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Research Article

# ASSESSMENT OF COMPLICATIONS OF PLASMODIUM FALCIPARUM MALARIA IN KHAMMAM DISTRICT OF AP

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## ABSTRACT

**Background and Objectives:** Malaria is a mosquito borne parasitic disease caused by the bite of female Anopheles mosquito. Globally it affects the tropics and sub-tropics. It is endemic in Khammam district of Andhra Pradesh. Out of the four Plasmodium species, *P. falciparum* is the leading cause of complications due to capillary infarcts, leakage and organ dysfunction. The study aims to study the incidence of complications of Malaria and to study the response to treatment in complicated Malaria.

**Methods:** 50 patients who were proved “smear positive” and card test positive for *P. falciparum* were studied at Mamata General Hospital, Khammam, A. P. from May 2012 – April 2013

**Results:** The most common complication as per our study is Anemia, seen in 82% of cases, followed by Jaundice (64%), Respiratory distress (20%), Cerebral Malaria (18%), bleeding disorders (18%), ARF (12%), Hypoglycaemia (6%), and there is good response to treatment with Artemisinin combination therapy. one patient died due to Multiple organ dysfunction.

**Conclusion:** The patients with *P. Falciparum* malaria are at increased risk of complications. Hence they must be followed to prevent morbidity and mortality.

**Keywords:** Assessment, Malaria, Complications, *Plasmodium Falciparum*.

## INTRODUCTION

Malaria continues to be a major global health problem with over 40% of world population, more than 3.3 billion people at risk for malaria with ongoing transmission. It occurs in 99 countries and the disease caused an estimated 6,55,000 deaths in 2010 mainly Among children under 5 yrs of age in sub-Saharan Africa<sup>1</sup>.

Human malaria is caused by protozoan parasites of the genus plasmodium. *Plasmodium falciparum*, *plasmodium vivax*, *plasmodium malariae*, and *plasmodium ovale* are four well known species of human malaria parasite and more recently another species knowelsi has been documented<sup>2,3</sup>.

Three percent of adult patients develop late neurological sequelae. It may be due to profound and protracted coma, severe anaemia, hypoglycaemia and prolonged convulsions. Hemiparesis with variable hemisensory deficit and sometimes hemianopia may be seen. Cortical blindness, diffuse cortical damage, tremor and occasionally cranial nerve palsies seen. There may be residual global encephalopathy like picture due to prolonged hypoglycaemia. Psychosis, tremor and cerebellar

dysfunction may be seen, attributed to treatment with chloroquine or mefloquine and are usually self-limiting. The syndrome of cerebellar ataxia occurring 2-3 weeks after acute uncomplicated malaria has been reported<sup>4,5</sup>.

Malaria is endemic to the district of Khammam, Andhra Pradesh and this prospective study aims to study the complications of *Falciparum* malaria and their response to treatment.

## METHODOLOGY

**Place of study:** Mamata General Hospital, Khammam, A.P.

**Study population:** A total number of 50 patients who are proved “smear positive” and card test positive for *P. falciparum* are studied.

**Study period:** May 2012 – April 2013

All the patients were followed during the hospital stay and after discharge or till the outcome.

The clinical diagnosis of *falciparum* malaria was suspected based on the Manson Bahr’s criteria.

**They are:**

All patients of *falciparum* malaria with typical presentation of

fever, chills and rigors, headache and atypical presentations like altered sensorium, seizure, encephalopathy, acute respiratory distress syndrome, acute renal failure, black water fever, acute abdomen or algid malaria were included in the study.

Detailed history and clinical examination were done upon admission and following investigations were done and patients were followed up:

Peripheral smear and card test for *falciparum* malaria parasite were done from capillary/venous blood in all patients.

Stain – Giemsa/ Leishman/ Field stain was done.

Other investigation like complete blood picture for type of anaemia, haemoglobin percentage, leukocytes count, RBC, Blood urea, serum creatinine, serum electrolytes, Urine examination, liver function test, ECG and chest X-ray (when required).

Lumbar puncture was done in indicated patients.

**INCLUSION CRITERIA:**

All patients > 12 years who had a positive blood smear and rapid diagnostic test (card test) for *Falciparum* malaria in Mamata General Hospital, Khammam

**EXCLUSION CRITERIA:**

1. Age <12 years
2. Only gametocyte of PF
3. *P. vivax* smear positive and mixed smear positive
4. Diagnosed cases of Malaria without complications.

**RESULTS**

Data is collected from Mamata General Hospital, Khammam, A.P. during the study period between May 2012 to April 2013. 50 patients who were smear positive for malaria and positive for *P. falciparum* by card test were studied and the following observations were made.

**Table 1: Age and sex distribution of study subjects**

Parameter		Number (%)
Gender	Male	30 (60%)
	Female	20 (40%)
Age groups (years)	12 – 20	07 (14%)
	21 – 30	12 (24%)
	31 – 40	08 (16%)
	41 – 50	11 (22%)
	51 – 60	09 (18%)
	61 – 70	02 (04%)
	71 – 80	01 (02%)

There are 30 (60%) male patients and 20 (40%) female patients in this study. Study group included age group from

12-80 years. More number of cases was in the age group 21-30 years.

**Table 2: Distribution of study subjects as per their symptomatology:**

Symptoms	Number
Fever	50 (100%)
Headache	44 (88%)
Respiratory distress	09 (18%)
Abdominal pain	12 (24%)
Generalized weakness	46 (92%)
Altered sensorium	09 (18%)
Loss of consciousness	05 (10%)
Seizures	04 (08%)
Nausea and vomiting	24 (48%)

Fever was seen in 100% of cases (50 patients), headache was seen in 88% of cases. (Out of the 44 patients, 40 patients are

complaining of intermittent headache, 4 patients are complaining of continuous headache).

**Table 3: Distribution of study subjects as per the complications found**

Parameter		Number (%)
Anemia	Normocytic normochromic	13 (26%)
	Microcytic hypochromic	05 (10%)
	Dimorphic	03 (06%)
	Normocytic hypochromic	17 (34%)
CNS Complications	Delirium	09 (18%)
	Loss of consciousness	05 (10%)
	Seizures	04 (08%)

	Signs of meningeal irritation	07 (14%)
Bleeding disorders	Bleeding gums	06 (12%)
	Epistaxis	02 (04%)
	Hematemesis	01 (02%)
Urine output	Normal	30 (60%)
	Oliguria	08 (16%)
	Anuria	06 (12%)
Other complications	Jaundice	32 (64%)
	Splenomegaly	32 (64%)
	Hepatomegaly	17 (34%)
	Black water fever	05 (10%)
	Hypoglycaemia	03 (06%)
	Acute renal failure	06 (12%)

Anaemia was found in 82% of cases (41 cases). Normocytic, normochromic in 13 patients, Microcytic, hypochromic picture in 8 patients, Dimorphic picture (both Normocytes and Microcytes RBC) in 3 cases, Normocytic, hypochromic in 17 patients.

Among CNS complications Delirium was found to be more common, seen in 9 cases.

## DISCUSSION

Khammam District in an endemic area for malaria and more over well known for *falciparum malaria*. In our study we have observed that most of the people hail from the rural places. Majority of patients are farmers, followed by house wives. It has been observed in our study that most of the i.e. 80% of patients belonged to low- socio economic strata.

The high incidence is probably because of poor basic health facilities, poor sanitation and closeness to vector transmission due to their occupation. 80% of patients hail from the rural places.

### AGE, SEX AND OCCUPATION:

The male sex group showed increase in incidence than female sex group in our study, probably due to vector contact. Of the 50 cases, 75% of patients belong to age group <50 years. It is more common in 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> decade, though it is equally distributed in all age groups. The younger age group is more effected mainly because of no or partial immunity to *P.falciparum* compared to population group.

*P.falciparum* is equally distributed in all socio economic status. As it is a blood parasite, disease is spread by vector female Anopheles mosquito in non or partially immune patients.

In our study, incidence of 80% cases of *P. falciparum* malaria was between June to September. Transmission is profoundly influenced by climate. The optimum conditions for transmission are between 20-30 degrees Centigrade temperature. At least 60% Sporogony does not occur <16 degrees Centigrade or >33 degrees Centigrade.

High humidity in this season favours mosquito longevity. There was slight drop in incidence before May. This study correlates with the Rajasthan study where 85% cases were reported during this period<sup>6</sup>.

### SYMPTOMATOLOGY:

In this study, all patients had h/o fever. Fever was intermittent in 84%, continuous in 12% and in the rest remittent type.

Almost all patients were associated with chills/rigors. The classical cold, hot and sweating stages were not frequent perhaps because of early intervention and or associated complications.

History of headache was observed in 88% of cases and out of these 84% had intermittent type of headache and rest continuous headache. The fever was associated with generalized weakness/malaise in 46 patients. Nausea and vomiting was observed in 24 patients.

### Mental status:

Altered sensorium was present in 9 patients and h/o seizure in 4 patients. It is attributed to various factors viz, hyperpyrexia, lacticacidosis, hypoglycaemia etc. The sequestration of parasites in the microvasculature of brain and the vital organs leads to altered sensorium and generalised convulsions.

### CEREBRAL MALARIA

The incidence of cerebral malaria in this study is 18% with variable involvement of other systems. Our study hospital, being a referral centre, high incidence of cerebral malaria expected.

The reported incidence in endemic area is 3.4%. All the patients had fever. Headache, altered sensorium of variable intensity was present at the time of presentation. The study correlates with the study by Bajiya et.al<sup>7</sup>, where fever was seen in 100% patients, but altered sensorium in 30%, headache in 75%.

Meningeal signs were present in 14% compared to 18-75% in Rajasthan study<sup>7</sup> and 25% in North-East study<sup>8</sup>. Involvement of meninges and symmetrical encephalopathy is attributed to resetting in the microcirculation. Other studies reported similar findings<sup>9,10</sup>.

Anaemia was noticed in 41 patients, which was of moderate to severe.

In 50%, the pathogenesis is multifactorial to immune mediated (haemolytic) destruction of non parasitized RBCs and natural lysis of infected RBCs. Splenic clearance also contributed to the anaemia.

Anaemia was 86% in Bikaner<sup>7</sup>, and 54% in study conducted by Gupta<sup>6</sup>. The mortality rate in severe anaemia was 4.7% in report and 4.7% in cases with brain and lung complications.

### ABDOMEN

Liver was palpable in 17 patients, while Spleen was palpable in 32 patients

Clinically, 3 patients had acute gastroenteritis with pain

abdomen. It is because of sequestration of parasites in the gut microcirculation causing visceral ischemia mimicking acute surgical abdomen with guarding, rigidity and shock associated with constitutional symptoms, which might have led to their complications.

Jaundice was the initial symptom in 64% of patients associated with fever, chills/rigors. It is due to haemolysis, hepatic microcirculation sequestration in the liver during sporogony and cholestatic component due to obstruction in the microvascular blood flow to the liver.

In the BDS post graduate institution of medical sciences-Rothack study<sup>9</sup>, Jaundice was seen 10% of patients and hepatomegaly in 75%. In our study, 64% and 34 % patients had respectively jaundice and hepatomegaly.

While in study of complicated *Plasmodium falciparum* malaria in S.P medical college, Bikaner, Rajasthan<sup>7</sup>, incidence of jaundice was 30% and hepatomegaly in 50% of cases which is close to our study. Prehepatic hyperbilirubinemia, high coloured urine and reduced in output was seen in 4 patients while majority of patients had normal urine output. While uremia was seen in 4 patients who died of multiorgan dysfunctions, 2 patients recovered from ARF.

#### CHEST:

Cough was found in 24% of patients. In the Bikaner study<sup>6</sup>, the incidence of ARDS was 7.02% compared to 10% in our study.

#### HYPOGLYCAEMIA:

3 patients developed hypoglycaemia- 2 patients already being Hypoglycaemic on admission and 1 during follow up in hospital, having developed Hypoglycaemia probably as a complication of the disease and later recovered. Our study results correlate with an earlier study by Bajiya et.al<sup>7</sup> where severe hypoglycaemia was seen in 4.32% of cases.

#### LABORATORY DIAGNOSIS:

Peripheral smear and parasite index were the usual mode of diagnosis of *falciparum malaria*. Erythrocytic Schizogony occurs inside the capillaries of internal organs such as Spleen, liver and bone marrow. Hence only the ring forms and not the growing trophozoites and schizont are found in the peripheral smear.

The appearance of parasite depends upon the density of the parasite in peripheral smear. The microscopic density is in the neighbourhood of 10 parasites/mm<sup>3</sup> of blood.

To overcome drug resistance and considering the sensitivity of illness at the presentation, a combination Therapy was advocated and thus patient population were randomly selected and various combination of Artesunate/ Artesunate + Doxycycline/ Clindamycin + Artesunate given. One patient did not responded to any therapy and died due to multiorgan dysfunction failure.

#### MORTALITY:

The mortality was very less in our study. Only 9 patients presented with cerebral malaria and multiorgan dysfunction

features with bleeding manifestation. The present study has less Mortality compared to 33.5% in a large study done in Bikaner, Rajasthan<sup>7</sup>. Early diagnosis, anticipation of complications, close monitoring of vital parameters and combination therapy to overcome drug resistance perhaps helped to contain the extent of mortality in the study.

### CONCLUSION

Khammam District is an endemic area for Malaria.

The incidence of *Plasmodium falciparum* malaria is maximum between June to Sept. Male patients were more in number compared to female in our study. Most of the cases were <50 years. All patients presented with fever. Anaemia was found in 82 % of patients (moderate - severe) followed by Jaundice in 64%, Respiratory distress in 20%, Cerebral Malaria in 18%, Bleeding disorders in 18%, A.R.F in 12%. There is a considerable decrease in morbidity in our study as compared to earlier studies probably due to higher potency of current anti-malarial drugs (Artemisinin derivatives).

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