Brief Reports

Malaria Prevalence and Outcome in the In-patients of the Paediatric Department of the State Specialists Hospital (SSH), Maiduguri, Nigeria

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Summary

Of 4651 admissions between February 1995 and February 1996, 1043 had a presumed diagnosis of malaria. Six hundred and twenty-seven cases were confirmed by thick blood film examinations. The highest prevalence was in October (124/480 admissions) and the lowest in March (12/303). Sixty-five children died while 562 survived, 12 with defects. The first treatment in 422 children was chloroquine, in 143 quinine, in 59 halofantrine, and in three pyrimethamine with sulfadoxine (Fansidar®). 23/422 patients started on chloroquine were switched to halofantrine, two to quinine. A higher mortality was associated with coma, convulsions, hepatosplenomegaly, pulmonary congestion, jaundice, haemoglobinuria, bladder paralysis, anuria. Anaemia and fever were more severe and hypoglycaemia more frequent in children who died than in children who survived (packed cell volume 18.5 ± 7.1 per cent vs. 25.6 ± 7.6 per cent, p < 0.001; temperature 39 ± 1.1°C vs. 38.7 ± 0.9°C, p < 0.05; random blood sugar <40 mg/100 ml; 76 vs. 22 per cent, p < 0.01). There was no difference in the median age, pre-treatment duration, and prevalence of diarrhoea and sickle cell disease. The male to female ratio was 1.5:1 in the surviving children vs. 1:1.03 in the dead.

Introduction

Malaria is estimated to cause about 500 000 deaths in children every year with the highest mortality in the age group 1–4 years.1 A retrospective study in Calabar revealed that 3.5 per cent of all paediatric deaths were caused by malaria.2 P. falciparum is responsible for more than 90 per cent of all infections.1 Severe falciparum malaria is a multisystem disease in which a number of vital organs are affected.3 While in holoendemic areas the infection becomes less severe with increasing age because of semi-immunity, in areas where it is more seasonal, severe malaria is seen in all age groups.1,4 Resistance to chloroquine treatment is so high in several areas like Malawi that it is no longer used there.5 In Damboa, a local government area not far from Maiduguri, resistance was still low, at 6.2 per cent in 1991.5 Maiduguri is the capital of Borno State, with a dry season of about nine months and a rainy season of three months duration. Laboratory tests are not available throughout the whole day in most places. The aim of the study was to elaborate practicable guidelines for the urgent management of malaria according to the severity of the disease in our area. In this report, for assessment of severity of clinical findings, packed cell volume (PCV) and random blood sugar (RBS) were used.

Materials and Methods

A study of the in-patients of the paediatrics department of SSH Maiduguri from 15th February 1995 to 29th December 1996 was undertaken. The nursery patients were excluded. All patients were clinically assessed for general condition, signs of infection, pallor, jaundice, hepatosplenomegaly, pulmonary symptoms, and abdominal, renal, and neurological abnormalities. In unconscious and convulsing patients, lumbar puncture was done to rule out meningitis. To grade the level of unconsciousness a modification of the ‘Glasgow’ coma scale was used during the earliest 30 min following a convulsion.2 Pneumonia was ruled out with chest X-ray if necessary. Children who presented with kidney symptoms had urinalysis with Multistix 10 SG (Bayer, Germany) and urine microscopy. Anuria was deemed present when no urine was passed within a period of ≥24 h and, depending on the child’s age, 50 ml or less of urine were removed from the bladder. When the bladder was full but urine had to be removed by expression, catheterization, or aspiration it was defined as ‘bladder paralysis’.

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**Table 1**  
*Malaria treatment*

- **Chloroquine**  
  Day 0: start with 10 mg/kg body weight, orally, then 5 mg/kg body weight after 6 h (or 15 mg/kg body weight, in three doses six-hourly i.m.)  
  Days 1 and 2: 5 mg/kg body weight, once per day

- **Halofantrine**  
  24 mg/kg body weight, in three doses six-hourly, or  
  Fansidar® for children who had chloroquine before without success

- **Quinine** i.v. in 5/10 per cent dextrose  
  Start with 20 mg/kg body weight. Continue with 10 mg/kg body weight, eight-hourly, in unconscious patients  
  Switch to oral as soon as possible  
  Treatment duration 7 days

- **Dextrose, when RBS <40 mg/100 ml**  
  Bolus of 1 g/kg body weight

- **Transfusion, when PCV < 20 per cent**  
  Packed cells, 15 ml/kg body weight

- **Nasogastric feeding in unconscious patients**

The enrolled cases with presumed malaria were all screened by thick blood film, with the presence of malarial parasites confirming the diagnosis. However, no quantitative assessment or species identification was done. Since October 1995 the PCV and RBS (Haemoglucotest 20-800 R; Boehringer Mannheim, Germany) have been measured in every child. ‘Simple malaria’ cases were said to occur in children without cerebral malaria and/or other organ manifestations or complications like pulmonary congestion, severe anaemia, hypoglycaemia, jaundice, and kidney involvement. The term ‘complicated malaria’ was used for the others. The treatment is shown in Table 1. For statistical evaluation, we used Student’s *t*-test for normally distributed data, Mann–Whitney test for non-normally distributed data, and Fisher’s exact test where indicated.

**Results**

A total of 4651 children were admitted with 1043 (22 per cent) suspected malaria cases. Malaria was confirmed in 627 (14 per cent) while 226 (5 per cent) negative cases responded to treatment. In 190 (4 per cent) cases the diagnosis was wrong; these children went on to treatment for other diseases. Sixty-five children (1 per cent of all in-patients, 10 per cent of the confirmed malaria cases) with malaria died.

Malaria was shown to be an all-year-round infection with a steady rise from March to October (Fig. 1). There was no difference in age, pretreatment duration, and diarrhoea between surviving and dead children. A higher mortality in girls was statistically not significant (Table 2). The mortality rate in children with sickle cell disease did not differ from that in children without. The mortality rate

**Fig. 1. Annual prevalence of malaria.**
was significantly higher in patients with cerebral malaria (with/without convulsions; with/without bladder paralysis) with hepatosplenomegaly, pulmonary congestion, jaundice, haemoglobinuria, and anuria (Fig. 2).

Anaemia and fever were more severe and hypoglycaemia (RBS < 40 mg/dl) more frequent in children who died than in children who survived (PCV 18.5 ± 7.1 vs 25.6 ± 7.6 per cent, \( p < 0.001 \); temperature 39.1.1 °C vs. 38.7 ± 0.9 °C, \( p < 0.05 \); RBS < 40 mg per cent, 76 vs 22 per cent, \( p < 0.01 \)). Anuric patients had the worst prognosis. Although this complication was present in only 1.3 per cent of all cases it contributed 9.7 per cent by mortality malaria. When jaundice was seen, the mortality rate was still 65 per cent. About one-third of patients with cerebral malaria (with/without lung manifestation and/or haemoglobinuria) and one-quarter of the anaemic children died.

Only five deaths were seen with simple malaria (one with fever and convulsion, two with fever and diarrhoea, and two with fever only). This contributed 8 per cent to the mortality rate. The dependence of mortality on the presence of a symptom (regardless of the combination with others) is shown in Fig. 3.

Out of the 562 surviving children, 550 recovered fully. Twelve of 122 (10 per cent) cerebral malaria cases treated with quinine survived with defects (Table 2).

### Table 2

**Course of malaria in 627 proven cases**

<table>
<thead>
<tr>
<th></th>
<th>Survived</th>
<th>Died</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>562 (89.6%)</td>
<td>65 (10.4%)</td>
</tr>
<tr>
<td><strong>Male</strong></td>
<td>335 (59.6%)</td>
<td>33 (50.8%)</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>223 (39.7%)</td>
<td>32 (49.2%)</td>
</tr>
<tr>
<td><strong>Sex unspecified</strong></td>
<td>4 (0.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Sex ratio (m : f)</strong></td>
<td>1.3 : 1</td>
<td>1.03 : 1</td>
</tr>
<tr>
<td><strong>Median age (months)</strong></td>
<td>24 (4–144)</td>
<td>24 (7–108)</td>
</tr>
<tr>
<td><strong>Median pretreatment duration (days)</strong></td>
<td>4 (1–30)</td>
<td>5 (1–30)</td>
</tr>
<tr>
<td><strong>Fully recovered</strong></td>
<td>550 (97.9%)</td>
<td></td>
</tr>
<tr>
<td><strong>Recovered with defects</strong></td>
<td>12 (2.1%)</td>
<td></td>
</tr>
<tr>
<td><strong>Deafness</strong></td>
<td>2 (0.35%)</td>
<td></td>
</tr>
<tr>
<td><strong>Blindness</strong></td>
<td>2 (0.35%)</td>
<td></td>
</tr>
<tr>
<td><strong>Epilepsy</strong></td>
<td>4 (0.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Hemiparesis</strong></td>
<td>4 (0.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Unknown</strong></td>
<td>3 (0.6%)</td>
<td></td>
</tr>
</tbody>
</table>

![Fig. 2. Malaria symptoms in dead and surviving patients.](https://academic.oup.com/tropej/article-abstract/44/2/109/1632580/1932580)
Sixty-seven per cent of the malaria cases were primarily treated with chloroquine while 9 per cent who had an unsuccessful treatment before were treated with halofantrine, 0.5 per cent with Fansidar®, and 0.2 per cent with quinine. Six per cent of the patients treated with quinine were switched to other antimalarials because of treatment failure. Of 143 patients primarily treated with quinine, 122 had cerebral malaria.

Discussion
Malaria prevalence in Maiduguri was continuous throughout the year with a peak of transmission towards the end of the rainy season. 1.4 per cent of all in-patients died of proven malaria; 92 per cent of all deaths were caused by complicated malaria while simple malaria contributed to 8 per cent. More often, complications like anaemia, haemoglobinuria, unconsciousness, pulmonary congestion, and jaundice occurred in combination. No bladder paralysis was seen without unconsciousness, no jaundice without anaemia. Hepatosplenomegaly was almost always associated with anaemia. Convulsions were not specific to cerebral malaria and were seen in patients with febrile convulsions and hypoglycaemia.

As in other studies, this one also revealed the brain as a vulnerable organ, but in contrast to others, the lung and the kidneys were affected as well. No liver failure was seen. Jaundice and anuria indicated a poor prognosis. The cause of renal failure is not fully understood but circulatory collapse and severe haemolysis are risk factors. Ten per cent of all malaria cases were treated with halofantrine, Fansidar®, or quinine because of previous unsuccessful chloroquine treatment on an out-patient basis. However, not all the treatment failures were due to resistance but as a result of underdosage and non-compliance. When the patients were hospitalized, the failure rate with chloroquine was 6 per cent only. That means there has been no increase in chloroquine resistance in our area since 1991. So, in our population, chloroquine for simple malaria is still the antimalarial of first choice but more emphasis must be put on the correct dose and treatment duration. The treatment of complicated malaria is still unsatisfactory. While in a study in Ibadan the mortality rate from cerebral malaria was given as 18 per cent, it reached 27.9 per cent in ours. Apart from the high mortality rate, there is also a significant number of patients who recover with defects—11 per cent in a study reported from Malawi compared to 10.4 per cent in ours. Also, the immediate correction of blood sugar and transfusion did not bring acceptable results. It is likely that earlier diagnosis and prompt treatment could improve the outcome. This is only possible when parents and health workers are better trained to recognize the symptoms of a complicated malaria.

Conclusion
About every fifth child admitted to the Paediatric Department of the State Specialist Hospital was admitted because of malaria. Fourteen of 1000 paediatric in-patients have died from proven malaria and 2.4/1000 have recovered with severe handicaps! Malaria is still an important health problem despite more potent drugs being available today. While chloroquine is still the drug of first choice for simple malaria, the treatment of
complicated malaria remains unsatisfactory. It is likely that earlier treatment could improve the outcome. Further research is needed.

References

Breastfeeding Practices in Urban Riyadh

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Summary
Three hundred and forty-seven mother–infant pairs attending a well baby clinic in a University Hospital in Riyadh were interviewed on the type of feeding given to their infants. The objective was to assess the latest trend of infant feeding practices in an urban population and to compare present trends and their significance with previous reports. Results showed that 32.4 per cent of infants at 3 months and 22.1 per cent of infants at 6 months were exclusively breastfed; 18.2, 48.4, and 65.4 per cent were exclusively bottle fed at 3 months, 6 months, and 1 year respectively. Weaning foods were added between 3 and 6 months to a very high percentage of infants. Insufficient breast milk and refusal of breast by the infant were among the most common reasons for introduction of bottle feeds.

Introduction
The entire population of Saudi Arabia has access to free comprehensive health care. However, increased utilization of health services contrasts sharply with the decreasing prevalence and duration of breastfeeding. Reports on breastfeeding practices in Saudi Arabia in the past two decades have shown an initial declining trend in urban populations with a high prevalence in rural areas, followed by a decline even in rural areas. Later, others reported a declining trend in all groups of urban and rural populations. An authoritative survey in 1987 by Al Mazrou et al. alerted us to the disparity between breastfeeding practices and WHO recommendations, conspicuous in urban areas. Therefore we conducted our study to monitor this trend by selecting a representative urban population.

Methods
Three hundred and forty-seven mother–infant pairs attending the Well Baby Clinic of King Khalid University Hospital, Riyadh, were selected randomly and details of the following variables were obtained.

Of the infants: Sex, age, gestational age, nationality, history of admission to NICU for more than 24 h, mode of delivery, birth weight, present weight, length and head circumference in percentiles.

Of the mothers: Age, educational level, working status, number of children, order of the present child, the type of feeding, duration of breastfeeding, the plan to breastfeed when pregnant, any advice on breastfeeding from support and advisory groups, breastfeeding in...