Neonatal malaria

in

Olabisi Onabanjo University Teaching Hospital, Sagamu - a 2-year review.

BY

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Summary

Background

In view of the fact that a significant proportion of neonates with malaria may be missed on our wards on the assumption that the disease condition is rare, this study aims at documenting the prevalence of malaria in neonates admitted into our neonatal ward and identification of possible risk factors so that early diagnosis and prompt management can be instituted.

Methods

Hospital records of all patients (two hundred and thirty) admitted into the Neonatal ward of Olabisi Onabanjo University Teaching Hospital, Sagamu between 1st January 1998 and 31st December 1999 were reviewed. All neonates (fifty-seven) who had positive blood smear for malaria parasite were included in the study. Socio-demographic data as well as clinical correlates of each of the patients were reviewed. The Epi-Info 6 statistical software was used for data entry, validation and analysis. Frequency distribution was generated for categorical variables. To test for association between categorical variables, the chi-square test was used. Level of significance was put at values less than 5%.

Results

Prevalence of neonatal malaria in this study was 24.8% and 17.4% for congenital malaria. While the mean duration of illness was 3.60 days, it was 5.14 and 3.55 days in those that died and those that survived respectively. The duration of illness significantly affected the outcome (p value = 0.03). Fever alone was the clinical presentation in 44 (77.4%) of the patients. Maturity of the baby, sex and age did not significantly affect infestation. However, history of malaria/febrile illness within the 2 weeks preceding the delivery was present in 61.2% of the mothers. Maternal age, concurrent infection and duration of illness all significantly affected the outcome of illness.

Conclusion

It was concluded that blood smear for malaria parasite should be included as part of routine workup for all neonates with fever or those whose mothers have history of fever two weeks
prior to delivery. In addition, Health education of pregnant mothers in the antenatal clinic should include early care seeking for newborns.

Sommaire

Les cas des patients (deux cent trente) admis dans notre pavillon de néonatologie à Olabisi Onabanjo University Teaching Hospital, Sagamu entre 1er janvier 1998 et 31 décembre 1999 ont été revus. Tous les nouveau-nés (cinquante sept) dont le frottis sanguin était positif concernant le parasite de malaria (TPF) étaient inclus. Les données socio-démographiques ainsi que cliniques vis-à-vis de chacun des patients étaient revues.

La prévalencé du paludisme néonatal dans cette étude était de 24,8 % et le paludisme congénital 17,4%.

Alors que la durée moyenne de la maladie était de 3,6 jours, elle était de 5,14 et 3,55 jours pour ceux qui en sont morts et les survivants respectivement. La durée de la maladie avait un effect significatif sur le pronostique. (valeur p=0,03). La fièvre était la seule présentation chez quarante quatre (77.4%) patients.

La maturité du nouveau né, le sexe et l’âge n’avaient aucun effet significatif sur l’ infestation. Cependant, l’histoire médicale de malaria ou d’attaque fébrile deux semaines avant l’accouchement était notée chez 61.2 % des mères.

Cinquante des bébés ont reçu 25mg/kg de chloroquine base per os, un a eu sulfadoxine/pyrimethamine (SP) peros. 6 des patients n’ont eu aucun traitement. Des 50 qui ont eu la chloroquine, 38 ont été sortis en bonné santé, 2 sont morts et 10 sont sortis contre avis medical. Le seul bébé qui avait eu le SP était aussi sorti en bonne santé. L’âge maternel, autres infections associées à la malaria, et la durée de la malaria ont tous eu des effets néfastes sur les résultats.

On peut conclure que le frottis sanguin pour recherche de parasite de malaria (TPF) doit faire partie des tests préliminaires chez le nouveau né souffrant de la fièvre ou ceux dont leur mère rapporte l’histoire de fièvre deux semaines avant l’accouchement. Les femmes grosses
Introduction

Malaria has been recognised as a leading cause of infant morbidity and mortality in Africans [1] but neonatal malaria was thought to be rare. This was thought to be partly due to the protective effect of Hb F on the neonates [2]. Recent report however seems to suggest that malaria is not as rare among newborn infants in Sub-Saharan Africa as previously thought. In a series, prevalence of congenital malaria was put at 7% with a range of 0-23%. [3]. Congenital malaria has been shown to occur in children of clinically healthy mothers who are delivered in malaria endemic- areas. [4].

As clinical signs of neonatal malaria may be indistinguishable from that of neonatal sepsis, it has been suggested that screening for malaria parasite be included as part of routine investigation in newborn infants with fever. [5]. Sometimes, the inability of clinicians to exercise that index of suspicion for congenital malaria has unwittingly increased the duration of hospital stay of the neonate or led to an increase in neonatal mortality.

The burden of malaria in non-malarious countries had led to the suggestion by workers that neonatal malaria is to be considered in those newborns with congenital infection born to mothers who had travelled to endemic areas, even when they appear clinically healthy [6,7].

A cursory observation on our neonatal ward suggests that malaria may not be uncommon in this environment. However, lack of scientific documentation has hindered the development of a definite policy on case management of neonatal malaria in our hospital.

Hence, this study aims at determination of the prevalence of malaria in neonates admitted into our neonatal ward and to identify possible risk factors for neonatal malaria so that early diagnosis and prompt management can be instituted. In addition, we sought to determine the contributory factors to the outcome of the illness.
Materials and methods

This is a retrospective epidemiological study. Case notes of all patients admitted into the Neonatal ward of Olabisi Onabanjo University Teaching Hospital, Sagamu between 1\textsuperscript{st} January 1998 and 31\textsuperscript{st} December 1999 were reviewed. This is the Teaching Hospital of the Olabisi Onabanjo University. The bed capacity of the neonatal ward is twenty-six (26). Majority of the babies admitted into the ward are referred from the nearby general hospital and private hospitals within and outside the state. As with all other laboratory investigations in the hospital, blood smear for malaria parasite are examined in the service laboratory of the hospital by trained laboratory technologists.

All neonates whose record indicate positive blood smear for malaria parasite were included in this study. Other data extracted from such baby’s record included: age at onset of symptoms (days), sex, birth weight, length, place of delivery, presenting problem that immediately led to blood investigation for malaria parasite and duration of illness, assessed or known gestational age, as well as treatment regimen given and outcome. Results of laboratory investigations viz: blood culture, full blood count and erythrocyte sedimentation rate were reviewed as well. The mothers’ age, parity, history of febrile illness/ malaria at least 2 weeks preceding the delivery and educational level were retrieved from the case notes.

The Epi-Info 6 statistical software was used for data entry, validation and analysis. Frequency distribution was generated for categorical variables. To test for association between categorical variables, the chi-square test was used. Level of significance was put at values less than 5\%. 
Results

Fifty-seven (24.8%) of the two hundred and thirty admissions into the neonatal ward in the period under review had a positive blood smear for malaria parasite. They were aged 1-28 days. Forty (70.2%) of the babies were aged 7 days or less and twenty-five (43.3%) were less than 48 hours old at the time of presentation. The mean age was 6.7 days. There were 35 males and 22 females giving a male: female ratio of 1.6:1. Infestation is not sex-linked (p-value = 0.33).

Almost forty-four percent (43.9%) of the babies weighed less than 2.5kg and 56.1% were more than 2.5 Kg at the time of presentation. Mean weight was 2.58 kg. Length of 73.2% of the babies was less than 48cm. Mean length was 44.29 (SD 4.33). Twenty-eight of the babies were delivered in public hospitals while 21 were delivered in private hospitals and the others were delivered elsewhere. The place of delivery did not significantly affect infestation.
(p-value = 0.99)

As shown in table 1, 31 (54.3%) of the babies presented within 3 days of onset of illness and 52 (91%) within 7 days. The mean duration of illness was 3.6 days.

While 21 of the babies were pre-term, 25 were full-term and maturity was not documented in eleven (11) of the babies. Forty-two (42) of the babies were however appropriate for age and 10 were small for date. There was no significant difference in the rate of infestation between pre-term and full-term babies (p value 0.896).

As shown in table II, fever was the presenting feature in 78.3% of the babies, 6.7% of them were hypothermic and were not feeding well. In all, 10% of them were either not tolerating feeds or refusing feeds.

No hematological evidence of bacterial infection was found in 96.4% of the babies and thirty-seven (64.9%) had Packed Cell Volume (PCV) between 30-45%. None of them had Packed Cell Volume (PCV) less than 20%.
Three of the mothers were aged between 15–20 years, Seven, between 21 and 25 years and 14 were between 26–35 years. Maternal age was not documented in 23 cases, Febrile illness within the last trimester of the pregnancy was present in 30 out of the 40 cases in whom there are records. No information was however recorded for 17 cases.
Only 27 of the mothers were primipara, 20 were multipara, 3 Grand multipara. The parity of 7 of the mothers was not stated.
Fifty of the babies were treated with appropriate doses of chloroquine (25mg chloroquine base/kg), one had Sulfadoxine-Pyrimethamine (SP). No treatment was documented in 6 cases.
Forty-two of the babies responded to the antimalarial given and were subsequently discharged home in satisfactory condition. Four died and 11 were discharged against medical advice. The duration of fever in those that died was longer than 5 days. This significantly affected the outcome of illness (p value =0.02). Also, concurrent bacterial infection and maternal age significantly affected the outcome (p values 0.02 and 0.04 respectively). Three out of the 4 deaths occurred in the babies of mothers aged 15-20 years. Table 111 shows the treatment and outcome of illness.
Infestation is significantly higher in babies of mothers with history of febrile illness (p value = 0.02).
None of the other factors examined is significantly associated with infestation.


**Discussion**

This study has identified a prevalence rate of 24.8% for neonatal malaria and 17.4% for congenital malaria. This is in keeping with an African survey on congenital malaria that had reported values of 0-23% [3]. It is also noteworthy that almost half of the neonates were less than 48 hours old as at the time of presentation. Similar to our findings in this study, a report from western Uganda has documented that there is no association between congenital parasitemia and birth weight [8]. Although, over half of the babies in this review presented within three days of illness, the outcome was found to be significantly associated with the duration of illness; the longer the duration the worse the prognosis. This fact has been demonstrated even in malaria in infancy, where death from severe complicated malaria is discovered to occur within 2-3 days of illness [9]. The risk factors that have been associated with neonatal infection e.g. maternal age and place of delivery are not at play in neonatal malaria. This is not surprising considering the fact that the epidemiology of one differs from the other. That fever was the main clinical presentation for malaria in this study seems to support the WHO case definition for malaria in endemic areas [10]. Interestingly, all the features found in this study are similar to those in neonatal infection. A study had earlier identified that signs and symptoms of malaria in the newborn may be indistinguishable from other neonatal infections [5]. Based on this, it may be impossible to differentiate one from the other at the bedside. Considering the fatality that can result from a delay in appropriate treatment, it will appear safer to treat all cases of fever in all children, neonates inclusive, in malaria-endemic areas with antimalarials while awaiting the result of investigations. However, that history of febrile illness in the last trimester of the pregnancy is significantly associated with infestation seem to suggest that all babies of such mothers with such history should be placed under observation in the neonatal ward and screened for malaria parasite.
SP was used for one of the babies. This was because of what was perceived to be “chloroquin resistance”. This baby was one of those with the longest duration of illness in this study having been treated in a private hospital with chloroquin without much response.

The parasitology report of the six babies whose record of treatment could not be traced was probably retrieved after their exit from the hospital.

Maternal age, concurrent bacterial infection and duration of illness significantly affected the outcome of illness. The three are interrelated. Babies of teenage mothers are at risk of neonatal infection. Such mothers may also present late in the hospital either due to poverty or ignorance.

In conclusion, this study has further confirmed that neonatal malaria is not as rare as we had thought in Sub-Saharan Africa. Clinicians need to have a high index of suspicion so that rapid diagnosis and early appropriate intervention can be instituted in line with the concept of Roll Back Malaria.

**Recommendation**

1. All neonates with features suggestive of neonatal infection should have blood smear for malaria parasite as part of their routine screening.

2. All babies of mothers with history of febrile illness within the last two weeks of pregnancy should have blood smear for malaria parasite examination.

3. Early care seeking for neonates should be part of the educational talks in the antenatal clinics.

**Acknowledgement**

The authors acknowledge the tremendous assistance of the residents in the department and the entire staff of the medical records department in retrieving the hospital records of the patients.
References


Table 1:

**Duration of Illness (days) in the babies**

<table>
<thead>
<tr>
<th>Duration of Illness (Days)</th>
<th>Number of cases</th>
<th>Cumulative Total</th>
<th>Percentage%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>31</td>
<td></td>
<td>54.40</td>
</tr>
<tr>
<td>4-7</td>
<td>21</td>
<td>52</td>
<td>91.23</td>
</tr>
<tr>
<td>Over 7</td>
<td>05</td>
<td>57</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 11:

**Frequency of Clinical Features**

<table>
<thead>
<tr>
<th>Clinical Features</th>
<th>Frequency%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature&gt; 37.2°C alone</td>
<td>78.3</td>
</tr>
<tr>
<td>Temperature&lt;36.5°C+ Not feeding well</td>
<td>6.7</td>
</tr>
<tr>
<td>Irritability</td>
<td>5.0</td>
</tr>
<tr>
<td>Temperature&lt;35.5°C alone</td>
<td>3.3</td>
</tr>
<tr>
<td>Diminished activity+ not feeding well</td>
<td>3.3</td>
</tr>
<tr>
<td>Fever, vomiting</td>
<td>1.7</td>
</tr>
<tr>
<td>Jitteriness</td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 111:

**Treatment and Outcome of Illness**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Discharged</th>
<th>Died</th>
<th>Vol. discharge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroquin 25mg base/kg</td>
<td>38</td>
<td>2</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Sulphadoxine-Pyrimethamine (SP)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>No Record of Treatment</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42</strong></td>
<td><strong>4</strong></td>
<td><strong>11</strong></td>
<td><strong>57</strong></td>
</tr>
</tbody>
</table>