

# Congenital Malaria Among Inborn And Out Born Babies At A Tertiary Care Hospital In Port Harcourt, Rivers State, South-South Nigeria.

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## Abstract

Congenital malaria is increasingly reported among babies born to mothers residing in endemic areas. Congenital malaria is a major problem in tropical and subtropical countries, it can be transferred vertically from the placenta of an infected pregnant woman to her foetus or perinatally during labour. The aim of this study was to determine the prevalence of congenital malaria in newborn babies delivered in University of Port Harcourt Teaching Hospital and to determine the level of parasitaemia in the mothers and their placentae. The prevalence of congenital malaria was studied in the University of Port Harcourt Teaching hospital from 2009 to 2010. Blood samples of maternal, placental, cord and neonatal blood were taken and malaria rapid immuno-diagnostic tests were carried out using *Plasmodium falciparum* Rapid Test Device. Tick films were examined microscopically for malaria parasite. Neonatal blood samples were collected at birth, on days 3, 5 and 7. Twenty-two (84.6%) out of 26 placental blood samples collected were positive for *Plasmodium falciparum*. For cord blood, maternal blood, and neonatal blood, the following results were obtained; 19 (73%), 13 (50%) and 78 (67.2%). The prevalence rate was 69% and parasite count ranged from 50 to 1020. *Plasmodium falciparum* was the dominant species. All the babies with congenital malaria had infected mothers, placenta and cord ( $p < 0.001$ ). Transplacental transmission of *Plasmodium falciparum* that may lead to congenital malaria is in existence in this locality. Thus direct infection to the foetus could contribute to prematurity, low birth weight, or increased likelihood of early and subsequent infant infections.

**Keywords:** Congenital, Malaria, Neonates, Placental, Parasitaemia

## 1. Introduction

Congenital malaria, defined as the presence of malaria parasite in the erythrocytes or peripheral blood smear of the new born, from 24 hours to 7 days of life (Basipinar et al., 2006) is increasingly been reported among babies born to mothers residing in endemic areas. (Mukhtar et al., 2005). Congenital malaria is a major problem in tropical and subtropical countries, and can be transferred vertically from the placenta of an infected pregnant woman to her foetus or perinatally during labour (Basipinar et al., 2006). Malaria risk in pregnancy is reported to result in maternal deaths and spontaneous abortion in up to 60% of cases, foetal loses, still births and premature births are other outcome of congenital malaria in endemic areas (Emad et al., 2008). Generally, reports on congenital malaria in Nigeria, has not captured the true condition of the disease in Port Harcourt. For example, Mukhtar et al., 2005 observed 15.3% prevalence rate among babies delivered at the University of Lagos Teaching Hospital. Sotimehin et al., 2008 carried out a cross sectional study among 192 live newborns and their mothers in Shagamu, Ogun-State, South-West Nigeria; The prevalence of congenital malaria was shown to be 10.9%. Neither of these, represent the true picture of what is obtainable in Port Harcourt, South-South, Nigeria, a riverine area and a malaria holo endemic region. The current study was carried out to determine the prevalence of congenital malaria in new born babies delivered in Port Harcourt City, and also to determine the level of parasitaemia in their mother and placenta, in view of ensuring that, congenital malaria is considered in the differential diagnosis in University of Port Harcourt Teaching Hospital. Also to emphasize the awareness of the use of chemoprophylaxis, bed nets and adequate treatment for suspected cases of malaria during antenatal periods.

## 2. Methodology

### 2.1 Study Area

The study was conducted in University of Port Harcourt Teaching Hospital, in Port Harcourt, Rivers State, Nigeria. Port Harcourt (4°45'N and 7°00'E/4.75°N, 7°E) has a human population of 1,620,214, characterized by constant rainfall with mangrove/swamp vegetation and it is a highly industrialized city. Over 50% of pregnant women in this city are served by University of Port Harcourt Teaching Hospital. The Hospital has 100 obstetrics and gynecology (O and G) beds, sometimes, occupation can exceed 120 at any given time. Pregnant women that are of term and in labour are admitted to a dedicated ward: The in-patient and outpatient/labour ward. New born babies with minor or major complications are admitted in the Special Care Baby Unit (SCBU) of the pediatrics department. Malaria transmission is seasonal, with peak transmission occurring from April to October.

### 2.2 Study Population

The study population involved 60% of primigravidae and their normal babies, 20% of new borns from SCBU (aged 3 days, 5 days and 7 days). And 20% of multigravidae between the age bracket of 24-45 years and their normal babies. The study was carried out between August 2009 and September 2010. The samples were collected from the labour ward, and post natal ward of the obstetrics and gynaecology department of the hospital and from the special care baby unit (SCBU) of the pediatric department. Written informed consent was obtained from the participants. Information on maternal age, area of residence, parity, history of intermittent presumptive therapy against malaria during pregnancy; as well as baby information on birth weight, and gestation age were collected by trained nurses during ante-natal period. From the SCBU, information on other clinical symptoms such as Neonatal sepsis, Neonatal jaundice, Anaemia, Hypoglycaemia were also obtained prior to recruitment from the open registry. The study excluded mother-neonate pairs that were exposed to retroviral diseases (RVD) and women that had intra uterine fetal death (IUFD).

### 2.3 Sample Collection

Blood samples of study mothers were collected by the project staff nurses from the maternal veins, placental tissues, umbilical cord and through either finger or heel prick of new born infants. Maternal samples were collected by gynecologists when setting hydration lines. Blood sample collected were screened, both quantitatively and qualitatively. For quantitative analysis, rapid immunochromatographic test kit for *Plasmodium* parasites malaria antigen were used (Sotimehin et al., 2008). Blood was added onto the pad at the anterior end or the card. The pad contains antibodies specific to PF HRP 2 (*Plasmodium falciparum* histidine-rich protein-2) antigen in a buffer solution. The buffer solution lyses the blood and the HRP 2 antigens joins with the dye coloured antibody and travels up the strip. About half way up the strip, a second antibody specific to PF HRP2 antigen is impregnated on a line across antibody line, where the dye coloured antigen-antibody was captured. The buffer reagent on the clearing pad clears the lysed blood, leaving a white background against which the captured HRP2 antigens can be viewed as a pink-mauve line, indicating a positive test for *P. falciparum* malaria.

**2.4 Control:-** A positive control is contained on the strip; it is seen as a solid pink mauve line above the test line, for participants test that are negative, only the control line is seen. For qualitative analysis, blood samples from the cord, placenta, Neonates and the mothers were examined in thick blood smear. The thick films were allowed to dry thoroughly (to avoid being washed off) and were dipped in field stain A for 5 minutes, water for 7 minutes, field stain B for 3 minutes and water for 6 minutes. Giemsa stain was also used to compare results of the two stains. The identification of *Plasmodium* sp was undertaken based on specific characteristics, including morphological features with respect to size and shape of infected red blood cell, chromatin dot. Pattern or ring form trophozoites, number of rings formed per cell and the shape and feature of schizonts and gametocytes in peripheral blood as outlined by Fleck and Moody, 1998.

### 2.5 Data management and analysis

For healthy babies, the research was based on the postulation of the null hypothesis  $H_0$  and was tested against the alternative hypothesis  $H_1$ .

$H_0$  = No significant difference exist between the variables.

$H_1$  = Significant difference exist between the variables.

The interpretation of the result therefore, is that for a significant difference to occur at any given degree of freedom (df) and significant level ( $\alpha$ ), the calculated chi-square ( $\chi_c^2$ ) must be equal to or greater than the

tabulated chi-square ( $\chi^2_T$ ) i.e.  $\chi^2_c \geq \chi^2_T$ . The existence of a significant difference between the variables being investigated leads to the rejection of the null hypothesis ( $H_0$ ) while the alternative hypothesis ( $H_1$ ) is accepted. For special babies from SCBU all the information copied from the registry and laboratory records were subjected to  $\chi^2$  descriptive statistical analysis. In all analysis, a malaria case was defined as any infant with positive malaria slide (a sexual stage) irrespective of the parasite density or disease severity.

### 3. Results

A total of 78 cases of maternal, cord, maternal and neonatal blood samples were studied for *P. falciparum* infection in University of Port Harcourt Teaching hospital between the period of August and September 2010. Result from pf rapid test device identified malaria in 20 out of 22 microscopy-positive mothers and out of these 13(65%) were primigravidae, 4(20%) were securidi-gravidae and 3 (15%) multi-gravidae. 19 out of 26 cord blood samples examined were positive for malaria parasite microscopically and 16 showed positive result by MPFRTD. 18 and 9 samples out of 26. Neonatal samples examined tested positive microscopically and by MPFRID respectively. Table 1: prevalence of *p. falciparum* infection as diagnosed by microscopy and malaria pf rapid test device.

Table 1. Prevalence of *P.falciparum* infection as diagnosed by microscopy and malaria pf Rapid Test Device

Samples	Total Number Analysed	Microscopy	MPf RT
Maternal blood	26	84.6% (22/26)	91% (20/22)
Cord blood	26	73.0% (19/26)	84.2% (16/19)
Neonatal blood	26	69.2% (18/26)	50% (9/18)

### 4. Discussion

Studies have shown that congenital malaria (which is one of the three types of recognized malaria, the other being transfusional and acquired) parasitaemia in tropical endemic areas is not rare as supposed by some authors (Mukhtar et al.,2005), (Emad et al., 2008). In this study prevalence of cord malaria as diagnosed by malaria pf rapid test device and microscopy was 16 (61.5%) out of 26 and 19 (73.0%) of 26 cases respectively. Neonatal malaria prevalence by microscopy and PfRTD (*Plasmodium falciparum* Rapid Test Device) were 9 (35.0%) and 18 (69.2%) respectively. This results differs with findings of Kassberger et al., 2000, who reported 1.7 of 37 (46%) of cord blood samples to be positive by PCR, while Grace et al., 2008 diagnosed cord malaria in 61 babies (61%) by PCR. Prevalence differences between these studies could be due to disparity in geographical location. Onset of congenital malaria may be as early as 14 hours to as late as eight weeks of age. Fever, anemia, splenomegaly are some of complication associated with congenital malaria, and are said to occur in 80% of cases (Menendez 1995, Steketee et al.,1996). Reticulocytosis occurs in 50% cases and jaundice in 33% cases. Other features include hepatomegaly, poor feeding, loose motions and failure to thrive. In most cases, the mother has been infected with the parasite during pregnancy (Remington & Klein 1995) and it is more frequent and serious during the first pregnancy, as is also the case in congenital malaria (Mutabingwa et al.,2005). Findings from this study and others (Okolo & Ibanesebhor 1992) suggests that placental malaria especially for primigravidae may increase malaria risk in offspring. In this study, more primigravide were infected with malaria parasite than multigravidae, indicating a greater risk in the former group. These observations were consistent with results of previous studies in malaria-endemic regions where among several factors, gravidity independently influenced the occurrence of placental malaria (McGregor et al., 1983; Fried & Duffy 1998).

Factors such as area of residence, and season of observation, have been implicated to increase the risk of parasitaemia in both mother and offspring, and therefore may confound the analysis of maternal parasitaemia and infant susceptibility (Meuris et al 1993). This is also confirmed in this study as higher prevalence was recorded than the case in Lagos and Shagamu; both in the South-West region of Nigeria and with less water bodies and not so much rainfall annually as compared to Port Harcourt. Low birth weight caused by pregnancy malaria has been estimated to cause 6% of infant deaths in sub-saharan Africa (Rogerson et al., 2003); while antimalarial chemoprophylaxis delivered to pregnant women during the third trimester reduced infant mortality in the Gambia by 18% and 4% among offspring of primigravid and multigravid women, respectively (Greenwood et al., 1993).

## 5. Conclusion

In conclusion, congenital malaria is not uncommon in Port Harcourt nowadays, as there are appreciable high rates of material, placental and cord blood parasitaemia. It is therefore recommended that babies born to mothers with malaria should be screened for congenital malaria; as it is an established finding both from this work and other research work, that both congenital and perinatal malaria are acquired by the transmission of parasitized maternal erythrocytes across the placenta.

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