

Clinical manifestations of severe forms of *P. falciparum* malaria in Koraput district of Orissa state, India

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The Orissa state on the east coast of India is endemic for malaria for decades¹. The state with a population of 3.6%, contributes about 22% of all malaria cases, 43% of the *Plasmodium falciparum* cases and 33% of total malaria related deaths in the country. Out of 30 districts in Orissa 27 are endemic for malaria and the average annual parasite incidence (API) for the state is 18.6 (\pm 13.7). The Koraput district (17°50'N and 20°30'N, 81°27' and 84°10'E) has an average API of 20.3. Transmission of malaria is perennial in all hilltop and foothill villages². Since malaria remains a major killer disease in this area, there is a need to understand the progress of clinical manifestations of the disease from acute stage to complications and to determine a clinical stage where the patients enter clinical severity so that an early warning system can be developed to prevent serious morbidity and mortality due to malaria. Therefore, a situation analysis has been carried out to know the spectrum of severe and complicated forms of falciparum malaria in this district.

A verbal autopsy was carried out in the study area to know the causes of deaths. Patients admitted at the district headquarters hospital (DHH) at Koraput, primarily with a history of fever constituted the study subjects. Types of serious and complicated manifestations of malaria were assessed from the

patients admitted with parasitologically confirmed *P. falciparum* malaria cases for a period of 20 months. The cause and effect of malaria were confirmed by the methods of: (i) exclusion by the results of laboratory investigation(s) for malaria parasite; and (ii) response to antimalarial therapy. Systemic involvements due to malaria were calculated as the proportion of involvement of a particular system to the total number of cases admitted. Clinical grading and involvement of organs in each system was looked into. Secondly, age-group wise analysis was carried out to know the preferential involvement of system/organ in malaria according to age groups, if any.

Fever (47%) followed by gastroenteritis (38.1%) was the predominant cause of mortality in the study population (Fig. 1). Out of 133 deaths that occurred at the DHH during the study period, 17 (12.8%) were due to cerebral malaria only and 13 (9.8%) due to respiratory infections. Stillbirth accounted for 21 (15.8%) deaths. The other important causes were tuberculosis and road accidents. Hyperpyrexia accounted for 32.7% followed by respiratory and central nervous system (CNS) involvement (13.2 and 11.8%, respectively) (Table 1). Hyperparasitaemia could not be elucidated due to lack of data on absolute parasite count. The presentations of CNS involvement showed a spectrum of clinical pictures

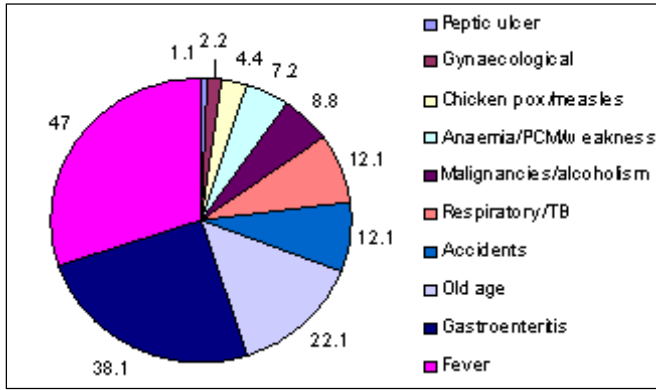


Fig. 1: Causes of mortality in the study area, based on verbal autopsy

varying from restlessness at one end to coma of grade III at the other end. About 38.5% of cases with CNS manifestations were admitted with grade III comatose conditions. Respiratory system, that is involved in 11.8% of cases, also has a wide range of presentations, majority with pneumonia. The involvement of gastrointestinal system manifested as simple choleric or dysenteric form of diarrhoea at one end to black water fever at the other end. Hepatosplenic involvement included tropical splenomegaly syndrome (TSS) like manifestation. There has also been

opportunistic infection mostly due to non-typhoidal gram-negative bacteria. More than 50% of all cases with CNS manifestations are children below 14 yr of age. Similarly, involvement of kidney and association of sickle-cell disease have been observed more in children (Table 1).

Falciparum malaria could present in several forms. The clinical assessment should include functions of CNS, presence of respiratory distress, hydration status, presence of hyperpyrexia and severity of anaemia. Two clinical entities: cerebral malaria and severe anaemia may lead to rapid health deterioration³⁻⁶. Hyperpyrexia in children could be associated with convulsions⁷. There is a significant overlap of clinical presentations of malaria and respiratory diseases, especially pneumonia in children in malaria endemic areas⁸⁻¹⁰. This emphasises the need for rationalising the treatment of fever cases with antimalarials in high endemic areas where rapid development of chloroquine resistant strain of *P. falciparum* occurs.

In the present study, hyperpyrexia is the most common form of severe manifestation and involvement

Table 1. Severe manifestations of *P. falciparum* malaria according to different age groups in Koraput district, Orissa

System	Age group (yr)					Total
	0-<1	1-4	5-9	10-14	>14	
Hyperpyrexia	1	13	27	15	182	238
CNS	3	20	17	7	39	86
Respiratory	4	10	10	1	71	96
Gastrointestinal	0	8	1	5	61	75
Renal	0	3	5	0	7	15
Sickle-cell disease	1	1	4	4	10	20
Enteric	0	2	1	1	12	16
Cardiovascular	0	15	0	1	2	18
Anaemia	0	2	0	1	9	12
Others	6	8	19	5	113	151
Total	15	82	84	40	506	727

of respiratory system is about 13%. Therefore, use of cotrimoxazole for the treatment of fever cases, which is effective in pneumonia and also has anti-malarial activity might minimise the development of complications of respiratory tract infections in this area. Any manifestation with CNS involvement has been considered as cerebral malaria as suggested¹¹. Retinal haemorrhage, very common and always associated with cerebral malaria cases in Africa and Thailand¹² is not observed in this area. Black water fevers (malaria haemoglobinuria), common in holo and hyper endemic areas are now rare because of use of chloroquine. Haemoglobinuria may also occur due to 8-aminoquinolines and sulfa drugs in Glucose-6-phosphate dehydrogenase (G-6-PD) deficient individuals¹³.

The present study with cases of black water fever might have been due to indulgence to alcohol, excessive physical exertion or cold climate in cases of repeated falciparum infection. However, deficiency of G-6-PD in the tribal population cannot be ruled out. Renal function is a sensitive prognostic indicator in adults with severe falciparum malaria in Southeast Asia¹⁴. In the present study 2.1% of all severe falciparum cases had renal dysfunction and >50% were children.

As the pattern of severe malaria is defined and refined more in future, it is likely that new syndromes will emerge. Though the public health department is taking all preventive and curative steps by mobilising the available manpower, machinery and resources, a good number of cases with severe manifestations of malaria are encountered in the community. The magnitude may be a tip of the ice-berg since this hospital is a referral hospital and patients are referred after incomplete or mismanagement at the peripheral dispensaries. Many cases might not have received any medical attention due to various causes at the village-level and might not have been recorded at all. Hence, it is necessary to workout the actual number and development of methods or

parameters for an early warning at the hospital-level and suggest steps for medical practitioners to save the patients from life threatening consequences.

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