Full Length Research Paper

Symptomatic and Asymptomatic Neonatal Malaria in Abuja

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Signs and symptoms of neonatal malaria does not differ much from those of neonatal sepsis, this has resulted in non judicial use of anti malaria drugs in newborns suspected of having sepsis because of the increasing reported cases of neonatal malaria in our environment. The study was aimed at determining the prevalence of neonatal malaria among newborns admitted for suspected neonatal sepsis, and to compare their malaria parasitic density with those of the apparently well neonate with a view of ascertaining whether the symptoms from symptomatic newborn were truly as a result of malaria parasitaemia. Blood culture and blood smear (thin and thick) were taken and made from neonates suspected of having neonatal sepsis in the special care baby unit of the University of Abuja Teaching Hospital from August 2007 to December 2009 (18 months study period). Thick and thin blood smear were also taken from well neonates for comparative purposes. The smears were stained with Giemsa and examined by light microscopy for asexual stages of plasmodium, specie identification, and quantification. Of a total 266 neonates admitted for presumed sepsis, 150 were males and 116 females, (m:f ratio of 1.3:1), and among the 272 well neonates recruited, 152 were male and 120 females, m:f ratio of 1.3:1. Their mean age, body weight, and gestational age were 5.1±5.7 days, 2.5±0.87 kg, 36.1±3.5 weeks for neonatal sepsis babies, and 6.7±4.3 days, 3.1±0.35 kg, and 36.7±2.8 weeks for the well neonates, p values >0.05. Malaria parasite was identified in 41.7% of babies with presumed sepsis, and in 12.5% of well babies, p value <0.05. There was however no statistical significant difference in the parasite density among the two groups, 84.7% Vs 88.2% for those with low parasite count, 12.6% Vs 11.8% for moderate parasite count, and 3.0% Vs 0.0% for high parasite count for babies admitted for presume sepsis, and those from the well babies group, p values >0.05. Two deaths (1.8%) were recorded among babies with malaria parasitaemia, one of whom had associated overwhelming sepsis, and the other with high parasite count. Neonatal malaria is common in our environment. Greater number however had low parasite count and had remained asymptomatic. Screening for malaria parasite should be part of septic work up for babies suspected of having neonatal sepsis, but treatment to be reserve to those with moderate to high malaria parasite count.

Keywords: Neonatal malaria, malaria parasite, malaria parasite count.

INTRODUCTION

Neonatal malaria (NM) defined as the presence of malaria parasites (MP) in the peripheral blood smear of a baby in the first month of life was taught to be rare (Covell, 1950; Bruce-Chwatt, 1952). This was as a result of the presence of foetal haemoglobin which retards the growth of MP (Jellife, 1968), the role of placenta in local antibody production (McGregor et al., 1983), the protective effects of the transplacental transferred maternal antibodies (McGregor, 1986), the deficiency of para-aminobenzoic acid in breast milk (McGregor et al., 1983; Mukhtar et al., 2006), the immunological role of spleen (Marsh, 1993) and the under reporting of the disease (Mukhtar, 2007). However, there has been growing incidence of NM in endemic areas with prevalence ranging from 0.3% to 46.7% (Orogade, 2004; Ekanem et al., 2008; Uneke, 2007; Obiajunwa et al., 2005). Reasons being due to: possibility of increased resistance of plasmodium falciparium (PF) to anti-malaria drugs resulting in increase in maternal parasitaemia (Nahlen et al., 1998), increased virulence from altered antigenic determinants (White et al., 1998), antibody dependent cellular inhibition...
of malaria parasite mediated via Fc gama RIIa (Kimberly et al., 2004), mothers on regular malaria chemoprophylaxis having low malaria antibody titers and hence transfer little protective antibody to their newborns (Ogala et al., 1991), and most importantly increased reporting of cases (Mukhtar, 2007).

Neonatal malaria has three types viz, congenital, acquired, and transfusional. Congenital type is the presence of MP in the peripheral blood smear of a new born baby within the first seven days of life (McGregor et al., 1983; Sodeinde et al., 1985), “acquired” results from mosquito bite anytime after delivery when asexual parasitaemia is detected within a minimum incubation period of greater than one week, (Ibhanesebor, 1995), and “transfusional” when malaria parasite is detected in the peripheral blood of a neonate whose peripheral blood film was negative prior to blood transfusion (Thapa et al., 1987; Sodeinde et al., 1985). Congenital malaria (CM) whose prevalence was put at 0–23% (Fischer, 1997; Uko et al., 1999) results from MP crossing the placenta from maternal blood to the fetal circulation. The exact mechanism of this crossing is not known, but damage to the syncytiotrophoblast occurring during active placental infection has been suggested (Larkin et al., 1991; Shulman et al., 2002). This type of malaria has been shown to occur in children of clinically healthy mothers who are delivered in malaria endemic areas (Larkin et al., 1991). In babies of these women with high level of immunity, CM is generally asymptomatic, majority of parasite being rapidly cleared from the infant’s circulation as a result of passive protection of the baby by maternal antibody crossing the placenta, active immunity developing from exposure to soluble malaria antigens in uterus, and high proportion of fetal haemoglobin present in the babies which retards the growth of the parasite (Jellife, 1968), (Shulman et al., 2002).

Neonatal sepsis (NS) defined as a clinical syndrome in the presence of bacteraemia in a newborn in the first month of life may be indistinguishable from NM (Ororogade, 2004; Ekanem et al., 2008; Ibhanesebor, 1995; Obiajunwa et al., 2005), and these has led to the suggestion that screening for MP be included as part of routine investigation in newborn infants with fever, as (Nyirjesy et al., 1993) has reported increased risk of perinatal deaths (RR=7.2), and low birth weight from CM. Early workers have however found some primary attack to be mild, in some instances being confined to a transient asymptomatic parasitaemia (Thapa et al., 1987). The mean incubation period of NM ranges from 1 week to 8 weeks (Thapa et al., 1987), and the parasitic density in babies with parasitaemia is generally low even in those that develop clinical symptoms (Thapa et al., 1987; Shulman et al., 2002). Plasmodium falciparum (PF) is the predominant species causing malaria in endemic area (White, 1998). It is responsible for over 90% of all cases of reported NM, however mixed infection with plasmodium malaria has been reported (White, 1998), and plasmodium vivax is seen in most non endemic areas. Ibhanesebor, 1995; Mukhtar et al., 2006; Quinn et al., 1982). Over prescription of anti-malaria drugs in neonatal period has been a common practice in some centers in malaria endemic and mesoendemic areas because of the increasing reported cases in the area. This study is aimed at documenting the prevalence of NM in neonates admitted into our neonatal ward for NS, and compares their parasitic density with those of well neonates from the child welfare, with a view of ascertaining whether the symptoms from symptomatic group were truly as a result of malaria parasitaemia. The result from this finding, we believe will guide in developing a definite policy on case management of NM in our hospital, and other centers.

SUBJECTS AND METHODS

An 18 months prospective study was carried out at University of Abuja Teaching Hospital (UATH) from August 2007 to December 2008 for the above objectives. All symptomatic neonates with features of NS and admitted into the special care baby unit (SCBU) of the hospital were part of the study. Also part of the study for comparative purposes were well babies from the child welfare clinic (CWC) of our health institution. Excluded were neonates admitted into SCBU with other neonatal conditions other than NS. Blood for culture, total white blood cell count /differentials, and MP were collected from all study patients. Blood for MP was also collected from well neonates attending the CWC of the hospital. Majority of the babies admitted into SCBU were referrals from the neighbouring general, private, mission hospitals, maternity homes, primary health centers and self referrals from home. SCBU is a 32 bed capacity key service ward in our health institution. It is an area where newborns are promptly managed on 24 hour basis, and represents a high volume, high stress service area of the hospital. CWC is well baby’s clinic where infants and young children receive their routine immunized according to the national program on immunization, growth monitoring and health talk on infant and young child feeding is also carried out in the unit. It is opened to the public on a daily basis from 8.00am to 4pm. UATH is a 350 bed capacity tertiary health institution located in the Federal capital territory (FCT), Abuja in the north central zone of the country. It is sub-serving many neighbouring states including Nassarawa, Niger, Kogi, Benue, parts of Kaduna state and FCT, Abuja.

The routine investigation done for neonates suspected of having NS in the SCBU is a sepsis work-up, and total full blood count (TFBC) with differentials. Blood for culture was sent to the laboratory in 2 bottles, one containing glucose broth and the other thio-glycolate medium, and both incubated at 37°C for 48 hours. Growth in either of the medium was sub-cultured on Mc-
of the research in the language they understand best. The research data was coded, privacy protected and confidentiality maintained. Data analysis was conducted using SPSS version 13.5. Tests for associations and differences were done by chi-square analysis. Statistical significance was set at p value < 0.05.

RESULTS

Of a total of 1,032 patients admitted into SCBU during the study period, 266 (25.8%) were admitted for NS. There were 150 males and 116 females (ratio of 1.3:1). The other 766 babies admitted were for other neonatal conditions which includes: admission for observation, HIV exposed babies for antiretroviral drugs prophylaxis, low birth weight babies, small for gestational age, post term deliveries, hypoglycemic babies, surgical conditions, congenital abnormalities, birth asphyxia, neonatal jaundice, etc. 272 well neonates were recruited from CWC (152 males and 120 females, ratio of 1.3:1), table 1. The mean age, body weight (BW) and Gestational age (GA) for babies suspected of having NS were 5.1±5.7 days, 2.5±0.87 kg, and 36.1±3.5 weeks, while those of well babies from CWC were 6.7±4.3 days, 3.1±0.35 kg, and 36.7±2.8 weeks, p values < 0.05.

Table 2 shows MP density in the two groups. Prevalence of NM among total admissions in SCBU was 10.8%. MP was positive in 41.7% of babies admitted for NS, and 12.5% in the other group, p value <0.05. 58.3% and 87.5% of on neonates in the two groups (NS and those from CWC) had no MP in their blood stream, p value also <0.05. While 68.8% of neonates with positive MP among the NS group had CM, 45.2% of those from the CWC also had CM. The mean MP count for babies admitted for NS and those from the CWC did not differ significantly, (682.79±50.3 parasite/µl of blood with a range of 500-3,000 parasite/µl) for NS group, and (465.30±25.7 parasite/µl of blood and a range of 500-1,500 parasite/µl) for the other group, p<0.05. The total percentage among the two groups with low MP count did not differ significantly, 84.9% Vs 88.2% for presume sepsis babies and those from CWC, P>0.05, so also with those with moderate parasitaemia, 15.3% Vs 11.8%,p>0.05.

DISCUSSION

This report from malaria mesoendemic area of north central part of Nigeria documented prevalence on NM among neonates admitted for suspected NS at 41.7%. This was comparable to 35.0% reported by (Ekanem et al., 2008) from Calabar on same group of babies admitted for NS. The 10.8% prevalence of NM for overall
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Table 1: Characteristics of Recruited Patients.

<table>
<thead>
<tr>
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<th>Neonatal Sepsis Babies</th>
<th>Well Babies from CWC</th>
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<tbody>
<tr>
<td>Total no</td>
<td>266 [150] [116]</td>
<td>272 [152] [120]</td>
</tr>
<tr>
<td>Age (days)</td>
<td>5.1±5.7</td>
<td>6.7±4.3</td>
</tr>
<tr>
<td>Wt (kg)</td>
<td>2.5±0.87</td>
<td>3.1±0.35</td>
</tr>
<tr>
<td>Gestational age (wks)</td>
<td>36.1±3.5</td>
<td>36.7±2.8</td>
</tr>
<tr>
<td>Mother’s parity</td>
<td>2.3±1.5</td>
<td>3.4±0.8</td>
</tr>
<tr>
<td>SVD</td>
<td>190</td>
<td>185</td>
</tr>
<tr>
<td>C/S</td>
<td>76</td>
<td>87</td>
</tr>
</tbody>
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SVD: Spontaneous vertex delivery.
C/S: Caeserian section
CWC: Child welfare clinic
{}: Male
[]: Female

Table 2: Comparism of Malaria Parasite Density in Babies Admitted For Neonatal Sepsis and Well Babies from Child Welfare Clinic.

<table>
<thead>
<tr>
<th></th>
<th>NS Babies (%)</th>
<th>CWC Babies (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no of recruited patients</td>
<td>266</td>
<td>272</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Total no with positive MP</td>
<td>111(41.7)</td>
<td>34(12.5)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Total no with negative MP</td>
<td>155(58.3)</td>
<td>238(87.5)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Total no with (500 parasites/ul) of MP</td>
<td>94(84.7)</td>
<td>30(88.2)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Total no with (&gt;500- &lt;1,500 parasites/ul) of MP</td>
<td>14(12.6)</td>
<td>4(11.8)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Total no with (&gt;1,500-3,000 parasites/ul) of MP</td>
<td>3(2.7)</td>
<td>0(0.0)</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

MP: Malaria parasite.
NS: Neonatal sepsis
CWC: Child welfare clinic

admissions in SCBU was also compared favourably to the 5.1% by (Falade et al., 2007) in their multi centered in Nigeria, and also similar to the 8.0% by (Ibhanesebor, 1995) from Benin, and 16.7% by (Kitua et al., 1990) from Tanzania. Several reports have however reported high prevalence of CM in malaria endemic area, ranging from 1.5% in Maputo Mozambique, by (Bergstrom et al., 1993) to 28.2% from Jos by (Egwunyenga et al., 1995), and as high as 46.7% from Ile-Ife by (Obiajunwa et al., 2005), and 28.6% in the present study. All these support the growing trend of neonatal/CM in hyperendemic malaria area which was much earlier taught to be rare in the region.

Congenital malaria may be symptomatic or asymptomatic, and risk of symptomatic type is rare <1% in babies born to women living in holoendemic conditions (Shulman et al., 2002). In the majority of asymptomatic cases, the parasites are rapidly cleared from the infant’s blood from the reasons given previously (Shulman et al., 2002). In the present study, 88.2% of well neonates from the CWC with positive MP in their blood smear had low MP count of 500 parasite/µ/l of blood, and had remained asymptomatic. This supports the findings by (Falade et al., 2007) who also noted that 62.1% of their smear positive newborns in their multi center study had remained asymptomatic. If we extrapolate this finding of asymptomatic low parasitaemia of well babies from the CWC to their counterpart in NS group who also recorded 84.9% of low malaria count among their smear positive patients, one may suggest that only 15.1% of the NS patients with significant malaria parasitaemia may have had true symptoms of malaria, and 84.9% may be over diagnosed. However because of high mortality and morbidity associated with these two disease conditions (NS and CM), and the great similarity in their clinical presentation delayed treatment may worsen outcome, and smear for MP should be part of septic work for newborns with suspected NS so as to identify those with significant malaria parasitaemia for anti malaria treatment.

The clinical manifestation of congenital malaria although occasionally seen within the first few hours of birth are typically delayed until an infant is several weeks of age (Marsh, 1993). The prolong interval between the onset of clinical symptoms may be explained by the present of protective transplacental acquired maternal antimalaria antibody (Marsh, 1993; Mukhtar, 2007). It is said that when such antibody is present in sufficient concentration, as in infant born to an immune mother, parasite replication may be prevented or attenuated (Marsh, 1993). Preterm newborn babies who do not benefit from such passive immunity may manifest clinical
signs and symptoms earlier than the full term babies. In the present study, 41.2% of babies with significant malaria parasitaemia were preterm deliveries. Achidi et al. (2005) made a similar observation in their study population when they noted that neonates born with malaria-positive placenta had a significantly higher incidence of LBW. The higher malaria parasitaemia seen in preterm deliveries may have been as a result of reason stated above (inadequate transferred of passive protective maternal transplacental antimalaria immunoglobulin). Similarly, primigravidae have also long been noted to have increased susceptibility to malaria than their multigravidae counterpart (Ekanem et al., 2008; Uneke, 2007; Ibinheseseor, 1995; Obijaunwa et al., 2005; Achidi et al., 2005). The apparent reason for this is poorly explained why multigravidae are less susceptible to malaria infection than primigravidae.

CONCLUSION
Neonatal malaria is common in our environment. Greater number however, had low parasite count and had remained asymptomatic. Screening for MP should be part of septic work up for babies suspected of having NS, but to be reserve to those with moderate to high MP count.

REFERENCES
Uneke CJ (2007). Congenital Plasmodium falciparum malaria in sub-