

A Study on Incidence, Clinical Profile and Prognosis of Falciparum Malaria in Jharkhand

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ABSTRACT

Introduction: Malaria is a protozoal disease transmitted by the bite of infected female Anopheles mosquitoes. The mortality in malaria is due to plasmodium falciparum. The considerable morbidity and mortality in falciparum malaria is due to its easily and continuously changing manifestations, multiorgan involvement, delay in diagnosis and failure of administration of treatment promptly and adequately. The problem is getting worse due to emergence of drug resistance. The present hospital based cross-sectional study was carried out with the aim to find the incidence, spectrum of various clinical manifestations and establish the prognosis and mortality in cases of falciparum malaria.

Material and methods: A hospital based cross-sectional study was done on 80 patients of falciparum malaria in RIMS, Ranchi, Jharkhand. A case sheet proforma was prepared and data regarding demographic profile, clinical features, investigations, treatment, and complication were recorded.

Results: Out of 80 cases of falciparum malaria, 57 (71.25%) were males and 23 were (28.75%) were females. The incidence of complicated falciparum malaria was higher (58.75%) as compared to uncomplicated falciparum malaria. Among the complicated cases of falciparum malaria, cerebral malaria was the commonest (42.50%) followed by malarial hepatitis with jaundice (31.25%), severe anemia (20%) and acute renal failure (17.50%). Out of 47 cases of complicated falciparum malaria, 8 cases (17.02%) who expired, presented with multiorgan failure.

Conclusion: Falciparum malaria is a dreaded disease and cerebral malaria in the presence of other complications has a poor prognosis. Multiorgan failure involving three or more systems in falciparum malaria is associated with high mortality.

Keywords: Falciparum Malaria, Complicated Falciparum Malaria, Multiorgan Failure.

INTRODUCTION

Malaria is a protozoal disease transmitted by the bite of infected female Anopheles mosquitoes. According to the latest WHO estimates, released in December 2016, there were 212 million cases of malaria in 2015 and 429 000 deaths. Between 2010 and 2015, malaria incidence among populations at risk fell by 21% globally; during the same period, malaria mortality rates among populations at risk decreased by 29%. An estimated 6.8 million malaria deaths have been averted globally since 2001.¹ Malaria is endemic in India. At present, official figures for malaria in India, available at National Vector Borne Disease Control Programme (NVBDCP),² indicate 0.7–1.6 million confirmed cases and 400–1,000 deaths annually.^{1,3}

The mortality in malaria is due to plasmodium falciparum. The considerable morbidity and mortality in falciparum malaria is due to its easily and continuously changing manifestations, multiorgan involvement, delay in diagnosis and failure of

administration of treatment promptly and adequately. The problem is getting worse due to emergence of drug resistance.⁴ The major manifestations of severe falciparum malaria may be cerebral malaria, unarousable coma, acidosis, severe normochromic, normocytic anaemia, renal failure, ARDS, hypoglycaemia, hypotension, shock, bleeding, disseminated intravascular coagulation, repeated seizures, hemoglobinuria and jaundice.

Chotanagpur plateau of Jharkhand is an endemic area of malaria. There is a large area of hills and dense forests all over the Jharkhand state. The population here is basically tribal dominated and the people are socioeconomically backward. It has been observed that complicated cases of falciparum malaria are being admitted in gradually increasing numbers at the Rajendra Institute of Medical Sciences, Ranchi.

Aims and objectives of the study were to study the incidence of falciparum malaria amongst the malaria cases admitted at RIMS, to study the incidence of various clinical manifestations in cases of falciparum malaria and to establish the prognosis and mortality in cases of falciparum malaria.

MATERIAL AND METHODS

This was hospital based cross-sectional study done on 80 confirmed cases of falciparum malaria admitted in hospital from April 2016 to March 2017 after taking informed consent. The approval of institutional ethics committee was taken prior to the commencement of this study. A case sheet proforma was prepared and data regarding demographic profile, clinical features, investigations, treatment, and complication were recorded. Severe falciparum malaria was diagnosed as per guidelines of WHO.

Inclusion criteria:- Only those cases whose blood was found to be positive for plasmodium falciparum by peripheral blood smear examination or antigen test were considered for the study.

Exclusion criteria

- Pre-existing neurological disease
- Pre-existing hematological disease
- Pre-existing acute or chronic renal failure
- Pre-existing liver disease

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Two groups were studied, one had the patients with features of uncomplicated malaria and second group had the patients with clinical features of complicated Plasmodium falciparum malaria.

Group I – Uncomplicated P. falciparum malaria (n=33): Fever, headache, fatigue, abdominal discomfort, muscular ache, nausea, vomiting, mild anemia and (in some cases) a palpable spleen.

Group II – Complicated or severe P. falciparum malaria (n=47): Cerebral malaria, severe normochromic, normocytic anemia, renal failure, pulmonary edema /adult respiratory distress syndrome (ARDS), hypoglycemia, hypotension/shock, bleeding/disseminated intravascular coagulation, convulsions, hemoglobinuria, acedemia/acidosis, jaundice.

STATISTICAL ANALYSIS

Microsoft office 2007 was used for the statistical analysis. Descriptive statistics like mean and percentages were used in the analysis.

Clinical presentation	No. of cases	Percentage of total cases of P. falciparum
Fever	80	100
Chills and rigor	80	100
Headache	80	100
Vomiting	42	52.50
Splenomegaly	32	40.00
Hepatomegaly	21	26.25
Cerebral malaria	34	42.50
Repeated GTCS	7	8.75
Neck rigidity	8	10.00
Jaundice	25	31.25
Severe anemia	16	20.00
Acute renal failure	14	17.50
Shock	4	5.00
Hemoglobinuria	6	7.50
Hypoglycemia	7	8.75
Acidosis	3	3.75
ARDS	2	2.50
DIC	1	1.25

Table-1: Different clinical presentations of the cases under study

RESULTS

Out of 80 cases of falciparum malaria, 57 (71.25%) were males and 23 were (28.75%) were females. The maximum numbers of falciparum malaria cases were seen in the age group of 21-40 years (58.75%).

63 (78.75%) cases were from rural areas and 17 (21.25%) were from urban areas. Majority of cases of falciparum malaria came from the tribal areas (78.75%) and from the lower socioeconomic group (68.75%).

The incidence of complicated falciparum malaria was higher (58.75%) as compared to uncomplicated falciparum malaria.

Fever with chills and rigors along with headache were the most common presentation present in 100% of the cases. In the present study, 42.50% of the patients presented with cerebral malaria. Jaundice was present in 31.25% of the cases, severe anemia in 20%, acute renal failure in 17.50%, hypoglycemia in 8.75%, hemoglobinuria in 7.50%, shock in 4%, acidosis in 3.75%, ARDS in 2.50% and DIC was present in 1.25% of the cases. (Table 1)

Among the complicated cases of falciparum malaria, cerebral malaria was the commonest (42.50%) followed by malarial hepatitis with jaundice (31.25%), severe anemia (20%) and acute renal failure (17.50%). (Table 2)

Out of 47 cases of complicated falciparum malaria, 8 cases (17.02%) who expired, presented with multiorgan failure.

The incidence of death was highest in the age group of 21-40 years (62.50%). (Table 3)

There were 8 deaths of cerebral malaria cases who presented with different combinations such as cerebral malaria, acute renal failure (1 death); cerebral malaria, ARF, jaundice (2 deaths); cerebral malaria, ARF, jaundice, severe anemia, acidosis (1 death); cerebral malaria, jaundice, ARDS, severe anemia (1 death); cerebral malaria, jaundice, repeated GTCS, severe anemia (1 death); cerebral malaria, jaundice, ARF, severe anemia, shock, repeated GTCS, hypoglycemia, acidosis (1 death); cerebral malaria, jaundice, ARF, severe anemia, hemoglobinuria, shock, hypoglycemia, DIC, repeated GTCS (1 death).

DISCUSSION

In our study, we included 80 cases of falciparum malaria. The total number of cases of malaria are over India in the year 2013

Clinical manifestation	Total cases (n=80)		Deaths		Survivors	
	No.	%	No.	% of respective complication	No.	% of respective complication
Cerebral malaria	34	42.50	8	23.53	26	76.47
Jaundice	25	31.25	7	28	18	72
Severe anaemia	16	20	5	31.25	11	68.75
Acute renal failure	14	17.50	6	42.86	8	57.14
Hemoglobinuria	6	7.50	1	16.67	5	83.33
Repeated GTCS	7	8.75	3	42.86	4	57.14
Hypoglycemia	7	8.75	2	28.57	5	71.43
Shock	4	5	2	50	2	50
Acidosis	3	3.75	2	66.67	1	33.33
ARDS	2	2.50	1	50	1	50
DIC	1	1.25	1	100	0	-

Table-2: Mortality in complicated falciparum malaria

Age group (years)	No. of cases	Percentage
≤ 20	2	25
21 – 40	5	62.50
41 – 60	1	12.50
≥ 61	0	-

Table-3: Age distribution of mortality of complicated cases of falciparum malaria

was 0.44 million. Out of these 0.29 million cases (66.9%) were found to be suffering from Plasmodium falciparum malaria. According to WHO, the slide positivity rate for malaria was found to be 0.51 in 2013 in India out of which 0.34 were Plasmodium falciparum).⁵

The maximum number (58.75%) of falciparum malaria was seen in the age group of 21 to 40 years. This age group represents the most active group of society. Young people of this age group frequently engage in outdoor activities like working in agricultural farms, close to areas having stagnant water like ditches, ponds, irrigation channels etc, which are the breeding places of mosquitoes. This increases the chance of mosquito bites.

A higher incidence of falciparum malaria was observed in males. This is attributed to the fact that males are more frequently exposed to the risk of acquiring malaria than females because of the outdoor activities of life. Further females in India are usually better clothed than males.⁶

According to the study 78.75% of the total cases of falciparum malaria were from rural areas, whereas 21.25% of the total cases were from urban areas. The incidence of malaria is high in rural population and is closely related to the insanitation, poor housing conditions and ignorance about the measures to prevent malaria.

The incidence in the low socioeconomic group was 68.75%, as compared to 30% in middle socioeconomic group and 1.25% in the higher socioeconomic group.

Malaria has demonstrated the relationship between health and socioeconomic development. It is generally accepted that malaria has disappeared from most developed countries as a result of socioeconomic development.⁷

According to the study 73.75% of the tribal population suffered from falciparum malaria whereas 26.35% of the non-tribal population suffered from the disease. The tribal population is engaged in forest related activities. Limited health infrastructure, social environment and ignorance at the village level are the factors responsible for high morbidity and mortality due to malaria.

A total of 33 patients out of 80 presented with features of uncomplicated falciparum malaria, which represents 41.25% of the cases. 47 patients (58.75%) out of 80 patients had features of complicated malaria. In our study, those cases testing positive for falciparum malaria were included. Out of the four species of malarial parasite, P. falciparum causes severe malaria with various fatal complications. Hence the incidence of complicated falciparum malaria was more than uncomplicated ones.

According to the present study fever with chills and rigor and headache was the most common presentation found in 100% of the cases. Vomiting, splenomegaly and hepatomegaly was present in 52.50%, 40% and 26.25% of the cases.

Commonest complication among the complicated falciparum

malaria cases was cerebral malaria observed in 34 patients (42.50%). Next most common complication observed was jaundice which was found in 25 patients (31.25%). Severe anemia was seen in 16 patients (20%). Acute renal failure mainly with oliguria or anuria was seen in 14 patients (17.50%). Systemic acidosis was observed in 3 patients (3.75%) of acute renal failure (ARF). Repeated GTCS occurred in 7 patients (8.75%). Hypoglycaemia was seen in 7 patients (8.75%). Patients with shock presented with systolic blood pressure < 80 mm Hg and with cold clammy extremities. Four (5%) such patients were observed in the study. Adult respiratory distress syndrome (ARDS) with dyspnoea and classical X-ray features was observed in 2 patients (2.50%). One case of disseminated intravascular coagulation representing 1.25% of the total cases was recorded.

According to Murthy G.L. and Sahay R.K.⁸ fever with chills and rigor was present in 98.10% of the cases, cerebral malaria in (48.10%), Jaundice in 27.12% and acute renal failure in 6.96%. Mishra S. K. and Mohapatra et al⁹ reported that the incidence of jaundice in falciparum malaria was between 10-45%. Jain P. K. and Amit Taneja¹⁰ recorded the incidence of malarial acute renal failure to be 13% in North India.

According to the study, out of 33 cases of uncomplicated falciparum malaria, all the cases survived. Out of 47 cases of complicated falciparum malaria, 39 (82.98%) cases survived. Death occurred in 8 (17.02%) cases of complicated falciparum malaria

The present study shows that out of 8 deaths, 5 deaths accounting for 62.50% of the cases occurred in the age group of 21-40 years. The highest mortality was found in this age group, followed by 25% mortality in persons upto 20 years of age. One death (12.50%) occurred in the age group of 41-60 years.

Eight patients (23.53%) with cerebral malaria expired during the treatment. In the study it was found that when cerebral malaria was associated with other complications the mortality rate became high. In general the response to I.V. quinine was the best among the other antimalarials.

A total of 7 patients (28%) of malarial hepatitis with jaundice expired. 5 patients (31.25%) with severe anemia expired during the treatment. Response to severe anemia was better if blood transfusion was given promptly. Acute renal failure when present along with other complications had a high mortality. Six such patients (42.86%) died during the study. Acute renal failure was treated with I.V. Furosemide and I.V. Dopamine (2-5 µg/kg body weight). Hemodialysis was done in 2 patients who survived.

Systemic acidosis was usually associated with renal failure and was evident with rapid and shallow acidotic breathing. Such patients were treated with sodium bicarbonate intravenously along with other supportive measures. Out of 3 patients, 2 patients (66.67%) died of this complication.

Mortality of patients presenting with repeated GTCS was high. 3 patients (42.86%) out of 7 patients died. The patients with repeated GTCS were treated with I.V. Diazepam and I.V. Phenytoin.

Hypoglycemia as soon as detected clinically and by glucometer was treated promptly with I.V. 25% Dextrose solution. Out of the 7 patients who presented with this complication, 2 patients (28.57%) died. The patients who presented with shock were

treated with I.V. Dopamine (8-10 μ g/kg body weight). 2 (50%) out of 4 patients expired.

The patients presenting with features of ARDS were managed with mechanical ventilation, oxygen therapy and antibiotics. Only one patient (50%) out of two could be saved.

The patient who presented with disseminated intravascular coagulation had other complications like cerebral malaria, jaundice, ARDS, acute renal failure, shock and hypoglycaemia. This patient was treated with injection Artesunate, injection Dopamine and blood transfusion, but unfortunately we lost the patient.

Murthy GL et al⁴ reported mortality of 20.25% in their study. Higher mortality was associated with the presence of complications like anaemia, jaundice, ARF, DIC, ARDS and septicemia. Most of the deaths were encountered in the patients with multiorgan failure. Jain P.K.¹⁰ reported a mortality of 45% in acute renal failure cases.

In the study it was noted that cerebral malaria in the presence of other complications had a poor prognosis. It was noted that multiorgan failure involving three or more systems was associated with high mortality. The findings of this study correlates with the works of Murthy G.L. et al⁴ and Satpathy S.K. et al.¹¹

CONCLUSION

Falciparum malaria is a dreaded disease and cerebral malaria in the presence of other complications has a poor prognosis. Multiorgan failure involving three or more systems in falciparum malaria is associated with high mortality.

Rural surrounding and rural population should be educated about preventive measures, early diagnosis and early treatment should be ensured to prevent morbidity and mortality. Male going out for work should be advised to wear proper clothing. Care for places where mosquito breed and prevention from mosquito bite is the main pillar to reduce morbidity and mortality from this dreadful disease.

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