta just before or during delivery [4, 5] while acquired neonatal malaria, which can occur within the first 28 days of life is due to an infected mosquito bite after birth. [4, 5] It is difficult to differentiate between congenital and acquired malaria especially in malaria endemic areas like Nigeria [6]. Several studies in Africa have demonstrated that 7-10% of the newborns may have malaria parasites in their cord blood. [7] Neonatal malaria has been reported to be prevalent in malaria endemic areas such as Nigeria, despite the protective effects of maternal antibodies transferred to the neonate and the protection of the fetal haemoglobin in inhibiting *Plasmodium* sp development in the newborn [8-10]. Incidence of Neonatal malaria has been reported to range from 6 – 20% across Africa [10-13] and from 1.1% to 5.1% across Nigeria [10, 13] Malaria is a serious health challenge,

with serious socioeconomic consequences especially in Nigeria which contributes to about one-quarter of the cases in the malaria endemic countries [10]. A retrospective study of malaria in the newborn as documented in medical microbiology registry of the department of medical microbiology and parasitology of the University of Port Harcourt Teaching Hospital from January 2006 to December 2011 was carried out.

2. Materials and Methods

2.1. Study Area

This study was carried out at the University of Port Harcourt Teaching Hospital (UPTH), Rivers state Nigeria. It is a tertiary health care institution that also attends to referral cases in the Niger-Delta region of Nigeria.

2.2. Study Population

All patients suspected of malaria in the neonatal group were included in the study. While patients above 1 month and patients with incomplete data were excluded from the study.

2.3. Data Collection

Data of the patients suspected of malaria and recommended for laboratory tests were retrieved from the laboratory records of the department of medical microbiology. Demographic data, results of laboratory tests were collected and analyzed with the statistical package for social sciences (SPSS) v20 (IBM, USA).

2.4. Data Analysis

The Chi-square test was used to compare proportion of malaria among the patients according to sex. All tests were carried out at a 95% confidence interval at a significant p-value of ≤ 0.05 with the Epi Info v7 software (CDC, USA).

3. Results and Discussion

3.1. Results

The results showed that the mean age of the patients was 0.25 ± 0.01 month. There were 1883 (55.55%) male patients and 1507 (44.45%) female patients as shown in Table 1.

Table 1. Demographic Distribution of Patients.

Age (Mean \pm S. D)	0.25 \pm 0.01 months	
Sex	Frequency	Percent
Male	1883	55.55%
Female	1507	44.45%
Total	3390	100.00%

SD: Standard Deviation

Figure 1. Shows that 2074 (61%) patients were positive for malaria and 1316 (39%) did not have malaria.

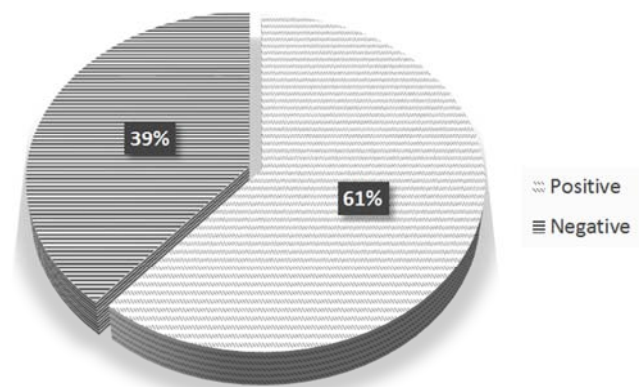


Figure 1. Frequency of Malaria in the Newborn.

Table 2 shows that 1149 male patients were positive for malaria and 734 did not have malaria, while 925 of the female patient had malaria and 582 did not have malaria. There was no significant difference ($p = 0.8304$) in the occurrence of malaria in the patients.

Table 2. Distribution of malaria according to sex.

SEX	Positive (n, %)	Negative (n, %)	Chi-square (p-value)
Male	1149 (55.40)	734 (55.78)	0.048 (0.8304)**
Female	925 (44.60)	582 (44.22)	
Total	2074 (100.00)	1316 (100.0)	

**Difference is not statistically significant ($p > 0.05$)

Table 3 shows the microscopic grading of malaria parasites in the patients. There were 1664 (80.23%) cases of malaria with 1+, 349 (16.83%) with 2+ and 60 (2.94%) had $\geq 3+$ parasitemia.

Table 3. Microscopic enumeration of malaria parasite.

Grading	Frequency (n)	Percent (%)
1+	1664	80.23
2+	349	16.83
$\geq 3+$	61	2.94
Total	2074	100.00%

Table 4 shows that 1117 (97.21%) male patients had mild malaria and 32 (2.79%) had severe malaria. Among the female patients 896 (96.86%) had mild malaria and 29 (3.15%) had severe malaria. There was no significant difference ($\chi^2 = 0.22$; $p=0.6390$) between mild and severe among the patients.

Table 4. Severity of malaria by sex.

Malaria Grade	Male (n, %)	Female (n, %)	Chi-square (p-value)
Mild	1117 (97.21)	896 (96.86)	0.22 (0.6390)**
Severe	32 (2.79)	29 (3.14)	
Total	1149 (100.0)	925 (100.0)	

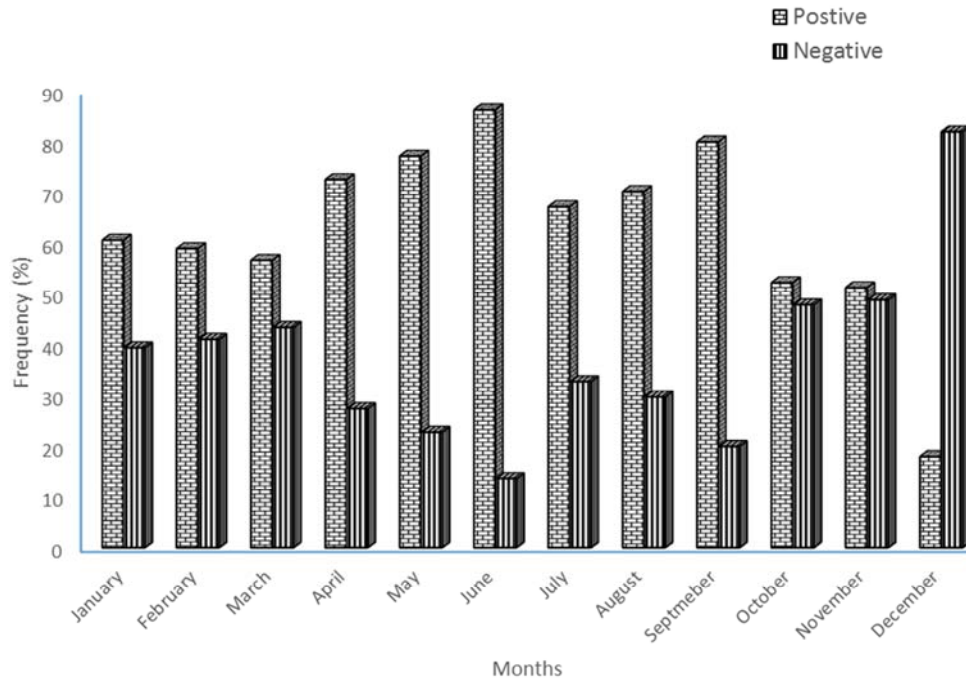
**difference between both groups is not statistically significant ($p > 0.05$)

Among the patients with severe malaria, 30 (49.2%) had Septicemia, 23 (37.7%) had severe anaemia, 5 (8.2%) and 8 (13.1%) other associated symptoms as shown in Table 5.

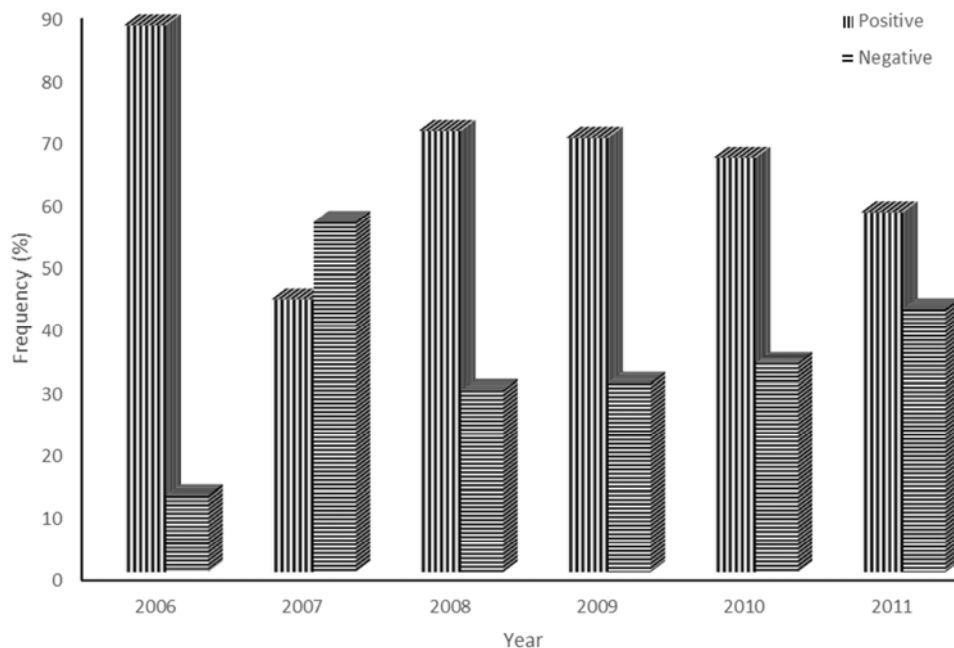
Table 5. Severe Malaria and associated Conditions.

Associated Symptoms	Frequency (n)	Percent (%)
Septicaemia	30	49.2
Severe Anaemia	23	37.7
Others	8	13.1
Total	61	100.0

The prevalence of malaria according to months is as follows: January (60.57%), February (58.92%), March (56.61%), April (72.57%), May (77.20%), June (86.32%), July (67.19%), August (70.21%), September (80.0%), October (52.17%), November (51.20%) and December (18.03%) as shown in Figure 2.

**Figure 2.** Distribution of Malaria according to months.

The distribution of malaria according to the year showed that there were 419 (87.66%) positive case out of 478 in 2006, 636 (43.83%) positive cases were recorded in 1451 patients in 2007, 735 (70.74%) patients of 1039 were positive for malaria in 2008. In the year 2009, 165 (69.62%) of 237 patients were positive for malaria. In 2010, 93 (66.43%) of 140 patients were positive for malaria and in the year 2011, 26 (57.78%) of the 45 patients were positive for malaria as shown in Figure 3.

**Figure 3.** Distribution of Malaria by years.

3.2. Discussions

The prevalence of malaria among neonates in this study is 61% and it is comparable to the prevalence rates between 61.1% and 71.4% as reported in previous studies in southern Nigeria [14-16] similar prevalence rates have been reported in endemic areas, with a high prevalence of malaria in the first three months of life. The occurrence of malaria in neonates have been attributed to congenital malaria as reported by Sotimehin [17]. The presence of parasites in the cord blood of 7-10% of newborns have been reported across Africa, sometimes without a symptomatic evidence of an active maternal infection, suggesting trans placental transfer of parasites to the fetus during pregnancy [18]. These high prevalence rates may result in childhood anemia and some other severe complications such as cerebral malaria and may also be potentially fatal to the infant [19, 20]

About 2.94% of the patients had severe malaria ($\geq 3+$ parasitemia), an indication of prevalence of congenital malaria as documented in similar studies across Africa [20-22]. Malaria in pregnancy has been reported to have a significant association with the occurrence of congenital and neonatal malaria, especially when the pregnant mothers do not receive adequate care and treatment of malaria during the depressed immunity state which is characteristic of pregnancy [21].

Among the patients with severe malaria, the most associated conditions were septicemia and severe anaemia. This is similar to the reports of other studies, indicating that these symptoms could lead to impaired immune responses to other infections especially in neonates with immature immune systems [18-20].

The occurrence of malaria ranged from 56% to 86% between March and July, while there was a decline in occurrence from 70% to 18% between August and December. This is in agreement with the findings of related studies, showing that occurrence of malaria is significantly higher during the period of heavy rainfall in endemic countries of Sub-Saharan Africa [9, 16, 22].

There was a decline in malaria prevalence from 70.74% to 57.78% between 2008 and 2011. This could be due to an improvement in the prevention and management of congenital malaria among pregnant women, based on the improved administration of the intermittent preventive treatment observed from the year 2005 in previous reports [23, 24]. The decline in prevalence of malaria also coincides with the decline in child mortality recorded in the country.

4. Conclusions

The study is a confirmation of malaria in the newborn in South-South Nigeria, and calls for a high index of suspicion and an early screening of neonates for accurate diagnosis and prompt intervention that will prevent potential mortalities. Although malaria occurrence declined steadily from 70.7% to 57.7% between 2008 and 2011. There is a need to intensify efforts of

preventing malaria in new born which will also contribute to the decline of child mortality a few weeks after birth.

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