

## Original Research Article

# Clinical profile of plasmodium falciparum case presenting to a tertiary care teaching institution in south India: An observational study

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## Abstract

**Introduction:** Malaria has been a major public health problem plaguing India for centuries and about 95% of Indian population is residing in malaria endemic regions. The proportion of the Pf % has gradually increased from 39% in 1995 to 65% in 2014. Periodic clinical profiling studies may help us in understanding of the changing pattern of the disease, complication rate and emerging drug resistance patterns, which can help the clinicians in making better and informed clinical decisions.

**Objective:** To analyze the socio demographic and clinical profile of falciparum malaria cases and to study the incidence and profile of complications of falciparum malaria and their impact on hospital in falciparum malaria.

**Materials and methods:** A prospective observational study was conducted in department of General Medicine of tertiary care hospital from November 2011 to November 2013 among patients diagnosed with falciparum malaria by smear. Patients aged above 18 years, both genders were included in the study.

**Results:** Among 50 study participants, 42% belonged to 26 to 40 years of age and 76% of them were males. Fever was the most common clinical symptom reported by all the patients, followed by chills and rigors (90%), headache (74%), nausea and vomiting (46%). A total of 37 (74%) of the patients had complicated malaria, out of the 37, 17 (45.95%) had single complication and remaining 54.05%

had multiple complications. Liver involvement manifested by jaundice was the most common complication seen 51.4% of the subjects, followed by cerebral malaria (48.6%) and anemia (45.9%). None of the patients reported mortality.

**Conclusions:** Males in the age group of 26 to 40 years is the most common population group affected by plasmodium falciparum malaria. The proportion of complicated cases is very high (73%) in the study population and the most common complications include liver dysfunction and cerebral malaria. No mortality was reported in the study probably attributed to early diagnosis and effective management.

## Key words

Plasmodium falciparum, Clinical profile, Malaria.

## Introduction

Malaria has been a major public health problem plaguing India for centuries and about 95% of Indian population is residing in malaria endemic regions. "The absolute number of malaria cases has shown a declining trend since 2002 and the Slide Positivity Rate (SPR) has also shown gradual decline from 3.50 in 1995 to 0.89 in 2014. Even though the reported absolute number Pf cases declined from 1.14 million in 1995 to 0.72 million in 2014, the Pf % has gradually increased from 39% in 1995 to 65% in 2014. Number of reported deaths has been levelling around 1000 per year but has shown a fluctuating trend during the period between 2001 and 2014" [1].

Malaria infection in humans is usually presented with a broad clinical spectrum ranging from asymptomatic infection, uncomplicated malaria, and complicated and lethal malaria which can be attributed to complex interaction between the parasite, human host and environmental factors [2, 3]. Out of all the plasmodium species, Plasmodium falciparum tends to present with more severe degrees of clinical spectrum and higher mortality.

Studies conducted by various authors have reported the proportion of complicated falciparum malaria to be ranging from 17.8% to 65% [4-10]. The most common complications reported by studies were Red blood cell abnormalities like hemolytic anemia, liver dysfunction, cerebral malaria. Renal, metabolic,

platelet and clotting factor defects were the other common complications reported [3-5, 11-15]. But the overall treatment strategies and mortality rates are also showing rapid changing trends, with the advent of new groups of medications and technologies [1, 6, 12, 15].

Even though, many authors reported the clinical profile of falciparum cases across the country, considering the rapid and unplanned urbanization, massive internal population movements and emerging drug resistance among plasmodium falciparum cases makes a case for high utility of periodic profiling studies in various parts of the country. This may provide us a fair understanding of the changing pattern of the disease, complication rate and emerging drug resistance patterns, which can help the clinicians in making better and informed clinical decisions.

## Objectives

- To analyze the socio demographic and clinical profile of falciparum malaria cases.
- To study the incidence and profile of complications of falciparum malaria and their impact on hospital in falciparum malaria.

## Materials and methods

The current study was a prospective observational study conducted in department of General Medicine, NRI medical college, Chinakakani from November 2011 to November

2013 among patients diagnosed with falciparum malaria by smear.

Patients aged above 18 years, both genders were included in the study. Patients diagnosed with Plasmodium Vivax smear positive and mixed smear positive malaria were excluded from the study. Other exclusion criteria included patients with chronic liver disease and chronic kidney disease.

A total of 50 patients who fulfilled the inclusion criteria were sequentially included in the study, hence no sampling was done.

Approval of institute Human Ethics committee was obtained. Informed written consent was obtained from all the participants, after explaining the objectives of the study, risks and benefits involved. The personal details of the patients were kept confidential throughout the study.

After obtaining informed written consent, information regarding socio demographic and clinical profile of each participant was captured using a structured proforma. In all cases a detailed history including past, socio-economic status, family and treatment history were taken. Detailed physical examination included assessment of general physical condition, vital parameters, pallor and jaundice. Systemic examination included central nervous system, respiratory system, cardiovascular system and abdominal examination to assess hepatomegaly and splenomegaly.

For all the consenting patients, 5 ml of venous blood and clean void urine sample were collected and the following laboratory tests were performed.

a). Complete haemogram b). Urine routine including analysis for hemoglobinuria. C). Peripheral smear for Plasmodium species- both thick and thin smears stained with Giemsa stain or Leishman and seen under oil immersion

microscope. d). Blood Sugar e). Blood Urea, Serum Creatinine.

Apart from these, the following investigations were done wherever found necessary. a). OptiMal test (LDH based immunochromatographic antigen detection assay) b). Liver function test. c). Coagulation profile d). Blood culture and sensitivity e). CSF analysis. F). Chest X ray g). Ultrasound abdomen and any other investigations found necessary.

All study participants were managed as per standard treatment protocol [16] as put forward by National vector borne disease control programme and WHO. Appropriate parenteral anti-malarial, including Quinine or Artemisinin derivatives along with either Mefloquine or Lumefantrine, as suggested by standard guidelines were initiated for all the patients and were later switched over to oral drugs once the general condition improved. Single dose of oral Primaquine was also given to all patients. Necessary supportive measures and treatment of complications were done wherever found necessary including assisted ventilation and blood transfusion. Cases were studied with reference to the presentation, complications.

Descriptive analysis of the data was done by using frequency and percentage for categorical variables, mean and standard deviation for quantitative variables. The sociodemographic, clinical profile, presence of complications and their nature were presented. The mean duration of hospital stay in days was compared between complicated and uncomplicated subjects, using independent sample t-test. P value 0.05 was considered as statistically significant. IBM SPSS version 21 was used for statistical analysis.

## **Results**

A total of 50 participants were included in the study. Majority (42%) of the participants belonged to 26 to 40 years of age. The proportion of participants between 18 to 25 years was 22%, 41 to 60 years were 28% and more than 60 years

were 8%. Males constituted 76% of the study population. (Table - 1)

**Table - 1:** Baseline characteristics of study population (N=50).

Parameter	Category	Frequency	%
Age group	18 to 25	11	22.0
	26 to 40	21	42.0
	41 to 60	14	28.0
	>60	4	8.0
Gender	Male	38	76.0
	Female	12	24.0

Fever was the most common clinical symptom reported by all the patients, followed by chills and rigors (90%), headache (74%), nausea and vomiting (46%). Symptoms suggestive of complicated falciparum malaria, including altered sensorium, jaundice, and diminished urine output were seen in 30%, 26.5 and 24% of the patients respectively. Breathlessness and convulsions were reported by 7(14%) subjects each. Three subjects (6%) had bleeding at presentation. Thirty one (62%) subjects had pallor, icterus was seen in 48% of the subjects and clinical dehydration and Systolic BP <100 were seen in 24% and 28% of the subjects respectively. Signs suggestive of CNS involvement like altered sensorium, neck stiffness and convulsions were seen in 42%, 12% and 14% of the subjects respectively. Hepatomegaly and splenomegaly was seen in 34% and 62% of the subjects respectively. (Table - 2)

A total of 37 (74%) of the patients had complicated malaria, out of the 37, 17 (45.95%) had single complication and remaining 54.05% had multiple complications. Liver involvement manifested by jaundice was the most common complication seen 51.4% of the subjects, followed by cerebral malaria (48.6%) and anemia (45.9%) and thrombocytopenia (40.5%). The other minor complications included ARF< ARDS and other miscellaneous complications. (Table - 3)

**Table - 2:** Clinical characteristics of study population (N=50).

Parameter	Category	No	%
<b>Clinical features</b>	Fever	50	100.0
	Chills and rigors	45	90.0
	Head ache	37	74.0
	Nausea and vomiting	23	46.0
	myalgia	18	36.0
	Diarrhea	6	12.0
	Cough	4	8.0
<b>Symptoms suggestive of complicated malaria</b>	Altered	15	30.0
	Jaundice	13	26.0
	Reduced urine output	12	24.0
	Breathlessness	7	14.0
	Convulsions	7	14.0
	Bleeding	3	6.0
<b>General condition of the patient</b>	Pallor	31	62.0
	Icterus	24	48.0
	Dehydration	12	24.0
	SBP < 100	14	28.0
<b>Sings suggestive of CNS involvement</b>	Altered sensorium	21	42.0
	Neck stiffness	6	12.0
	convulsions	7	14.0
	Focal neurological deficits	0	0.0
<b>Other clinical findings</b>	Hepatomegaly	17	34.0
	Splenomegaly	31	62.0

About half of the patients had stayed in the hospital for more than 5 days. And duration of hospital stay was significantly higher in complicated falciparum cases, compared to uncomplicated cases (8.32 Vs 5.15), which was statistically significant with a p value of 0.006. (Table - 4)

**Table - 3:** Presence of co-morbidities and complications in study population (N=50).

Parameter	Category	Frequency	Percentage
<b>Complication (n=50)</b>	Complicated malaria	37	74.0
<b>Number of complications (N=37)</b>	Single complication (N=37)	17	45.95
	Multiple complications (N=37)	20	54.05
<b>Type of complication (N=37)</b>	Jaundice	19	51.4
	Cerebral malaria	18	48.6
	Anemia	17	45.9
	Thrombocytopenia	15	40.5
	ARF	11	29.7
	ARDS	5	13.5
	Hypoglycemia	3	8.1
	Hypotension/shock	3	8.1
	Bleeding/DIC	3	8.1
	hemoglobinuria	2	5.4

**Table - 4:** Comparison of treatment and duration of hospital stay among complicated and uncomplicated cases (n=50).

Category	Frequency	Percentage
<b>1.Treatment received</b>		
Quinine (IV)	20	40.0
Aretemesinin combination therapy (IV)	17	34.0
Aretemesinin combination therapy (ORAL)	3	6.0
Chloroquine and Primaquine	10	20.0
<b>2.Duration of hospital stay</b>		
1-5	27	54.0
6-10	19	38.0
11-15	3	6.0
>15	1	2.0
<b>3.Comparison of duration of hospital stay</b>		
<b>Hospital stay in days</b>	<b>Mean ± SD</b>	<b>P-value</b>
Complicated cases	8.32±3.79	0.006
Uncomplicated cases	5.15±2.30	

## Discussion

Many studies in the recent past and the findings of the surveillance data of national vector borne disease control programme, have been reporting a steep rise in proportion of falciparum cases. As reported by the current study and many previous studies, adult males in the age group of 26 to 40

years of report highest prevalence [1, 4, 10-12, 17].

Fever was the most common clinical symptom (100%) followed by chills and rigors (90%), headache (74%), nausea and vomiting (46%). Altered sensorium, jaundice, and

diminished urine output were seen in 30%, 26% and 24% of the patients respectively. In a study by Murthy G. L., et al. commonest presenting manifestations were fever with chill and rigor (98.10%), altered sensorium (48.10%), algid malaria (18.35%), and jaundice (27.21%) [5]. Katyal V. K., et al. have pointed lack of fever as one of independent risk factor for death in complicated falciparum cases, hence due attention needs to paid to these patients [12].

A total of 37 (74%) of the patients had complicated malaria, out of the 37, 17 (45.95%) had single complication and remaining 54.05% had multiple complications. Katyal V. K., et al. have reported the proportion of complicated malaria to be about 85% of the falciparum infections. Mohapatra M. K., et al. have reported 57.1% complication rate among patients of Pf malaria. Out of that single and multiple complication rate was 45.5 and 54.5% and independent risk factors for a patient developing complicated malaria were no fever, high parasite count, Pf mono infection, and fever to treatment interval [4].

Liver involvement manifested by jaundice was the most common complication seen 51.4% of the subjects, followed by cerebral malaria (48.6%) and anemia (45.9%) and thrombocytopenia (40.5%). In a study by Harris V. K., et al. the proportion of people affected by hyperbilirubinemia and cerebral malaria was 37% and 24% respectively [11]. Katyal V. K., et al. [12] have reported most common complications as cerebral malaria, black water fever and algid. The authors have also pointed out that, mortality is highest when renal involvement is there. Rao SV, et al. [7] have reported Extreme weakness (80%), jaundice (55%), renal failure (50%), and severe anemia (27.5%) as the most common complications of falciparum malaria. Murthy G. L., et al. have reported anemia (74.68%), jaundice (40.50%), cerebral malaria (45.56%), thrombocytopenia (40.50%) and renal failure (24.68%) as most common complications.

The current study has reported no mortality in plasmodium falciparum cases, but duration of hospital stay was significantly higher in complicated falciparum cases, compared to uncomplicated cases (8.32 Vs 5.15 days). Many of the previous studies have reported mortality ranging from 5% to 15% [4-8, 15, 18], in spite of therapy. Higher parasite count, presence of complications like anemia, jaundice, renal failure etc. were noted. This can be attributed to early reporting of many of the current study participants as most of the deaths reported by previous studies were among patients with delay in clinical diagnosis. So, early diagnosis and institution of timely therapy can have huge impact on mortality [5].

## Conclusions

Males in the age group of 26 to 40 years are the most common population group affected by plasmodium falciparum malaria. The proportion of complicated cases is very high (73%) in the study population and the most common complications include liver dysfunction and cerebral malaria. No mortality was reported in the study probably attributed to early diagnosis and effective management.

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