

Severe Malaria: A clinical-epidemiological study

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ABSTRACT

Plasmodium vivax, thought to be benign until recently, has been associated with severe malaria and its complications. This study describes severe and complicated *P. vivax* malaria in children. It affected almost all of the organ systems and the most commonly found complications were thrombocytopenia and severe anaemia. All children with malaria, including malaria caused by *P. vivax*, should be monitored for such complications. A review of record was carried out all diagnose cases of malaria admitted at Jaipur of SIR PADAMPAT MOTHER & CHILD HEALTH INSTITUTE, (SMS MEDICAL COLLEGE) JAIPUR from Jun 2011 to Sep. 2012. Out of the 79 admitted cases of malaria 41 cases severe *P. vivax* malaria and 7 cases of *P. falciparum* malaria.

INTRODUCTION

It is estimated that 2 billion people are risk for malaria world over with 300 to 500 million cases resulting in 1 to 2 million deaths. Children are more likely to suffer from severe manifestations of the disease and of these almost 85% of deaths occur in children under five years of age. In India 60 to 65% of the infections are due to *P. vivax* malaria and 35% due to *P. falciparum*. On the cusp of II decade of 20th century, malaria continues to have a global health impact. *P. falciparum* has justifiably attracted the most attention, as it held responsible for near all global severe morbidity and mortality.¹

Plasmodium vivax is now recognized as a cause of severe and fatal malaria despite its low parasite biomass, the increased deformability of vivax-infected red blood cells and apparent paucity of parasite sequestration. The pathogenesis severe vivax malaria is quite intriguing.²

Taking this background, we planned a study in a tertiary care centre in Jaipur from June 2011 to Sep. 2012 to note the clinical profile of patients admitted with severe vivax malaria .

MATERIALS AND METHODS

The study was conducted at the Department of Paediatrics tertiary care centre in Jaipur India between June 2011 and Sep. 2012. Patients up to 15 years of age who tested positive for *P. vivax* malaria by PBF examination/Optimal test and who had been admitted for treatment in the Department of Paediatrics were eligible for inclusion in the study. Children infected with *P. falciparum*, both *P. vivax* and malaria falciparum, treated on an outpatient department (OPD) basis, empirically treated for malaria (negative for malaria parasite) and with other co-infection (tested when clinically indicated) were excluded from study. Data listing the the general and systemic examination findings were noted for all included patients. Complete blood counts and renal function tests were performed for all patients. Liver function tests, blood gas analysis another tests (blood culture, serum Widal, Dengue serology, etc.) were performed as clinically indicated. Children with *P. vivax* infection were assessed for complications.

Severe malaria and complications were defined as per the World Health Organization (WHO) criteria.³

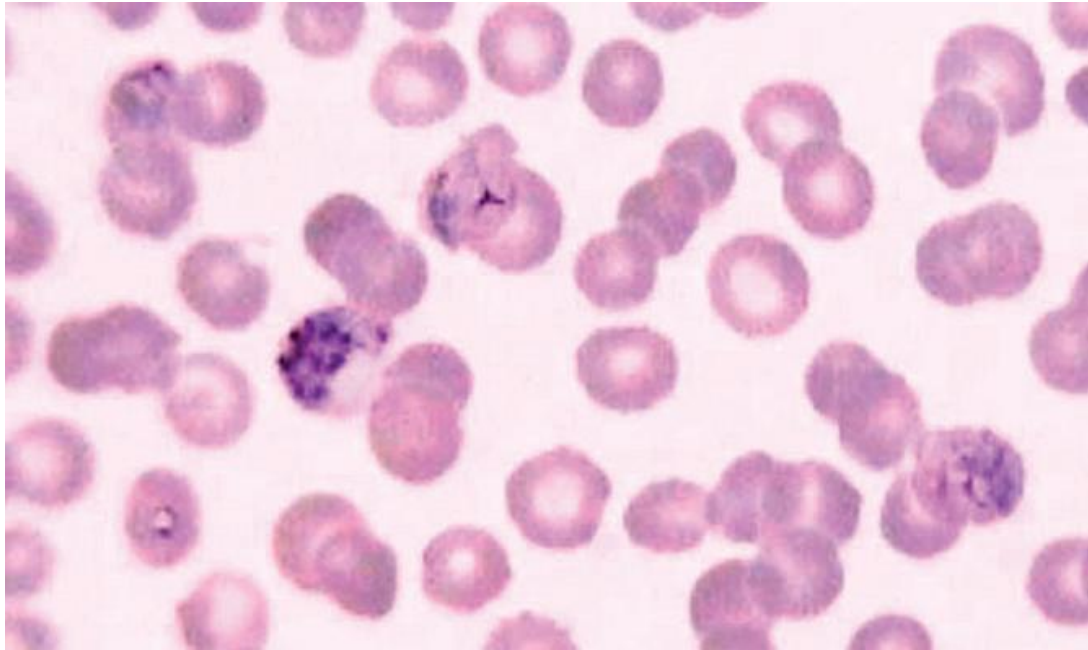


Figure 1: Peripheral blood smear (Giemsa stain, magnification ×1,000) showing ring, trophozoite, and schizont stages of *Plasmodium vivax*.

RESULTS

Out of the 79 admitted cases of malaria 41 cases severe *P. Vivax* malaria and 7 cases of *P. Falciparum* malaria. From this group 27 were males and 14 were females diagnose based *P. Vivax* was established by PBF examination/Optimal test. Most of the patients come from remote areas of Jaipur district.

A total of 79 cases of malaria were admitted during the study period. Of these, 38 were excluded (7 with *P. falciparum* infection; 31 with uncomplicated *P. vivax* malaria).

The remaining 41 cases (27 were male and 14 were female) of severe *P. vivax* infection were included in the study. The mean age of children was 8.6 years (range, 15 months to 15 years). thirty (71%) were from rural areas and eleven (27%) were from urban areas.

Fever was the main presenting complaint and was present in all patients. The mean duration of fever before presentation was 4 days (range, 2– 8 days). Chills and rigors were present in 88% and were absent in five (12%) patients. Presenting complaints other than fever and physical findings at admission are shown in Table 1. The diagnosis of *P. vivax* malaria was made by peripheral blood smear tests in all patients. The rapid card test were performed in ten patients and these results corresponded with the peripheral blood smear results. The mean haemoglobin, total leucocyte counts and platelet counts of the patients are shown in Table 2. the coagulation profile (done for 5 patients) were abnormal. Blood culture (9 patients), serum Widal (20 patients) and dengue serology (9 patients) were negative. The complications suggestive of severe malaria due to *P. vivax* infection are summarized in Table 2. All patients had one or more complications with the most common being thrombocytopenia.



**2 ½ years old male present
Black water fever with *P. Vivax* malaria**



**11 Year male on Peritoneal
dialysis**

Table 1: Presenting complaints other than fever and physical findings on admission in children with P. vivax infection organ system/physical findings.

Gastrointestinal symptoms: Vomiting (13), pain abdomen(4), abdomen distension(1)
Central nervous system symptoms: Seizures (5), altered sensorium (3), headache (3)
Respiratory symptoms: Respiratory difficulty (3),cough (6).
Abnormal bleeding: Nose bleed (2), blood in vomitus (1), black colour stool (2) red coloured urine (3)
Skin lesions: Petechial rash (5)
Urinary system: Decreased urine output (5)
Haematological(pallor) some pallor (10), severe pallor (12)
Jaundice (4)
Only Hepatomegaly (2) Mean liver size below right costal margin 3.0+2.7 cm (Maximum 10 cm)
Only Splenomegaly (6) Mean spleen below left costal margin 2.4+3.0 cm (Maximum 15 cm)
Both hepato- and splenomegaly (29), no hepatosplenomegaly(4)
Miscellaneous anasarca (3),refusal to feed (6).
Note: Many patients had a combination of the complaints/findings

Table 2: complications suggestive of severe malaria % (patients)

Thrombocytopenia-83%(34)
Severe anaemia-29%(12)
Abnormal bleeding -20%(8)
Acute renal failure-12%(5)
Jaundice/hepatic dysfunction(include derange coagulation profile)- 20%(8)
Cerebral malaria-20% (8)
Shock-7%(3)
Multi-organ dysfunction- 12%(5)
Respiratory distress -12%(5)
Mortality- None
Hypoglycaemia- None
In this study lowest value of Hb (g/dL) value 2.7 and platelet count (per mm³) lowest value was 10000.
oral chloroquine (1), oral artesunate (2), injection artesunate(24) and injection quinine (14) were used as antimalarials ,
twelve children were received packed cell transfusion, twelve children were received platelet concentration and five children were received fresh frozen plasma.
Three Patients were given Peritoneal dialysis.
The mean (+SD) duration of hospital stay was 4.6 days with a range of 2–12 days. All except one patient(LAMA) survived.

DISCUSSION

The reported severe manifestations in vivax malaria include thrombocytopenia ,abnormal bleeding, cerebral malaria, hepatic dysfunction, renal dysfunction, severe anaemia, ARDS, and multiple organ involvement. In this prospective study, we recruited 41 patients severe P. vivax malaria during the study period from June 2011 to Sep. 2012.. In studies from Indonesia, Papua New Guinea, Thailand and India about 21–27% of patients with severe malaria were associated with P. vivax mono-infection.⁵ Most case reports describe complications due to P. vivax malaria in children. Kochar et al.⁶ (from Bikaner, India) and Rodríguez-Morales et al.⁷ (from Sucre, Venezuela) presented series on complicated P. vivax malaria in children – cases of only anaemia and thrombocytopenia were included in a later study.

Table 3: comparison of complications suggestive of severe malaria and other findings in the present study and other studies in children with P. vivax infection

Complications/findings	Present study % (patients)	Kana Ram et al. ⁵ % (patients)	Kochar et al. ⁶ % (patients)	Rodríguez-Morales et al. ⁷ % (patients)
Thrombocytopenia	83	86	-	58.9
Severe anaemia	29	23.3	75.4	10.26
Abnormal bleeding	20	11.6	10.7	-
Acute renal failure	12	9.3	15.4	-

Jaundice/hepatic dysfunction	20	9.3	26.2	-
Cerebral malaria	20	7.0	13.9	-
Shock	7	2.3	-	-
Multi-organ dysfunction	12	13.9	47.7	-
Respiratory distress	12	9.3	10.8	-
Mortality	none	2.3	6.2	-
Hypoglycaemia	none	none	none	-

CONCLUSION

The *P. vivax* malaria which, until recently, was considered to be benign malaria may cause severe malaria in children with significant morbidity and even, although uncommon, mortality. Thrombocytopenia and severe anaemia were the most common complications of *P. vivax* malaria in children. There is an urgent need to re-examine the clinical spectrum and burden of *P. Vivax* malaria, so that adequate control measures can be implemented against this emerging but neglected disease.

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