Clinical Falciparum Malaria
Its Severity, Types, Splenomegaly, Association with Malnutrition and Criteria for Diagnosis

by

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This is a clinical study of malarial cases admitted to Harare Hospital in the period between June 1980 and June 1981. I saw most of the patients myself, even though many of them were under the care of other physicians, but I did not see infants or young children who were admitted under paediatricians.

Relatively few studies have been recorded of acute clinical malaria. Schmitz and Gelfand (1976, a,b,c,d) presented their findings on the clinical features in falciparum malaria in Zimbabwe. Although malaria must be one of the most common diseases and perhaps the most serious, the clinician has not described its clinical features. There are a number of papers relating to particular effects of the disease, such as cerebral malaria, or to particular types of the disease. The main or perhaps essential features of almost every attack are known - namely, sudden onset, headache, perhaps some shivering and vomiting, delirium sometimes and, on physical examination, a high fever and a splenomegaly may be expected.

Of special importance, and familiar to doctors practising in these parts, is the mandatory enquiry as to which region had the patient been. Every now and then, however, this vital question is omitted. And despite this knowledge, it is surprising how often the clinician is not sure whether the patient is suffering from acute malaria or from another acute infection, such as typhoid fever, encephalitis, a viral infection of the upper respiratory tract or acute hepatitis, and so he correctly decides to take a blood smear. Then, he either waits to hear the results or he might start a course of chloroquine plus an antibiotic. Thus in the 78 cases studied in this series, malaria was not provisionally diagnosed in 17 patients (21.8%), although once the results of the routine blood examination became known, the diagnosis was changed.

Provisional Diagnosis in 17 patients not known to be malarious

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastroenteritis</td>
<td>3</td>
</tr>
<tr>
<td>Pneumonia or bronchopneumonia</td>
<td>5</td>
</tr>
<tr>
<td>Cystitis</td>
<td>1</td>
</tr>
<tr>
<td>Typhoid or meningitis</td>
<td>2</td>
</tr>
<tr>
<td>Meningitis</td>
<td>1</td>
</tr>
<tr>
<td>Kwashiorkor</td>
<td>1</td>
</tr>
<tr>
<td>Anaemia and hepatitis</td>
<td>1</td>
</tr>
<tr>
<td>Bilharziasis or T.B. lymphadenitis (or sickle cell disease)</td>
<td>1</td>
</tr>
<tr>
<td>Chronic otitis media</td>
<td>1</td>
</tr>
<tr>
<td>Asthma</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

Definite Diagnosis of Malaria
Malaria was diagnosed after admission as the sole disease in 21 (27%) out of 78 patients.

Malaria Included in Provisional Diagnoses
Malaria was included in the provisional diagnosis in 39 patients (50%). Other diseases eliminated in the differential diagnosis of malaria were typhoid, meningitis, gastroenteritis, conjunctivitis, pyrexia of unknown origin, dysentery, amoebic dysentry, pneumonia, hepatitis, septicaemia, hypoglycaemia, kwashiorkor, marasmus, tuberculosis, meningitis, portal vein thrombosis, bronchopneumonia, tonsillitis, cirrhosis, nephritis, secondary anaemia and measles.

Age
This study shows clearly that the bulk of the patients were children. Between the ages of 0 and 9 years, there were 42 cases, between 10 and 19 years of age there were 13. Above the age of 30, there were relatively few cases.

Number of Cases, According to Age

<table>
<thead>
<tr>
<th>Years</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>42</td>
</tr>
<tr>
<td>10-19</td>
<td>13</td>
</tr>
<tr>
<td>20-29</td>
<td>17</td>
</tr>
<tr>
<td>30-39</td>
<td>3</td>
</tr>
<tr>
<td>40-49</td>
<td>1</td>
</tr>
<tr>
<td>50-59</td>
<td>1</td>
</tr>
<tr>
<td>60-69</td>
<td>1</td>
</tr>
<tr>
<td>70+</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78</strong></td>
</tr>
</tbody>
</table>

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Perhaps of interest, too, is the fact that 9 cases of malaria occurred in infants of one year and under. Thus malaria is largely a disease of childhood.

**Time of the Year**
The incidence of malaria was related to the rainy season, its frequency reaching a peak at the end of the season, with a low incidence in the winter.

**Location of the Patient about 10 days before the illness commenced**
It was of interest to note that of the 78 patients, no less than 51 (64%) contracted the disease in the communal lands and most of them were visiting their rural homes. This figure of 64% may well have been greater, as it is very likely that this information was not always recorded.

Relapse in malaria seems to be very uncommon in my experience. Whenever a malarial case was seen the disease appeared to have been contracted afresh. Schmitz and Gelfand (1976) found that town dwellers who contracted the disease did so afresh, and not as a relapse.

**Type of Parasite**
The great majority of patients had *falciparum* malaria. *P. falciparum* was revealed in 69 (88%). In six the species was not identifiable. There was one case with *P. malariae* in a child of 3½ years and two in whom both *P. falciparum* and *P. malariae* were reported. No other plasmodium species was identified.

**The Severity of Peripheral Blood Smears in Relation to the Gravity of the Clinical State**
The presence of parasites in the blood smears of a malarial patient is usually reported as being scanty (scanty = 1 per 2 or 3 fields) or numerous (2 to 3 per field). If the severity of the blood smears is between the two (moderate), the parasites are merely reported as being present (1 per field).

In this study, an attempt was made to correlate the degree of parasitaemia, as reported, with the clinical severity of the illness in the patient. Thirty-one cases were reported as having numerous parasites in the peripheral blood. Fifteen of these patients were regarded as having a serious attack of malaria (49%) and in 16 the attack was not serious. Twelve cases were reported with scanty ring forms of *P. falciparum* and 8 of these patients were seriously ill (67%). In the moderate series, there were 35 patients. Twenty-five of these were seriously ill (72%).

### Table Comparing the Severity of the Peripheral Blood Smears with the Clinical State of the Patients.

<table>
<thead>
<tr>
<th>Parasites</th>
<th>Clinical State</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanty</td>
<td>Serious</td>
<td>67%</td>
</tr>
<tr>
<td>Moderate</td>
<td>Serious</td>
<td>71%</td>
</tr>
<tr>
<td>Numerous</td>
<td>Serious</td>
<td>48%</td>
</tr>
</tbody>
</table>

**Patients with Symptoms not Generally Associated with Malaria**

**Respiratory Symptoms**
We noticed in the histories of patients in this series, the presence of certain symptoms such as cough, loose bowel action or even jaundice, not as a rule described as clinical pictures of the disease. There were no less than 28 patients in whom cough was a definite symptom and in 15 of these a pulmonary disorder was given as a preliminary diagnosis. This was mostly bronchopneumonia, occasionally lobar pneumonia and once asthma.

**Acute Bowel Disturbance**
Diarrhoea, a term widely used, probably describing conditions ranging from loose bowel action to frequent liquid motions, was mentioned by 15 patients. Six were provisionally diagnosed as having acute gastroenteritis, four of them as cases of acute gastroenteritis and two as acute dysentery (bacillary or amoebic in one case and acute bacillary in another).

**Typhoid**
Before a confident diagnosis of malaria is established with the finding of the parasite, typhoid is not uncommonly considered and blood is taken as well for culture. There were 15 such cases in our series.

**Cerebral Symptoms**
The same type of problem arises when cerebral symptoms, such as headache, figure largely in the clinical picture and acute meningitis may be considered and thus a lumbar puncture is usually performed. There were 10 cases in the series in which a diagnosis of acute meningitis was considered.

**Jaundice**
Jaundice, mild or marked, was present in 11 cases. In four the icterus was deep. One case was considered to be of the hepatic type of malaria (bilious remittent fever).

**The Temperature**
An elevated temperature is the most outstanding feature of a malarial attack. Indeed, acute
malaria was often referred to simply as the “fever”. A study of the response of the temperature to treatment revealed one or perhaps two useful observations. Whenever the clinician was faced with an acute fever, the cause of which was not clearly known or if malaria was suspected, the practice was to prescribe chloroquine and often an antibiotic as well. The most valuable finding in the series was that within 24 hours there was a steep descent in temperature to normal. This was a most striking effect, which I have likened to steep hill decline or a precipitous descent. Thirty-six of the 78 patients with acute malaria showed this precipitous descent effect. An interesting but less frequent event was the rapid decline of the temperature which, however, rose again within a few hours and then returned to normal where it remained. The development of the second rise might suggest that the amount of the drug administered was not sufficiently adequate to dispel the parasite completely. There were 11 cases showing this double elevation of temperature, resembling the letter M on the chart. Seven cases showed mild or no fever (less than 37.5°C) on admission. Five of these patients were five or less than five years old and two were adults.

**Positive Blood Cultures**

Because the cause of the acute fever is not known on admission, blood may be taken for culture in case the patient is suffering from typhoid fever or has a septicaemia. It is perhaps worth mentioning that in 11 of the cases, a positive result followed. Such findings are dismissed as perhaps due to contamination when the malarial parasite is reported, but is it not just possible that a secondary infection may occur in acute malaria? It may be argued that if these organisms were of moment, how is it that the patients recovered? But it should be remembered that the great majority of patients admitted with a high fever are given antibiotics routinely, generally penicillin, as well as chloroquine.

**Splenomegaly**

When confronted with a malarial attack many clinicians would agree that the enlarged spleen comes to mind as one of the outstanding features of the disease. In this series, however, the spleen was reported as palpable in 27 cases of acute plasmodium malaria (35%). This organ is found to be enlarged in about a third of the cases. Of interest is that 18 of the 27 patients were infants and children, five years old and younger. In other words, splenic enlargement is likely to be found in children and much less often in adults. One asks whether the sequestration syndrome or perhaps a similar pathogenesis to that found in sickle cell anaemia is not encountered in adults. In this series 40 out of the 78 patients with malaria were in children five years old and younger. Of them 17 (43%) had enlarged spleens and in two the spleens could be regarded as big, in four as moderately enlarged and in the rest slightly enlarged. On the other hand, the spleen was palpable in 8 (21%) of the 38 patients over 5 years of age. In one it was moderately enlarged (4 cm) and in the other seven it was palpable.

This appears to be the first evidence that splenomegaly in malaria is more commonly present in young children. I have chosen the age of five years. In older children and in adults the spleen is relatively moderately enlarged and as such is of less value as a sign of the disease than it is in the younger child.

**Types of Malaria**

It has been customary to classify the more severe or more complicated types of acute malaria. The best known are cerebral, hepatic, renal including haemoglobinuria, pulmonary, algid and gastrointestinal.

Those mentioned in this series are:-

<table>
<thead>
<tr>
<th>Type of Malaria</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebral</td>
<td>5</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>1</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>3</td>
</tr>
<tr>
<td>Renal</td>
<td>4</td>
</tr>
<tr>
<td>Anaemic</td>
<td>14</td>
</tr>
<tr>
<td>Hepatic</td>
<td>3</td>
</tr>
<tr>
<td>Algid</td>
<td>1</td>
</tr>
</tbody>
</table>

**Cerebral**

All these patients were in coma and followed
THE CENTRAL AFRICAN JOURNAL OF MEDICINE

CLINICAL FALciparum Malaria

the classical description. The importance of coma is stressed because this feature distinguished these cases from the psychiatric ones.

Acute Psychotic (Psychiatric) Malaria

I recall the first case of acute psychotic malaria I saw about 15 years ago. The patient, a man, was sent by the prison medical officer to the Central Hospital for a barium meal because he was vomiting. However, at the hospital, although he was agitated and kept moving around, it was clear that he was not normal mentally. As he was found to have a fever, he was examined physically, blood smears were taken and they revealed the presence of P. falciparum parasites. When the patient was given the specific treatment for malaria he recovered rapidly. In the present series the patient was an African woman, aged about 54 years, first seen sitting outside the Nurses’ Home at Harare Hospital on 15/10/80. She would not answer when asked what she was doing there. However, after she had apparently attempted to assault a maid, she was committed to the psychiatric ward. There was no previous history of a mental disturbance nor of a previous admission to hospital. She was garrulous, but unintelligible, so it was thought she was speaking a dialect of Sotho. On examination, her pupils reacted to light and were equal. There was no mystagmus. The tendon reflexes were brisk and equal and the plantar ones flexor.

Shortly after admission she became drowsy, confused and uncooperative. She responded poorly to commands and hardly spoke. At the time she passed a loose bloody motion. An intravenous half-strength dextrose Harrow’s solution was set up. Acute gastroenteritis was diagnosed, although malaria and shigellosis were also considered. A lumbar puncture was done; the pressure of the fluid was 90mm H₂O, it was clear and colourless, leucocytes 3, glucose 96 and globulin negative. A blood smear showed ring forms of P. falciparum. She was given 300ml chloroquine intramuscularly, a glucose/saline drip was set up and she was moved to a medical ward, where she died the same day. There was no autopsy.

Comment. The patient had a fairly typical illness, characteristic of acute malaria, that is, one in which a bloody diarrhoea ensued during its course, with short intervals in which she seemed to be recovering. The occurrence of a fit, as the illness progressed, in the absence of specific treatment, would support the diagnosis of malaria.

The purpose of reporting this case is to draw attention to the acute behavioural disorder that may characterise acute malaria. During the febrile paroxysms, instead of being so prostrated by the fever and lying still in bed, the patient may be excessively active and restless with disturbed consciousness. Dianne L. Houghton has described a similar form of cerebral malaria with psychosomatic manifestations which may be mistaken for mental illness.

Acute Gastrointestinal Type.

This accounted for three cases in the series. In all of them the acute diarrhoea and fluid loss were the dominating features. All three were given intravenous saline. A summary of the three cases would appear to be justified.

Case I. Female, four months old. Severe diarrhoea and dehydration.

Case II. Male, 14 years, acute diarrhoea. A non-lactose fermenting coliform organism grown.

Case III. Female aged 66. Severe diarrhoea and dehydration. A lactose fermenting coliform organism grown.

In two of the cases, a coliform organism was cultivated from the blood.

Renal Type

Four patients in the series developed renal failure.

Case I. (13) was a female aged 22. She was confused and anaemic with a blood urea of 290. Dialysed. Also because of the encephalopathy was thought to have malaria.


Case III. ( ) Female, 18 years. Confused.
Blood urea 376 mEq/l. Bicarbonate 5.6 mEq/l.

Case IV. ( ) Male, 29, acute haemoglobinuria. Blood urea 104 mg/dl.

The Anaemic Type
I would consider this type a separate group, since it has its own special feature, loss of blood. It was the most common in this series, there being 14 cases. In some of them the anaemia was complicated by some other serious complication, such as coma or uraemia. I classified as anaemic those patients with a haemoglobin below 8G per 100ml, who necessarily had to be given a blood transfusion.

Haemoglobin in G/100ml in 14 Patients with the Anaemic Type

<table>
<thead>
<tr>
<th>Haemoglobin in G/100ml</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1-8</td>
<td>2</td>
</tr>
<tr>
<td>6.1-7</td>
<td>0</td>
</tr>
<tr>
<td>5.1-6</td>
<td>4</td>
</tr>
<tr>
<td>4.1-5</td>
<td>2</td>
</tr>
<tr>
<td>3.1-4</td>
<td>3</td>
</tr>
<tr>
<td>2.1-3</td>
<td>3</td>
</tr>
</tbody>
</table>

Hepatic Type
There were three cases that could be regarded as being of the hepatic type.
1. A man aged 29, was very ill, vomiting and jaundiced++.
2. A pregnant woman, 24 years of age, with jaundice++.
3. A little boy of two years with jaundice+.

All three patients were very ill and required intravenous fluids with chloroquine.

Algid Type
I accepted one patient as having the algid type – a little boy of 2½ years who was collapsed and required intravenous fluid therapy.

Mixed Types
Eight patients had more than one type of malaria. Three cases of cerebral malaria showed a combination with another type, one with the hepatic type, another with the anaemic and a third had acute renal failure as well as severe anaemia. Two patients with acute renal failure were anaemic and three with the hepatic form of malaria had anaemia.

Malnutrition
There were 7 cases in the series, all in children whose ages ranged from seven months to three years, four with marasmus and three with kwashiorkor. It has been said that the African child with kwashiorkor rarely develops cerebral malaria and is in some way protected from contracting severe malaria (Edington, 1954). In this series, whilst none of the children had the cerebral form, it was shown that malaria is definitely seen in the malnourished. Five of the children I graded as having been severely ill, one died and the only other case I considered had been moderately ill.

Deaths
There were three deaths in the series. Two were in infants, one a baby of four months and one aged two years. The third was in a woman, aged 54 years. The older of the two children had kwashiorkor. Severe pallor was a striking feature in both children. The haemoglobin was below 5G% in the older one and 3G% was recorded in the baby. Many of the patients were extremely ill and may have perished easily had it not been for the drugs administered and the correction of the shock and loss of fluid or electrolytes.

Criteria for Diagnosing Acute Malaria in the Absence of a Positive Blood Smear
Not even after repeated blood smears will every case of acute malaria show the presence of the plasmodium parasite. As with schistosomiasis, there are a few reasons for this. The blood positivity in malaria is between 80 and 90%. Is there any special criteria that may be adopted to constitute the diagnosis of such cases? Acceptable as criteria in the diagnosis of malaria might be:
1. Time of the year. In Zimbabwe the season for malaria may be said to be between October and the end of May.
2. History of exposure in a malarial zone at least 10 days before the onset of the illness.
3. Malaria is unlikely in an African person over the age of 55 years.
4. Headache present in a patient over 8 years of age, since younger children, especially very young ones, do not seem to mention this symptom.
5. The presence of a mild to moderate splenomegaly.
6. A normal total leucocyte count or one with a leucopenia with lymphocytosis.
7. A haemoglobin of 80% or less.
8. A moderate to severe fever.

All three major criteria and four minor ones should be present to diagnose the disease.

Major Criteria
1. History of exposure in a malarial zone, at
least 10 days before the onset of the illness.
2. The onset of the attack in the malarial season.
3. A moderate to severe pyrexia.

Minor
1. Headache in a patient over 8 years of age.
2. The presence of a mild to moderately soft splenomegaly.
3. A normal total leucocyte count.
4. The patient, an African, is under the age of 55 years.
5. A haemoglobin of 80% or less.

SUMMARY

A clinical study of 78 consecutive cases – almost all by *P. falciparum* – was carried out. The population is semi-immune.

1. Most of the patients appeared to have contracted the disease when visiting the rural areas. Relapse malaria appears to be very uncommon.
2. The disease is very common in infants and children.
3. The spleen was palpable in about a third of all the cases, but the number of children who showed a splenomegaly was significantly greater than in the adults. The possibility that malaria is a cause of sequestration of the spleen is made.
4. A confident diagnosis of acute malaria is seldom made in the absence of positive blood smears.
5. Not uncommonly the main presenting symptoms were those of cough, diarrhoea or severe headache.
6. The main clinical types are described, the most common found being the anaemic type. There was one case which corresponded to the psychiatric type. Other types encountered included those of cerebral, renal, hepatic, gastrointestinal and algid.
7. Severe malaria may not uncommonly be seen in the malnourished infant or child.
8. A positive blood culture occurred in some of the cases with acute malaria but the importance of this finding was difficult to assess.
9. The criteria for considering a diagnosis of acute malaria in the absence of positive blood smears are made.
10. Often when chloroquine was given to a patient the fever dropped steeply.

REFERENCES