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Study comparing the clinical profile of complicated cases of *Plasmodium falciparum* malaria among adults and children

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ABSTRACT

Objective: To compare the clinical profile of *Plasmodium falciparum* (*P. falciparum*) malaria in adults and children. **Methods:** In this retrospective study, data were collected from case records of patients admitted with *P. falciparum* malaria to the paediatric and adult critical care facility of a tertiary care hospital in an endemic area. A total of 20 adults and children were compared for their symptoms. **Results:** In this study, among all adults and children with *P. falciparum* malaria, the commonest symptom was fever with chills and rigors. Among children, the next common symptoms were altered sensorium and irritability. Nine children (45%) had cerebral malaria, among which five had seizures. Other common manifestations were reduced urine output (35%) and vomiting (35%). Among adults, vomiting (65%) was the most common symptom followed by headache (60%). Eight (40%) adults had jaundice while nine (45%) had complaints of decreased urine output. Among adults, 4 had altered sensorium, of which 2 had seizures and jaundice; and all 4 had renal impairment. **Conclusions:** Clinical symptoms and profile of *P. falciparum* malaria differ among age groups. Early recognition of symptoms and treatment of malaria is paramount especially in children who tend to have higher rates of complications compared to adults.

1. Introduction

According to UNICEF, around the world one child death occurs due to malaria every 30 seconds[1]. The usual symptoms are headache, lassitude, fatigue, abdominal discomfort, myalgia and arthralgia, which are usually followed by fever, chills and rigors, perspiration, anorexia, vomiting and worsening malaise. The symptoms of malaria are non-specific, and similar to other systemic viral and bacterial illnesses. Due to the similarity in symptoms with viral and bacterial infections, malaria is frequently considered as a diagnosis in endemic areas. This is to be well appreciated, as malaria in the early course of the disease is a potentially treatable disease with oral

medications[2]. At times, blood smears are negative in spite of having malarial infection. With the advent of new diagnostic techniques, identification of the parasites have become easier.

The treatment given at appropriate dosage and without delay, particularly in *Plasmodium falciparum* (*P. falciparum*) malaria, reduces the parasite load, complications and mortality. Manifestations of severe malaria include one or more of the following: cerebral malaria, metabolic acidosis, severe anaemia, hypoglycaemia, acute renal failure or acute pulmonary oedema. The case fatality in severe malaria receiving treatment is around 10%–20% and in untreated cases most are fatal[2].

2. Materials and methods

2.1. Method of collection of data

The data were collected from case records of patients

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admitted with severe *P. falciparum* malaria, to the paediatric and adult critical care wards of a tertiary care hospital in an endemic area.

Study design: This is a retrospective study with data collected from case records of patients' admitted in Critical Care facility of tertiary hospital. A total of 20 adult patients and 20 children were compared for the above study.

The data assessed were the clinical history and examination parameters were noted. The diagnosis of *P. falciparum* malaria was established by peripheral blood film (PBF), and severe malaria was categorized as per World Health Organization guidelines^[3]. Severe malaria in the form of cerebral malaria, severe anaemia (Hb<5 mg/dL), severe thrombocytopenia (platelet count–50 000/mm³), pancytopenia, jaundice (>3 mg/dL), splenic rupture, acute renal failure (serum creatinine >3 mg/dL) and acute respiratory distress syndrome were included in the study^[3, 4].

2.1.1. Inclusion criteria

Individuals above the age of 18 years were considered as adults and below the age of 18 years as children.

Individuals having *P. falciparum* mono-infections were only included in the study.

2.1.2. Exclusion criteria

Patients diagnosed as *Plasmodium vivax* or mixed malarial infections.

Diagnostic methods used to detect malaria parasites: conventional thick and thin PBFs stained with Giemsa were examined under oil immersion and confirmed by immunofluorescent smear study. Slides were considered negative when there were no parasites in 100 high-power fields.

The data was captured on a Microsoft Excel sheet and analysed.

3. Results

The average age of adults was 37.2 years and that of children was 6 years. Fever with chills and rigors were the commonest symptom in both groups, accounting to 38 (95%) patients.

In the present study, the most common clinical symptoms of *P. falciparum* malaria in adults were vomiting, headache, followed by decreased urine output. Thirteen (65%) adults out of the 20 chosen had vomiting as a symptom followed by 12 (60%) who had headache. Eight (40%) adults had jaundice while 9 (45%) had complaints of decreased urine output.

Coryza was found in ten (50%) children with *P. falciparum* malaria, while nine (45%) had altered sensorium. The symptoms of vomiting and reduced urine output were noticed in 7 children.

4. Discussion

Infants and young children suffer from manifestations of severe malaria and have associated higher mortality^[4–7]. Severe malaria is less common in older children and adults because of acquisition of partial immunity. In areas of low to moderate transmission (South–East Asia) people of all age groups are vulnerable to severe malaria^[3].

In our study, children presented most commonly with altered sensorium. Nine children (45%) had cerebral malaria, five of whom had seizures. Three of these children died. Other common manifestations were renal failure (35%) and vomiting (35%).

In various studies done on childhood *falciparum* malaria, the most common manifestations of severe malaria in children included severe anemia, cerebral malaria and acidosis^[4–7]. Acute renal failure, respiratory distress (ARDS) and jaundice are rarely encountered in children^[8]. Adults, on the other hand, suffer from multi-organ involvement like acute renal failure as compared to adults, respiratory distress apart from cerebral malaria^[8,9]. In our study, significant number of children had renal failure.

In study done on African children with malaria, the presence of impaired consciousness or respiratory distress was identified as high risk for death^[10–12].

In a study done in Kenya^[13], 1 223 children admitted with malaria, 293 (24%) had severe anaemia (haemoglobin level < 5.0 g/dL). There were 265 (22%) deaths; 121 (10%) occurred in-hospital and 144 (13%) occurred out-of-hospital within eight weeks after admission. Of all the deaths 32% were associated with malaria.

Clinical profile of malaria among Indian children differed from the studies reported from African population. Multiple organ dysfunctions emerged as an important presenting feature and a new predictor of death in childhood malaria seen in India^[3].

In our study, adults presented with vomiting (65%) as the most common symptom followed by 60% who had headache. Eight (40%) adults had jaundice while 9 (45%) had complaints of decreased urine output. Only 4 patients had altered sensorium of whom 2 had seizures and jaundice; all 4 had renal failure. One among the 4 died.

A study done in Jabalpur^[14], comparing complication rates among children and adults having cerebral malaria showed jaundice (26%), acute renal failure (22%), respiratory distress (22%), severe malaria anemia (18%), hypotension (17%), hepatic encephalopathy (7.0%), and hematuria (5%). Among these cases, seizures and severe malaria anemia were significantly higher in children compared with adults, whereas jaundice, acute renal failure, and hematuria were significantly higher among adults. Mortality was high among adults with multiple organ failures. Overall case fatality rate was 21%.

Another study done in Berhampur^[15], showed that cerebral

malaria alone or in combination with other complications is still the commonest form of complicated malaria. The presence cerebral malaria, jaundice, and renal failure as complications were more common than other combinations.

A study by Kochar *et al*[17], on adult patients admitted with cerebral malaria. Apart from fever and unconsciousness, in all the patients, incidence of jaundice and haemoglobinuria were high. Other features like convulsion (21.31%), neck rigidity (19%) and psychosis (5.21%) were prominent among the subjects.

The common clinical features of severe *falciparum* malaria in literature were cerebral malaria, metabolic acidosis, acute renal failure, respiratory distress, severe anemia, thrombocytopenia, coagulopathy, hypotension, hyperbilirubinemia, hepatic encephalopathy, hypoglycaemia and convulsions[3,17–25].

Clinical profile of *P. falciparum* malaria differs not only over age groups but also depend on endemicity of malaria and the ethnicity of people. In the present study we were able to observe a variation in the clinical profile of *P. falciparum* malaria. We need to conduct more studies to ascertain the changing trends in the manifesting symptoms of *P. falciparum* malaria.

Conflict of interest statement

We declare that we have no conflict of interest.

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