

Study on Complications of Vivax Malaria in Tertiary Care Hospital, Ranchi

*Dr. Divya singh¹, Dr. Rani Manisha², Dr. Kamal Narayan Prasad³,
Dr. Pankaj Kumar Singh

¹(Medical Officer, Ex-Senior Resident, Department of paediatrics, RIIMS, Ranchi)

²(Junior Resident, Department of paediatrics, RIIMS, Ranchi)

³(Junior Resident, Department of paediatrics, RIIMS, Ranchi)

⁴(Junior Resident, Department of paediatrics, RIIMS, Ranchi)

Corresponding author: *Dr. Divya singh

Abstract

Introduction: Most of the complications of cerebral malaria are seen commonly with plasmodium falciparum malaria. But severe cases and deaths due to vivax malaria have been reported from all endemic regions. In many endemic countries, like India, the poorest and most marginalized communities have both the highest risks associated with *P. vivax* malaria and the least access to effective preventive, diagnostic and curative services.

Aims and objectives: To study various complications in pediatric age group in patients of severe vivax malaria. Severe vivax malaria was defined as per WHO criteria.

Materials and Methods: This was a retrospective observational study done at a tertiary care hospital in Ranchi over one year period from June 2016 to May 2017. 55 pediatric indoor patients positive for vivax malarial infection based on peripheral smear or malarial antigen (LDH) spot test were included in the study. Their demographic profile, complications, course in ward till discharge or death was noted.

Results: 55 cases of malaria infected with vivax were included in the study. Severe disease was present in 21 cases of vivax malaria. The complications seen in vivax malaria were thrombocytopenia(38.2%), anaemia(20%), hypoglycemia(10.9%), acidosis(9%), cerebral malaria(5.5%), shock(5.5%), unconsciousness(3.6%), acute renal failure (3.6%), pulmonary edema(3.6%) and death (1.8%).

Conclusions: The trend of plasmodium vivax malaria is changing as more and more serious and life threatening complications are occurring with vivax malaria so there is need of adequate measures that can be implemented against severe vivax malaria in endemic areas of India like Jharkhand, also further research is needed to understand the exact pathogenesis of severe vivax malaria and its complications.

Keywords: vivax Malaria, complications,

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I. Introduction

In India, malaria is a serious health problem which causes significant mortality and morbidity. Among all species of malaria, vivax malaria has been considered as a benign disease with rarely any complications but in the past few years there has been change observed in clinical manifestations of vivax malaria with many cases of severe vivax malaria and even some cases resulted in death although the exact cause of changes in the clinical profile of vivax malaria are uncertain. It was previously presumed that the severe disease with vivax infection is actually caused by coinfection of vivax and falciparum species however with application of the recently developed tests of malarial antigen and the nucleic acid amplification technique it has become evident that vivax mono-infection can be a cause of severe malaria and death(6). Hence this study was done to find out incidence of various complications of vivax in pediatric age group patients at Rajendra Institute of Medical Sciences, Ranchi, a tertiary care hospital.

Plasmodium vivax has the widest geographical distribution of the four human malarias, with about 35% of the world's population being at risk (1) There were an estimated 15.8 million symptomatic cases of *P. vivax* malaria globally in 2013 (uncertainty range 11.9–22.0 million), of which two thirds occurred in the WHO South-East Asia Region(2). The spectrum of disease associated with *P. vivax* infection ranges from asymptomatic parasitaemia, to uncomplicated febrile illness, to severe and fatal malaria (4,5). In non-immune individuals, *P. vivax* malaria gives rise to a well-defined paroxysmal fever with a periodicity of 24 or 48 hours, usually preceded by chills with rigour. Other symptoms and signs include headache, anorexia, myalgia, abdominal pain, cough, diarrhoea, restlessness, delirium and anaemia. *P. vivax* malaria causes severe anaemia,

particularly in infancy and in prolonged, untreated or recurrent infections. It has also been associated with malnutrition in childhood. Acute *P. vivax* disease has also been associated with severe malaria and death(6).

Clinical manifestations of severe *P. vivax* malaria include severe anaemia (<5 mg haemoglobin/dL), thrombocytopenia, acute pulmonary oedema and, less commonly, cerebral malaria, pancytopenia, jaundice, splenic rupture, haemoglobinuria, acute renal failure and shock. Coma and other neurological complications are rare, as is the case with severe *P. falciparum* malaria outside of Africa. Metabolic acidosis and coma occur less frequently in severe *P. vivax* malaria(6). Severe *P. vivax* malaria is characterized by lower blood-stage parasitaemia than is observed in severe cases of falciparum malaria. Unlike *P. falciparum* infection, *P. vivax*-associated pathogenesis is not associated with significant microvascular obstruction of vital organs. Nevertheless, low blood-stage parasitaemia may mask parasite sequestration outside the vascular system (e.g. in the spleen), which may explain development of complications at relatively low levels of parasitaemia. The severity of anaemia observed with low parasitaemia may also be due to the cumulative impact of multiple *P. vivax* relapses(6). Also enhanced inflammatory responses as well as the sequestration of parasitized red cells in microcirculation are thought to be the possible mechanisms as the inflammatory and immunological response plays a significant role in pathophysiology of severe vivax malaria(7).

II. Material and methods

It was a retrospective observational study carried out at department of pediatrics, Rajendra Institute of Medical Sciences, Ranchi. Study duration was one year(june 2016 –may 2017) . A total of 55 cases admitted with acute onset fever and diagnosed as vivax malaria based on positive peripheral smear examination or malarial antigen (LDH) spot test were included in the study. Clinical history, examination findings and laboratory data including blood counts, general blood picture, liver function tests, renal functions tests, blood gas analysis, serum electrolytes, and blood glucose were recorded.

Definition of severe vivax malaria (7)

Severe malaria was defined according to WHO definition, that is, presumptive diagnosis of malaria with documented plasmodium asexual parasitemia and one or more of the following features:

- 1.Impaired consciousness:** Blantyre coma score <3 in children.
- 2.Prostration:** Generalized weakness so that the patient is unable to sit, stand or walk without assistance.
- 3. Multiple convulsions:** More than two episodes within 24 hours.
- 4.Acidosis:** A base deficit of >8 mEq/L or, if not available, a plasma bicarbonate level of <15 mmol/L or venous plasma lactate \geq 5 mmol/L. Severe acidosis manifests clinically as respiratory distress (rapid, deep, laboured breathing).
- 5. Hypoglycaemia:** Blood or plasma glucose <2.2 mmol/L (<40 mg/dl).
- 6. Severe malaria anaemia:** Haemoglobin concentration \leq 5 g/dL or a haematocrit of \leq 15% in children <12 years of age with a parasite count of >10 000/ μ L.
- 7. Renal impairment:** Plasma or serum creatinine >265 μ mol/L (3 mg/dL) or blood urea >100 000/ μ L.
- 8. Jaundice:** Plasma or serum bilirubin >50 μ mol/L (3 mg/dL) with parasite count >100 000/ μ L.
- 9. Pulmonary oedema:** Radiologically confirmed or oxygen saturation <92% on room air with a respiratory rate >30/min, often with chest indrawing and crepitations on auscultation.
- 10. Significant bleeding:** Including recurrent or prolonged bleeding from the nose, gums or venepuncture sites; haematemesis or melaena.
- 11. Shock:** Compensated shock is defined as capillary refill \geq 3 s or temperature gradient on leg (mid to proximal limb), but no hypotension. Decompensated shock is defined as systolic blood pressure <70 mm Hg in children or with evidence of impaired perfusion (cool peripheries or prolonged capillary refill).

All patients received treatment based on WHO recommendations for antimalarial chemotherapy. Complicated vivax malaria was treated like falciparum malaria using artemisinin based combination therapy (ACT).

III. Result

Table – 1 AGE & Sex Distribution Of Cases Under Study (N = 55)

SL. No.	Age distribution (in years)	Male		Female		Total	
		No. of cases	%	No. of cases	%	No. of cases	%
1.	0 – 1	1	1.8%	0	0%	1	1.8%
2.	1 – 5	6	10.9%	7	12.7%	13	23.6%
3.	5 – 10	13	23.6%	10	18.2%	22	40%
4.	> 10	10	18.2%	8	14.5%	18	32.7%

	Total	30	54.5%	25	45.5%	55	100%
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Table – 2
Tribal & Non – Tribal Distribution Of Cases Under Study (N = 50)

	No. of cases	Percentage
Tribal	37	67.3%
Non - Tribal	18	32.7%
Total	55	100%

Table – 3
Various Clinical Features Of Cases Under Study (N =55)

Sl. No.	Clinical Presentation	No. of cases	Percentage
1.	Thrombocytopenia	21	38.2%
2.	Cerebral Malaria	4	7.3%
3.	Unconscious patient	2	3.6%
4.	Anaemia	11	20%
5.	Pulmonary Edema	2	3.6%
6.	Shock	3	5.5%
7.	Acute Renal Failure	2	3.6%
8.	Death	1	1.8%
9.	Acidosis	5	9%
10.	Hypoglycemia	6	10.9%

IV. Discussion

In the present study, 55 cases of vivax malaria were selected on the basis of clinical features and laboratory confirmation of vivax malaria on the basis of thick and thin smears of blood film or malaria antigen (LDH) spot test, from the patients admitted in Department of pediatrics, Rajendra Institute of Medical Sciences , Ranchi. Study showed that majority of patients that is 40% were in age group of 5-10 years, 32.7% cases were in age group of >10 years, 23.6% were 1-5 years of age. Only 1.8% cases were under 1 year of age. The table also shows that 54.5% were male and 45.5% were female. Among different age group incidence was found to be more in males than in females. . Male child due to their frequent outdoor activities may be a cause of more frequent exposure. This is because some important vectors in *P. vivax* endemic areas have primarily early-biting, outdoor-feeding and outdoor-resting behaviours (3). Also female are better clothed than male child and have less outdoor activities as compared with male child. Lack of care and attention towards female child, neglect of females, illiteracy can also lead to less admission of female cases in hospital (6).

Study also showed that the incidence of falciparum malaria cases were found to be more in tribal population (67.3%) than in non – tribal population (32.7%). The high incidence of cases from malaria among tribals of rural area might be due to ill ventilated, improperly built houses, refusal to insecticidal spray, ignorance about the medical facilities, lack of personal protection like mosquito nets and delay in seeking medical intervention . The non-tribal cases were mostly from urban- slums. Type of housing, sleeping habits, outdoor activities, poor knowledge regarding health and treatment seeking behavior play an important role in the transmission of malaria and negligence towards seeking medical facilities immediately may result in increased severity of illness with many complications including death.

The present study showed that although vivax malaria once described as benign disease with no complications, is now causing severe illness including death. The exact cause of such change in presentation and complications is still not known with only few proposed mechanisms as mentioned earlier. Among all 55 vivax mono infection cases included in our study , 21 developed serious complications including 3 deaths. Thrombocytopenia was present in 38.2% cases, anemia was present in 20% cases, hypoglycemia in 10.9% cases, acidosis in 9% cases, cerebral malaria in 7.3% cases, shock was present in 5.5% cases, unconsciousness was found in 3.6% cases, pulmonary edema was present in 3.6% cases, acute renal failure in 3.6% of cases and 1.8% cases died of complications. One of the deaths was caused by severe hypoglycemia who was admitted at hospital in very late stage of illness. Other two deaths were caused by multi-organ failure again admitted in very late stage of disease. All cases were treated with IV or intramuscular (IM) artesunate for at least 24 hours, and until they can tolerate oral medication. Children weighing <20 kg were treated with a higher dose of artesunate (3 mg/kg body weight per dose) than larger children. Following parenteral artesunate for at least 24 hours, treatment was completed with a full treatment course of oral ACT or chloroquine . A full course of radical treatment with primaquine was given after recovery only after checking G6PD status of the patient.

V. Conclusion

The trend of disease with plasmodium vivax malaria is changing. It is increasingly recognized that serious and life threatening complications can occur with vivax malaria. 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. For successful control and elimination of *P. vivax* malaria, we need specific, additional interventions, notably against the liver stage of the parasite along with the vector control methods. Patients of vivax malaria should be monitored for occurrence of different complications as their early detection and treatment or referral to higher centre from peripheral health centres in rural areas of Jharkhand can be life saving.

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