# A Study of the Clinical Features of Malaria in Rhodesia

BY

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## PART III.

### African Children.

We were able, through the kindness of Dr. E. Forbes, to study the reports of cases of African children up to six years of age admitted as suffering from malaria. Only those in whom a blood smear showed presence of parasites were accepted.

The greatest incidence of malaria in children up to the age of six, occurred in infants under one year (Fig. 17). It is known that African children born in an endemic region of malaria have an immunity towards the disease from their mother, due possibly to the transfer of IgG of the mother or to the persistence of foetal haemoglobin or from the mother's milk. From three months onwards the child loses this protection and often contracts malaria in a severe form. If the child recovers it usually acquires an immunity to the disease (McGregor 1970).

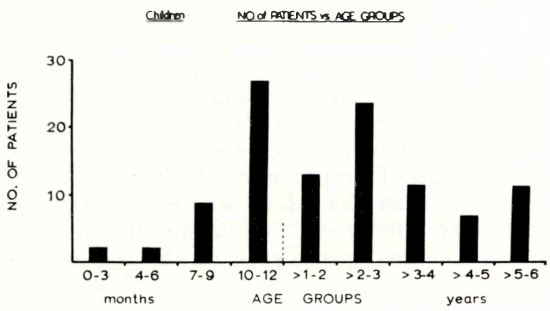


Fig. 17.

*Place of infection*: The areas where infection probably occurred are seen in Table 15.

*Table XV*

| *Area* | *Number* | *Percentage* |
|---|---|---|
| Mtoko | 20 | 19 |
| Mrewa | 12 | 11 |
| Malawi | 18 | 17 |
| P.E.A. | 11 | 10 |
| Mount Darwin | 11 | 10 |
| Umtali | 4 | 4 |
| Rusape | 3 | 3 |
| Inyanga | 4 | 4 |
| Charter | 1 | 1 |
| Unknown | 22 | 22 |

Fifty-two patients had been in the above areas less than three weeks before they took ill and five had been there under three months. Seventeen of the patients were definitely tribal in origin.

*Time of Year*: The highest incidence of malaria was in March (22 patients, 21 per cent.) followed by April and May (14 patients, 13 per cent.). (See Fig. 18).

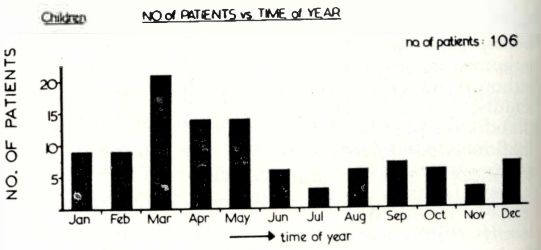


Fig. 18.

### Symptoms.

The most common symptoms noted were cough which was found in 29 per cent. of the cases, followed by diarrhoea in 22 per cent., abdominal pains in 15 per cent. and vomiting in 13 per cent.

*Table XVI*

Showing Symptoms of 106 African Children Under Six Years.

| *Symptoms* | *No. of Patients* (*Total* 106) | *Percentage* |
|---|---|---|
| Vomiting | 14 | 13,0 |
| Diarrhoea | 23 | 22,0 |
| Constipation | 3 | 3,0 |
| Cough | 31 | 29,0 |
| Headache | 10 | 9,0 |
| Chest | 2 | 1,8 |
| Abdominal pains | 16 | 15,0 |
| Leg and joint pains | 2 | 1,8 |
| General pains | 4 | 4,0 |
| Dysuria | 1 | 0,9 |
| Hot body | 6 | 5,6 |
| Swollen body | 1 | 0,9 |

### Signs.

*Pyrexia*: Most of the children had a severe fever and remained pyrexial for about two days. Thirty-two, however, remained apyrexial. (See Table 17).

*Table XVII*

Showing the Extent of the Pyrexia.

| | *No. of Patients* |
|---|---|
| Mild pyrexia 98,6-100°F | 7 |
| Moderate pyrexia 100,1-101°F | 16 |
| Severe pyrexia 101,1°F and above | 51 |

In the great majority of cases (65 per cent.) the fever returned to normal within two days. (See Table 18).

*Table XVIII*

| *No. of days pyrexia lasted.* | *No. of Patients* |
|---|---|
| 1 | 32 |
| 2 | 37 |
| 3 | 3 |
| 4 | 2 |
| 5 | 2 |

*Anaemia*: Very few children had a haemoglobin above 14,7 gm%. Most had haemoglobin counts between 10 and 14 gm% (Fig. 19). However, 10 children had a haemoglobin below 5 gm%.

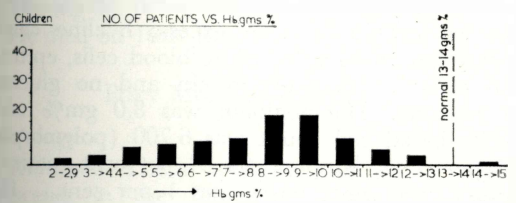


Fig. 19.

*Jaundice*: There were five children who had jaundice and in all of them it was mild. These children were not reported as being unduly ill.

*Enlarged Spleen*: Sixty-eight (64 per cent.) of the children had an enlarged spleen and two by as much as nine fingers enlargement. In the series of African adults, 52 per cent. had an enlarged spleen and in most of them the enlargement was 1-2 fingers in extent. In adults gross enlargement of the spleen due to acute malaria, is most uncommon whereas in children a markedly enlarged organ appears to develop more readily (see table below). In about a third of the children, the splenomegaly was slight and in another 25 per cent. of it was 2-3 fingers enlarged (moderate). Fairly well marked enlargement (four fingers and over) was noticed in about nine per cent. of the cases. (See Table 19).

*Table XIX*

ENLARGEMENT OF THE SPLEEN.

| *Degree of Enlargement* | *Number* | *Percentage (out of 106 cases)* |
|---|---|---|
| Tipped | 12 | 11 |
| 1 Finger | 21 | 20 |
| 2 Fingers | 19 | 18 |
| 3 Fingers | 8 | 7,5 |
| 4 Fingers | 4 | 3,8 |
| 5 Fingers | 2 | 1,8 |
| 9 Fingers | 2 | 1,8 |
| Total | 68 | 64 |

*Enlargement of the liver*: Fifty-one per cent. of the children had an enlarged liver as opposed to only 19 per cent. of the African adults, but in most of them it was slight. In 22 per cent. it was over two fingers enlarged.

DEGREE OF LIVER ENLARGEMENT IN 106 CASES

| *No. of Patients* | *Percentage* |
|---|---|
| Tipped 5 | 4,7 |
| 1 Finger 17 | 16,0 |
| 2 Fingers 23 | 22,0 |
| 3 Fingers 6 | 5,6 |
| 4 Fingers 2 | 1,8 |
| 5 Fingers 0 | 0,0 |
| 6 Fingers 1 | 0,9 |
| *Total* 54 | |

*Malaria Species*: As with the adult series, the most common parasite found was *P. falciparum* and about six per cent. had *P. malariae* (see Table 20). Most of the children had a moderate infection with ring forms only. Four patients showed a long standing infection with gametocytes only present in their blood slides (see Table 20).

*Table XX*

GIVING THE TYPES OF PLASMODIUM SPECIES IDENTIFIED.

| | *Percentage* |
|---|---|
| P. ovale | 1 |
| P. vivax | 0 |
| P. malariae | 6 |
| P. falciparum | 87 |
| Plasmodium sp | 7 |

In most of the children, the infection was moderate. (31-65 per cent. of the total r.b.c. were infected.) Goldsmid, personal communication). (See Table 21).

*Table XXI*

DEGREE OF PARASITIC INFECTION.

| *Ring forms only* | *No. of Patients* |
|---|---|
| Scanty | 8 |
| Moderate | 61 |
| Numerous | 22 |

*Ring forms and Gametocytes*: Gametocytes and ring forms in the same patient were found in about 10 per cent. of the cases.

| | |
|---|---|
| Scanty | 2 |
| Moderate | 8 |
| Numerous | 0 |

There were four cases in whom scanty gametocytes only were seen in the blood.

### Complications with Malaria.

Severe forms of the disease were encountered in five cases. No cases with cerebral malaria were encountered in the 106 children's cases studied.

*Nephrotic Syndrome*: One case with *P. malariae* associated with the nephrotic syndrome was recorded.

The patient, T.M., Hospital No. 124974, female aged three years from Mazoe was admitted in July (15.7.72). The patient presented with a history of a swollen body for three days. Examination showed periorbital oedema and oedema of the legs and sacrum. Her haemoglobin was 8,7 gm%, white blood cell count 8 200, E.S.R. 115 and sickling test negative. Schizonts of *P. malariae* were found in the blood smear. The level of enzyme glucose-6-phosphate dehydrogenase was normal. Her serum cholesterol was 317 mg%, serum potassium 5,6 mEq/L units, sodium 127 mEq./L units and blood urea 15.

Serum proteins were : Total 4,8 mg%, albumin 1,2 mg%, globulin 3,6 mg%, A/G 0,3/1.

Examination of the urine revealed the presence of granular casts, a few red blood cells, leucocytes and epithelial cells; viable *S. haematobium* ova were also present. The urine showed 5,7 gm of protein per 24 hours.

A renal biopsy was taken of the right kidney. Sections of the specimen showed marked protein leakage into the tubules, some of which were dilated and hypertrophied. The glomeruli showed mesangial sclerosis while the capillary loops varied from almost normal to the typical thickening of membranous glomerulonephritis.

The patient was maintained on a high protein diet but she continued to lose large amounts of protein in her urine. Two days after admission she was given primaquine and chloroquin and steroids twice a day.

She was discharged on 12.9.72 but was largely unimproved at the time of discharge and trace of her was lost.

### Typhoid Fever.

One case was recorded (15).

This patient, M.E., was seen by Dr. E. Forbes. He was six years old and had returned from Malawi ten days previously. He was admitted on 6.2.1970. His Hospital No. was 56977. He had been ill for a week and complained of weakness, a hot body and diarrhoea. Blood slides showed numerous ring forms of *P. falciparum*. A blood culture confirmed that he was also suffering from typhoid fever. His haemoglobin was 9,9 gm%. On admission, his temperature was 104,2°F.

The patient was treated with chloramphenicol and nivaquin and he was discharged after five days.

### Sickle Cell Anaemia.

One case was recorded. (17). This patient, B.M., was seen by Dr. E. Forbes. He was admitted in December (7.12.71). He was four years old and came from Salisbury.

He was admitted with a history of pains in his abdomen, vomiting and the passage of dark urine for two days. He complained of yellow eyes for one week. On examination, he was clinically anaemic and jaundiced and his spleen was two fingers enlarged. He was pyrexial for two days (100°F). Examinations of his urine showed urobilinogen in excess; hyaline casts, a few red blood cells, white blood cells, epithelial cells; a trace of protein and no glucose or acetone. Haemoglobin was 8,0 gm% and white blood cell count was 6 700 (polymorphs 44 per cent., lymphocytes 54 per cent., eosinophils 1 per cent., monocytes 1 per cent.). He had a reticulocyte count of 15 per cent. and his blood platelets were slightly reduced. Electrophoresis of his blood showed him to be a homozygote sickler. In the blood smears scanty ring forms of *P. falciparum* were found. Biochemical examination showed total bilirubin 1,9 mg% and conjugated bilirubin of 0,83 mg%, an alkaline phosphatase level of 22 K.A.U./100 ml (normal 3,3 to 12,9), serum G.O.T. 20 i.u./L (normal four to 20) serum G.P.T. 4 i.e./L (normal 16 to 35). The patient was treated with nivaquin and was discharged after five days.

### Mortality.

There were two deaths. One had malaria and glomerulo-nephritis and the other had malaria with marasmic kwashiorkor. (Cases 13 and 16).

Case Report 13. This patient, K.S. (97722) was seen by Dr. E. Forbes and was admitted in April (23.4.71). He was five years old and came from Salisbury.

He was admitted with a history of cough for four days as well as swelling of the face and legs. On examination, his liver was palpable three fingers below the right costal margin and his spleen was grossly enlarged. His blood pressure was 170/110; his fundi were normal. He was found to have ascites and was thought to have early kwashiorkor. He was mildly pyrexial. Blood slides showed ring forms of *P. falciparum*. Haemoglobin was 9,4

gm% and his white blood cell count was 6 500 (eosinophils 8%-520). Examination of his urine revealed granular casts, a few red blood cells and large amounts of albumin. Also found was an insignificant growth of *E. coli* and viable ova of *S. haematobium*. Examination of his faeces *S. mansoni ova*. His serum cholesterol level was 220mg% and his total serum proteins were 4,0 gm% (albumin 1,3 gm%, globulin 2,7 gm%, AG 0,5). His blood urea was 40 mg% and electrolytes were Na 135 mEq/1, K.4,6 mEq/L.

The patient was treated for nephrotic syndrome but in July he became very ill. On 5th July his serum electrolytes were Na 167 mEq/1, K.4,2 mEq/1. His blood urea was 51 mg%. By 16th July his blood urea had risen to 145 mg%.

He died on 16th July.

### Post Mortem Findings.

*Histology*

*Kidneys*: There were a number of early crescents in the Bowman's capsules. There were also some capsular adhesions. In most glomerular tufts there was some mesangial thickening and in a few there was sclerosis of the tuft. A few tufts were hypercellular. There was some thickening of the basement membrane. The arteriolar walls were thickened. Granular and hyaline casts were seen in many of the loops of Henle and collecting tubules.

*Liver*: Heavy deposits of black pigment were seen in portal areas and Kupffer cells.

*Brain*: At the edge of the necrotic tissue were fairly numerous astrocytes and petechial haemorrhages.

Case Report 16. Patient was seen by Dr. E. Forbes. C.D., male, aged one year from P.E.A. He was admitted in October (30.10.70). His Hospital No. is 84758.

He was admitted with a history of vomiting, diarrhoea and coughing for one week. On examination his liver was one finger enlarged. He was apyrexial. His total serum proteins were 3,2 gm% with albumin, 1,1 gm% and globulin 2,1 gm%. His serum electrolytes were Na 118 mEq/L, K 1,2 mEq/L and Cl 100 mEq/1. His blood urea was 22 mg% and his blood sugar 62 mg%. Blood slides showed a moderate mixed infection of *P. malariae* and *P. falciparum*. His haemoglobin was 10,8 gm% and his platelet count was 2 900. The patient was *marasmic* and died three days after admission.

He had been treated with nivaquin.

### Mortality.

Out of 106 children studied, two died (1,8 per cent.) — Case Reports 13 and 16. One child suffered from marasmic kwashiorkor.

According to I. A. McGregor (1971), children with marasmic kwashiorkor or kwashiorkor are less prone to malaria than other children. Our results support this view. Out of a total of 5 141 patients admitted to the paediatric wards 60 (1,2 per cent.) suffered from either kwashiorkor or marasmic kwashiorkor. Of these only one had malaria. (Case Report 16).

Cases 13 and 14 both had nephrotic syndrome: one had *P. falciparum* and *P. malariae*.

There were two deaths (Case Reports 13 and 16). The latter probably died because of his kwashiorkor as he only had a moderate infection of malaria. People have noticed that there is an uncommon association between kwashiorkor and severe malaria.

*(to be concluded)*