Prevalence of Congenital Malaria in Ile-Ife, Nigeria

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Summary
The study was designed to determine the prevalence of congenital malaria, cord blood and placental malaria parasitaemia and the prevalence of clinical manifestations of congenital malaria. Ile-Ife is a holoendemic area for malaria. Placental, cord and peripheral blood smears of 120 newborn babies were examined for malaria parasites. They consisted of 104 (86.7 per cent) full term babies and 16 (13.3 per cent) preterm babies. Positive parasitaemia was found in 56 (46.7 per cent) of peripheral blood smears, 68 (56.7 per cent) and 65 (54.2 per cent) of the placental and cord blood smears respectively. There were strong associations between placental malaria and cord malaria parasitaemia and congenital malaria ($p < 0.001$). Congenital malaria has a high prevalence in Ile-Ife. There is a paucity of its clinical manifestations in the newborn. Only two babies had fever within 48 hours of birth.

Introduction
Malaria is a serious disease that causes both an acute and chronic illness in both adults and children; it is a common cause of mortality in children aged <5 years in Nigeria and tropical developing countries. Horizontal transmission of malaria from the mosquito to humans and back to the mosquito was first described by Sir Ronald Ross in 1894.1 Despite attempts at eradication of the mosquito vector, horizontal transmission remains the most important means of contracting malaria to date. Vertical transmission of malaria from the mother to the fetus through the placenta was thought to be rare in endemic areas.2,3 However, recent reports show a rapid increase in the rate of occurrence of congenital malaria.4–7 This study was designed to determine the prevalence of congenital malaria, cord blood and placental malaria parasitaemia and the prevalence clinical manifestations of congenital malaria in Ile-Ife, a holoendemic area for malaria.

Materials and Methods
The study was carried out at Ife State Hospital, Ile-Ife, a unit of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria, over a period of 6 months, (March–August, 1997). The subjects were consecutive newborn babies delivered at the labour ward of the Hospital. Ethical clearance was given by the Hospital Research and Ethical Clearance Committee.

An informed parental consent was obtained from the mother of each baby. Information was obtained from the mothers as to the occurrence of symptoms of malaria in the 2 weeks immediately preceding parturition and the use of antimalarial drugs both for acute treatment and prophylaxis of malaria throughout pregnancy.

A detailed clinical examination was done on each newborn at delivery. The data recorded included: Apgar score, weight, length, head circumference, vital signs, signs of illness (refusal to suck, jaundice, hepatospleno-megaly, pallor, etc.). The level of asphyxia was assessed by one of the authors (P. Obiajunwa) at 1 and 5 min after delivery using the Apgar scoring system.8 The Dubowitz scoring9 was carried out whenever there was a doubt about the gestational age.

Thick and thin blood films were obtained from the placenta, the cord blood and the peripheral blood of the baby. The placenta immediately after delivery was cleaned and multiple aspirations as previously described by Sowunmi, et al.10 were made on the maternal half of the placenta, just below half way between the maternal and foetal surfaces, using a 19G needle attached to a 2 ml syringe. From the aspirates, duplicate thick and thin films were made on clean microscope slides. For the cord blood, the cord was cleaned with 70 per cent alcohol to avoid maternal blood contamination and then incised with a fresh blade at about 15 cm from its place of attachment to the placenta. Duplicate thick and thin blood films were then made from the cord blood. Peripheral blood of the baby was obtained from a peripheral vein on the dorsum of the hand (within 6 h
of birth) using a 23G needle. Haematocrit and duplicate thick and thin blood films for malaria parasites were done on the peripheral blood.

Each slide was identified with a paper sticker bearing the baby’s identification number and the sample name. The slides were placed horizontally in a slide holder in a covered container to avoid insect contamination. They were allowed to dry before being stained with Giemsa. The slides were examined by an experienced laboratory scientist and one of the authors (P. Obiajunwa).

The presence of malaria parasites was determined by microscopic examination under a 100× oil-immersion objective. A minimum of 200 fields was examined for each negative thick and thin smear. Asexual malaria parasites were counted concomitantly with white-blood cells (WBC) in each field. The parasite counts were recorded as the ratio of asexual forms per 200 WBC in each field. Values are given in the text and tables as mean (SD). The differences between means were compared using Student’s t-test while differences between proportions were compared using χ² tests. p values of <0.05 were taken as statistically significant.

Results

A total of 115 mothers with 120 babies were studied. The mean age of the mothers was 29.8 ± 4.7 years. The profiles of the mothers are presented in Table 1. One hundred and four (90.4 per cent) of the mothers were booked in the hospital, while 11 (9.6 per cent) were unbooked. The parity of the mothers ranged from one to seven with a mean of 2.5 ± 1.6. There were 41 (35.7 per cent) primigravidae and 74 (64.3 per cent) multigravidae. The mean duration of gestation was 38.6 ± 2.6 weeks. The modes of delivery of the babies were spontaneous vertex (SV) 78 (65 per cent), caesarean section (CS) 40 (33.3 per cent) and vacuum extraction one (0.8 per cent). One hundred and twenty babies were studied. There were 109 singleton births and 6 twin births. One of the twin babies was a macerated stillbirth and was excluded from the study.

Table 2 shows the prevalence of malaria parasites in placental, cord and peripheral blood samples. Of the 120 placentas examined, 68 (56.7 per cent) were positive for malaria parasite. Twenty-seven (39.7 per cent) of these belonged to primigravidae while 41 (53.9 per cent) belonged to multigravidae. The difference between the number of the parasite positive primigravid and multigravid placentas was not statistically significant (p = 0.43).

A total of 65 (54.2 per cent) of the 120 cord blood smears were positive for malaria parasite, while 56 (46.7 per cent) of the 120 baby peripheral blood samples, were positive for parasitaemia.

There was a strong association between placental infection and peripheral blood malaria (congenital malaria). Fifty six (82.4 per cent) of the 68 babies born with placenta smears positive for malaria had malaria parasites in their peripheral blood (congenital malaria). There was no baby with parasitaemia among babies of mothers without placental infection. The association between placental infection and congenital malaria was statistically significant (p < 0.001). There was also a strong association between placental and cord parasitaemia. Of the 68 placentas positive for parasite, there were 64 (94.1 per cent) babies with malaria parasites in their cord blood. The association was statistically significant (p < 0.001). Also a strong association

<table>
<thead>
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<th>Parameter</th>
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<tr>
<td>Number of mothers</td>
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<tr>
<td>Mean gestat. age (weeks)</td>
<td>38.6 ± 2.6</td>
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<tr>
<td>(Range)</td>
<td>(29–44)</td>
<td>(30–44)</td>
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<table>
<thead>
<tr>
<th>Source of blood sample</th>
<th>Number examined</th>
<th>Total M:F</th>
<th>Number positive</th>
<th>Total M:F</th>
<th>Per cent positive</th>
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<td>68</td>
<td>26:42</td>
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<tr>
<td>Cord</td>
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<td>54:66</td>
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<td>25:42</td>
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<tr>
<td>Baby peripheral</td>
<td>120</td>
<td>54:66</td>
<td>56</td>
<td>21:35</td>
<td>46.7</td>
</tr>
</tbody>
</table>

Table 1

Clinical profile of mothers showing their mean age and mean duration of pregnancy by parity

Table 2

Parasitaemic rates in the placental, cord and baby peripheral blood in relation to sex
(p < 0.001) existed between cord blood malaria parasite infection and congenital malaria. Out of the 65 babies with cord blood positive for malaria, there were 55 (84.6 per cent) babies with peripheral blood parasitaemia.

Only 2 out of 56 babies with congenital malaria had fever in the first 48 h of life. Ten parasitaemic babies who were not treated with chloroquine at the age of 2 days, were followed up to age 6 weeks and no clinical manifestations of malaria were noticed.

Discussion

The exact prevalences of congenital malaria, placental malaria and cord blood parasitaemia are uncertain in many parts of tropical Africa. The prevalence obtained in this study for OAUTHC, Ile-Ife were 46.7 per cent, 56.7 per cent and 54.2 per cent for congenital, placental and cord blood parasitaemia respectively. There were strong associations between placental and cord parasitaemia, placental and congenital malaria, and cord blood and congenital malaria (with p < 0.001 in all).

The high prevalence for congenital malaria observed in this study could be attributed to several factors. First, there is an observed recent upsurge of malaria in malaria endemic areas,11,12 due partly to rapidly spreading resistance to antimalarial drugs.12,15,14 Secondly, the common use of antimalarial prophylaxis in pregnancy may have lowered the maternal immunity and thus allow easy transmission of malaria parasites to their babies.15 A third factor is the possible increased virulence resulting from altered antigenic determinants in Plasmodium falciparum and fourthly, past under-reporting due to the difficulty of differentiating between truly congenital malaria and malaria that is acquired in both endemic and non-endemic areas. Examples of increasing prevalence of congenital malaria include 7.5 per cent in Calabar in 1985 by Ezeoke, et al.,21 29 per cent by Larkin and Thuma in Zambia in 1991,16 23.7 per cent by Akindele, et al., in Ibadan in 1993 and 22.5 per cent by Sowumni, et al. in Ibadan in 1996.18 Also Fischer in 1997 reported a prevalence rate of 0–23 per cent at various sites of sub-Sharan Africa.25

In the present study, the majority of the infected neonates were asymptomatic during the pre-treatment observation period. Out of the 56 babies with congenital malaria only two (3.6 per cent) had fever within 48 h of birth. Ten of these parasitaemic babies were followed up till 6 weeks of age without treatment, and they remained without clinical manifestations of malaria. This paucity of clinical manifestation and delay in presentation of congenital malaria have been observed by other workers18, 26, 27 and is said to be due to some degree of resistance of newborns to multiplication of malaria parasite.

Conclusion

The prevalence of congenital, cord blood and placental malaria in Ile-Ife of 46.7 per cent, 54.2 per cent and 56.7 per cent respectively, are high. Clinical manifestations of congenital malaria are sparse in the early newborn period.

This study has shown that the prevalence of congenital malaria may be higher than has been previously reported. This may be due to a true increase in prevalence observed in recent times. A baby with parasitaemia need not be treated unless he develops a fever or other clinical features of illness.

References